Supporting academic engagement among white working-class boys: Field experiments to investigate the impact of role model interventions

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I, Eliza Charlotte Kozman, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the work.

Abstract

White boys from low-income backgrounds are among the worst performing pupils in English schools. Existing research describes how white "working-class" boys perceive academic education as incompatible with notions of working-class identity but offers few practical solutions.

Role model interventions have been shown to influence pupil aspirations and behaviour; however, the efficacy of this approach appears to depend on perceived similarity, thus calling into question the widespread practice of using current students in university outreach. Existing literature suggests that white working-class boys characterise university progression as inherently middle-class so it is unclear that students can act as effective role models for this group. By contrast, apprentices may be seen to embody a vocational destination which is more compatible with these pupils' values and existing goals.

In this thesis I examine the effect of "academic role models" (university students) and "vocational role models" (apprentices) on attitudes to education for white working-class boys. By adopting a parallel mixed methods approach, comprising qualitative interviews and two randomised controlled trials, I test the impact of exposing pupils to role models via light-touch video interventions. My results suggest a positive effect of exposure to academic role models but no effect of exposure to vocational role models. Qualitative evidence provides insights into why my findings appear to contradict the existing literature.

This thesis is a novel example of how mixed methods research can be used to test theory. It contributes to a growing evidence base on role models in education by taking a highly targeted approach to working with one of the worst performing groups in English schools. Moreover, it advances the literature by using rigorous experimental techniques to investigate how role models who embody different post-school destinations impact on pupils' attitudes to education and aspirations.

Impact Statement

This thesis is likely to be of interest to four main audiences: researchers, policy makers, widening participation (WP) practitioners and teachers.

Researchers will primarily benefit from an improved understanding of role model interventions. Specifically, this thesis contributes to a burgeoning literature which demonstrates that role model interventions can improve educational outcomes for disadvantaged groups. It uses experimental techniques to provide new insights on role model efficacy and demonstrates how role models who embody academic and vocational post-school destinations have a differential impact on pupils' attitudes to education. These findings will be informative for any researcher seeking to further the evidence base on role model interventions, particularly in education. This thesis is also a robust contribution to the literature on randomised controlled trials in education and provides a novel case study of how such an approach can be used to test theory. Moreover, this project is focused on white working-class boys so it provides relevant insights for those who study social class and educational disadvantage. Therefore, this work may inform future research across a number of disciplines, including social psychology, public policy, education and sociology and makes both theoretical and methodological contributions.

White working-class boys are one of the worst performing groups in English schools and this issue has attracted significant policy and media attention over recent years (Gov.uk, 2017; Education Committee, 2014; Ofsted, 2013). Many schools and higher education providers are investing in programmes of activity to improve educational outcomes for this group but so far there has been relatively little evidence to support these efforts. Therefore, policy makers, WP practitioners and teachers will primarily benefit from much-needed new evidence on this issue, including robust empirical support for the use of "student ambassadors" (current university students) to improve how white working-class boys engage with academic education. This finding will have direct and practical implications for anyone seeking to optimise their approach to working with this group in the UK but may also inform similar work in other developed countries facing issues of inequality in education.

The results of this thesis will be disseminated to the research community via publication in academic journals and will be featured in a symposium for the Journal of Behavioural Public Administration, for which I am the guest editor. A broader non-academic audience will be engaged via social media, blogs and concise summary reports which will be distributed to a mailing list of individuals collated over the course of this research.[1] Over the course of this project I have taken an active approach to engaging with policy makers, WP practitioners and teachers by presenting at a wide range of events and I will continue this approach to disseminate my final results. I will also seek to build on previous mention of my research in the national press where possible.[2]

[1] An existing blog on my interim results was published in 2018 and can be accessed at: https://blogs.kcl.ac.uk/behaviouralinsights/2018/01/12/the-power-of-role-models-for-white-working-class-boys/.

[2] My research was mentioned in the Telegraph in 2018. The article can be accessed at: https://www.telegraph.co.uk/men/thinking-man/need-new-role-models-boys-dare-different/.

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List of Acronyms

ACORN	A Classification of Residential Neighbourhoods
FSM	Free school meals
HE	Higher education
IAG	Information, advice and guidance
ICC	Intracluster correlation coefficient
ISQ	Identification with school
MDES	Minimum detectable effect size
Ofsted	Office for Standards in Education, Children's Services and Skills
RCT	Randomised controlled trial
SES	Socioeconomic status
WP	Widening participation
WWCB	White working-class boy
WWCG	White working-class girl

Chapter 1

Introduction

> *"We wanna live for now. Wanna live while we're young, want money to go out with, wanna go with women now, wanna have cars now, and uh think about five, ten, fifteen years' time when it comes, but other people ...they'm getting their exams, they'm working, having no social life...I think that's the difference...They're the ones that abide by the rules. They're the civil servant types, they'll have 'ouses and everything before us... They'll be the toffs...and we'll be the brickies and things like that."*
>
> *- Joey, a white working-class boy (Willis, 1977)*

The educational performance of white working-class boys in England has been studied for decades. Paul Willis' now-famous 1970s case study provides a vivid account of how these pupils form powerful group identities that directly impede their ability to succeed in school (Willis, 1977). This example of apparently non-rational behaviour has profound consequences for attainment and post-school destinations and sparks a number of questions about how this process occurs and more importantly, how it can be disrupted.

Humans are inherently social animals. From an early age we enact a cycle of observation and imitation which helps us learn how to navigate our surroundings (Bandura, 1971). This process transmits more than just practical behaviour; those around us are also a source of information about our place in society. For example, gender stereotypes about household chores can emerge as early as the age of two, while stereotypes about the suitability of woman or men for certain occupations follow just a few years later (Miller et al., 2018). Stereotypes are just one example of how we all inherit a web of attitudes about how different groups should behave on the basis of factors such as gender, race, ethnicity and social class. Depending on which of these groups we perceive ourselves to occupy, we develop a self-image which is inextricably linked to our social networks — our so-called "social identity" (Reicher et al., 2010).

Although social forces are well-studied in other domains, the concept of incorporating identity into traditional economics is relatively new. In 2000, Akerlof and Kranton first set-out their theory of "Identity Economics" which recognises how individuals seek to act in such a way as to be consistent with their self-image (Akerlof and Kranton, 2000). They argued that participating in activities which are viewed as incompatible with one's identity is associated with a psychological cost. By taking costs like these into account, Identity Economics can help explain why certain groups in society, like white working-class boys, may systematically under-invest in education when they perceive it as incompatible with their social identity.

There is an a rich vein of sociological research which describes how white working-class boys perceive academic education as incompatible with notions of working-class identity and masculinity (see for example Archer, 2001 and Willis, 1977). This issue is perhaps most clearly manifest at the point of leaving compulsory education when the literature tells us how working-class young people perceive university students as intrinsically middle-class and "other" (Reay, 2001). Indeed, there is particular policy interest in the fact that white male students from low-income homes have the lowest rate of progression to higher education (HE) of all groups (Crawford and Greaves, 2015; Gov.uk, 2017). In reality patterns of progression to HE in England are largely reflective of prior attainment (Crawford and Greaves, 2015; Crawford et al., 2016). Therefore, although it is valid to examine identity-based barriers to HE, it is arguably more important that we consider how pupils respond to academic education in a holistic sense. In the case of white working-class boys, low rates of progression to HE are consistent with rejection of academic education much earlier in the school system, which itself is reflected in poor outcomes throughout their education. Therefore, the source of what I shall term "anti-academic" attitudes is also, rightly, of significant policy interest (Education Committee, 2014).

There is remarkably little literature on how to improve outcomes for white working-class boys and a clear niche to provide much-needed new research on this topic (Education Committee, 2014; Hunter et al., 2018). As I have outlined above, anti-academic attitudes are an intrinsically social issue and it is relevant to seek solutions which are themselves social. Just as individuals can organically absorb messages about how to behave from those around them, there is evidence that systematic exposure to messages from inspirational role models can help promote more positive outcomes in a range of domains including education (Breda et al., 2018; Riley, 2017; Sanders et al., 2018b).

The relevance of this work is threefold: first, it is intended to inform a common policy intervention — the use of role models to inspire pupils in schools (Fleming and Grace, 2016; Gartland, 2012); second, it seeks to support a more evidence-based approach to working with one of the worst performing groups in English schools; and third, it forms an original addition to a burgeoning body of field-based literature on role model interventions.

In the remainder of this chapter, I justify my choice of target group (Section 1.1), outline my approach to handling social class (Section 1.2), provide some background to the focus on role model interventions (Section 1.3) and start to explore the characteristics of an effective role model intervention (Section 1.4). In Section 1.5, I set out my intended contributions and provide an overview of the remainder of this thesis.

1.1 Justifying my target group

Over recent years there has been a growth in public concern about levels of attainment among white working-class children, particularly boys. In 2013, the Office for Standards in Education, Children's Services and Skills ("Ofsted" — the non-ministerial government department responsible for inspecting schools) published a report highlighting the consistently poor results for white pupils from low income backgrounds (Ofsted, 2013) which was closely followed by a government enquiry on the same topic (Education Committee, 2014). Numerous newspaper articles have picked up on this narrative (see for example Coughlan, 2019; Line, 2016; Silverman, 2019; Walker, 2018) and in 2016, low rates of university progression were highlighted as a key issue in a speech from the incoming Prime Minister, Theresa May (Gov.uk, 2017). Although political interest in particular issues and subgroups is prone to wax and wane, the focus on white working-class boys has also become part of the regulatory guidance to HE providers, which are mandated to invest in outreach work with disadvantaged young people as part of their funding arrangement (Baars et al., 2016; Hillman and Robinson, 2016; Hunter et al., 2018; Office for Fair Access, 2017). Therefore, the issue of improving attainment for this group is likely to be somewhat resilient to shifting political priorities, at least in the medium term.

Given the prominence of this issue, it is important to scrutinise whether the concern is justified. The English education system is characterised by a single track through school until the end of Key Stage 4 (aged 15-16) when high-stakes tests (most commonly General Certificates of Secondary Education or "GCSEs") sort pupils into a number of Key Stage 5 destinations which tend to focus on either academic qualifications (most commonly "A-levels") or vocational skills. Performance at each stage of this journey is heavily patterned by by individual-level characteristics and simple analysis of educational performance finds that average attainment is striated by ethnicity, girls outperform boys, and there is a striking gradient in attainment by socioeconomic status ("SES") (Department for Education, 2019; Baker et al., 2014; Strand, 2011). However, a more nuanced approach shows that there are substantial interactions between SES, gender and ethnicity and that low-SES white British pupils are in fact the worst performing group (Kirby and Cullinane, 2016; Strand, 2014a; 2014b). Moreover, Strand (2014a) finds that low SES has a negative impact on attainment for pupils of all ethnicities, but a disproportionately big effect on white British students. To put this into context using the most recently available exam results, in 2018 white male pupils from low-income homes were least likely to achieve or exceed the threshold for acceptable grades in English and maths — 15 per cent compared to an average of 20 per cent of white female pupils from low income homes, 42 per cent for other white males and 43 per cent for the whole school population (Department for Education, 2019).[1]

As per school attainment, when considering rates of progression to HE, it is simplistic to consider individual characteristics in isolation. In a parallel to the analysis presented by Strand (2014a), Crawford and Greaves (2015) find that although low SES young people are less likely to enter HE than their high-SES counterparts regardless of ethnicity, the socioeconomic gradient is steepest for those who are white British. When gender, ethnicity and SES are combined, low-SES white male students have the lowest rates of progression to HE of all groups (Crawford and Greaves, 2015; UCAS, 2016).

In sum, there is a quantitative case that white British low-SES boys are arguably the worst performing group in English education and this would appear to support the heightened level of policy and public interest in their performance. However, critics point out that this approach risks placing a disproportionate emphasis on some pupils to the detriment of others, "so we have the bizarre situation of a scramble to represent a particular category as the most under-privileged when all working class groups across gender and ethnicity need extra resources and criti-

[1]Pupils who achieve grade five or above in both GCSE English and maths are said to be meeting the threshold for acceptable levels of attainment.

cal attention" (Sveinsson, 2009, pp.28). Indeed, white British low-SES females and males from some other ethnic groups achieve only marginally better results than white British low-SES boys (Strand, 2014a) and some other white pupils, for example those from gypsy/traveller backgrounds, do even worse. While it is true that there is no binary divide in the data that can entirely justify a focus on white British low-SES boys, qualitative research provides a more compelling case. In Section 2.2, I discuss how attitudes are the product of the interaction between ethnicity, SES and gender and as a result, certain groups are likely to face different barriers to educational success. Therefore, the particular focus of this project is justified by a drive to generate insights which can be used to improve current activities for the target group. It is not intended to endorse a focus on this group over and above other pupils who face similar levels of disadvantage.

1.2 Defining "working-class"

Despite the "moral panic" surrounding outcomes for white working-class boys (Reay, 2006), most statistics cited in the media and policy actually relate to white boys from low-income homes. That is, the government statistics nearly always identify disadvantaged pupils as those who are eligible for free school meals ("FSM") due to living in a low-income household. So how can we make the jump from this discrete measure of financial disadvantage to a discussion of social class? Given the topic and nature of this thesis, it is vital to interrogate these labels in more detail to clarify and justify the terms which I will use upfront.

Historically, social class in the UK was based on an occupational hierarchy with professionals at the top and unskilled manual workers at the bottom (Erikson and Goldthorpe, 1992; Savage et al., 2013; Savage, 2015). In line with this largely economic conception of class, "Rational Action Theory" purports to explain differential outcomes in education on the basis of three assumptions: first, it is assumed that all families seek for their children to secure a position in society at least as advantageous as their own (so called "relative risk aversion"); further, it is assumed that lower SES students have lower levels of "ability" (which can be interpreted as attainment) and therefore lower expectations of success; finally, the model takes into account the different levels of resources available to young people (Breen and Goldthorpe, 1997; Goldthorpe, 2014)).

However, this traditional treatment of social class in economics is subject to a range of criticisms, particularly around its limited ability to account for cultural and social factors (Devine, 1998; Mountford-Zimdars and Harrison, 2017; Savage et al., 2013; Stocke, 2007). By contrast, "culturalists" draw on sociological theories of capital which state that social groups possess "bundles of real and symbolic resources and pursue active strategies to facilitate the intergenerational transmission of physical and symbolic property" (Nash, 1990, pp.432). In other words, traditional economic theories must be modified to include the assumption that individuals aspire to gain and retain social and cultural capital, as well as real capital.

Unfortunately there is no clear way to derive measures of social or cultural capital using the data routinely collected from pupils in England and so this sets a high bar to using more nuanced targeting criteria for large-scale quantitative research. Instead, I take a pragmatic approach and turn to examine the demographic data which is currently available.

FSM eligibility is widely used as a measure of disadvantage in education research mainly because "it is officially and routinely collected annually for nearly every pupil, has a relatively simple legal binary definition, is strongly related to educational and other outcomes and has been collected since 1989, giving analysts enough data to consider long-term trends at national, regional, local and institutional level" (Gorard, 2012b, pp.1015). However, its use is subject to a number of criticisms. For example, FSM eligibility actually only applies to students who are eligible for, and *claiming*, free school meals and therefore excludes students whose parents do not register for this support (Hobbs and Vignoles, 2010). Perhaps more problematically, FSM eligibility does not actually provide a very accurate proxy for family income because it takes into account other means-tested benefits and tax credits and therefore introduces a binary divide between nominally advantaged and disadvantaged pupils which is not necessarily based in reality; for example, Hobbs and Vignoles (2010) find that eligible children are much more likely than other children to be in the lowest income homes but state that "only 23 to 55 per cent of the 16 per cent of children 'eligible' for FSM are one of the 16 per cent of children with the lowest equivalent net household incomes in 2004/5". Other analysis has highlighted how, for some pupils, FSM eligibility data is missing and a number of these missing pupils are likely to have come from particularly deprived backgrounds (Gorard, 2012b). So FSM eligibility will not identify all most disadvantaged children in English schools.

In an effort to develop more valid metrics, recent work has compared FSM eligibility against other alternative indicators of pupil disadvantage. Ilie et al. (2017) find that parental occupation and education (which possibly capture factors relating to social and cultural capital to some extent) are more predictive of pupil attainment than FSM eligibility, although only marginally. Elsewhere, recent sociological research has also attempted to improve the categorisation of class by incorporating similar measures (Bathmaker et al., 2013; Ingram, 2011; Lewis and Demie, 2015). Indeed, this approach is consistent with the view that "working-class" pupils are those whose "parents are in semi-routine occupations or ... depend on the welfare state for their income and all pupils who qualify for a free school meal" (Demie and Lewis, 2011, pp. 250). However, as previously noted, parental occupation and education data are simply beyond the reach of most education researchers.

Instead I turn to area-based measures of disadvantage which capture the "educational and occupational profile of the communities in which pupils live [and] may also serve as proxies for individual-level socioeconomic circumstances" (Ilie et al., 2017, pp.257). These measures relate to geographical areas rather than individuals, but are often used to provide an aggregated snapshot of HE participation or deprivation in a pupil's neighbourhood. Area-based measures are not ideal as they cannot identify disadvantaged pupils who may be living in more privileged areas and aggregated scores can "disguise" disadvantage within heavily polarised communities, such as those in London (Crawford and Greaves, 2013; Gorard, 2012b; Ilie et al., 2017). Similarly, pockets of advantaged young people may live in disadvantaged areas. Looking to the world of policy, HE providers typically flag pupils with multiple markers of disadvantage but there is no indicator or basket of indicators that is entirely satisfactory (Gorard et al., 2019). However, in the absence of richer individual-level data, FSM-eligibility can be combined with area-based measures of disadvantage to provide a proxy measure which is subject to a less severe threshold effect than FSM eligibility alone (Crawford and Greaves, 2015; Ilie et al., 2017; Strand, 2014b). For my purposes, it is most valid to use an area-based measure which relates to the occupational make-up of geographic areas as this seems the most appropriate way to capture how class-identity has links to particular types of occupational status (Baars et al., 2016). From the point of view of external validity, it is also sensible to adopt an approach to identifying the target group which is already used by some HE providers and could be adopted by others. Therefore, I use a composite marker that incorporates FSM eligibility and "A Classification of Residential Neighbourhoods" ("ACORN") marker. ACORN is a segmentation tool which divides the UK population into demographic types on the basis of postcodes (discussed in more detail in Section 4.4). Although my working-class marker is an inexact proxy, there is likely to be a reasonable degree of overlap between my target group and those who might be identified as "working-class" using more nuanced approaches.

It may perhaps be simpler to limit my thesis to the discussion of pupils from low-income homes. However, this approach would ignore the fact that many of the attitudes discussed in the literature are inextricably tied-up with social class. While it is true that economic capital can play a role in decision making, in this thesis I will outline how cultural attitudes also hold significant sway in shaping investments in education. My project is focused on interventions designed to address these attitudes; therefore, I believe that it is correct to frame this research project as focused on working-class pupils.

1.3 A focus on role models

With growing interest in white working-class boys, there has been a corresponding increase in tailored support for this group, particularly from HE providers (see for example Office for Students, 2018; Highham and Gagnon, 2017; Webster and Atherton, 2016). These initiatives normally comprise a combination of information, advice and guidance ("IAG") and activities designed to to encourage pupils to aspire to HE, but this work is not supported by any evidence on the most effective approaches (Baars et al., 2016; Hunter et al., 2018).

As outlined previously, white working-class boys do seem to hold a particular set of attitudes that inhibit their engagement in academic education, by which I mean both formal schooling and academic post-school study such as university (discussed in more detail in Section 2.2). These attitudes are strongly rooted in issues of identity and are therefore likely to be fairly resilient to IAG provision which simply focuses on providing more information to pupils. As stated by Archer and Yamashita (2003b), "typically 'rational' and individualistic government education policies and strategies may have little impact on increasing the boys' identification with, or engagement with, formal learning since they do not address the boys' strong emotional attachment to identities grounded outside of the educational context"(Archer and Yamashita, 2003b, pp.129). Therefore, the inspirational components of activity, which are designed to improve a pupil's emotive connection with academic education, are likely to be particularly important for my target group. The use of role models is one such activity, which is woven into a vast array of programmes and policies for just this purpose.

The supposed importance of role models for white working-class boys has been highlighted in a range of reports (Baars et al., 2016; Hillman and Robinson, 2016; Hunter et al., 2018; Office for Fair Access, 2017; Raven, 2012). Role models most commonly appear in university outreach in the form of "student ambassadors" — current university students who normally help deliver elements of a programme for disadvantaged or underrepresented groups of pupils (Gartland, 2014; Raven, 2012). The use of student ambassadors has been a feature of HE outreach and marketing practice for many years and there is a great deal of policy literature documenting the efficacy of this approach (HEFCE, 2011; Hatt et al., 2009; Rodger and Burgess, 2010) but relatively less academic research, particularly on the causal effect of exposure to such role models (Sanders et al., 2018a, 2018b). Therefore, there is an opportunity to provide more evidence to inform this approach, both for white working-class boys and more generally.

There is also a clear link here with an emerging body of research into light-touch role model interventions. In some instances, interaction with a role model may be somewhat sustained, for example over the course of a university summer school. By contrast, a light-touch role model intervention involves a shorter stint of exposure, either in-person or via some other medium, for example a letter or video (for more detail, see Section 2.5). Study of these interventions is part of a broader field of research into how behavioural science can improve outcomes by making small tweaks or changes to a young person's journey through education which can have a disproportionate effect (French and Oreopoulos, 2017; Lavecchia et al., 2016; Leaver, 2016). My research sits at the confluence of interest in a real-world policy application of role models and this body of literature on behavioural interventions; my ambition is to contribute on both fronts.

At this stage it is important to address the stated aim of many role model interventions in education, namely encouraging pupils to consider applying to HE, often termed "raising aspirations" (Cummings et al., 2012). The raising aspirations narrative is based on the idea that increasing an individual's level of interest in HE will improve the chance that they fulfil their academic potential (Anders, 2017). Indeed, there is some evidence which provides superficial support for this approach: pupil expectations about their future education correlate with attainment at age 16 (Chowdry et al., 2011) and the probability of applying to HE (Anders and Micklewright, 2015).

However, the raising aspirations narrative is characterised by some as a red herring because aspirations, "low" or otherwise, are not the reason many people are unable to progress to HE. Recent reviews of the literature do not find very strong evidence to support raising aspirations as a means of promoting HE participation, partly because aspirations are so intimately bound-up in attainment and much of the socioeconomic difference in participation is due to patterns of attainment — there is little point in encouraging young people to aspire to attend university if those who have the grades to go are already likely to and those who do not have little chance of getting in (Chowdry et al., 2013; Cummings et al., 2012; Gorard, 2012a). Indeed, there is evidence to suggest that although widening participation ("WP") policies aimed at underrepresented groups have been successful in "raising aspirations", this has not tended to translate into HE participation (Rizzica, 2019).

Therefore, it is more valid to conceptualise aspirations and expectations as symptomatic of SES, prior attainment, and other background characteristics than necessarily causally manipulable (Anders, 2017, pp.383). In this context, rather than focusing on promoting post-school aspirations, it's vital to understand if role model interventions impact on attitudes and behaviours which can help pupils get the grades which will open doors to HE alongside a range of other options. Moreover, as I have outlined previously, for white working-class boys, the issue is much broader than a rejection of HE; we should be more concerned with the lack of engagement which starts far earlier in school. Therefore, my research is primarily focused on whether role models can help pupils place a greater valuer on their current education and whether this has a knock-on effect on related behaviours. I am naturally interested in the post-school aspirations of these pupils but, based on the literature discussed above, I believe these are of secondary interest only.

1.4 What makes an effective role model intervention?

Given the prevalence of university ambassadors in education outreach work it is naturally relevant to test whether these individuals can act as effective role models for white working-class boys. However, if we are to assess this policy, it is important to examine the basis for role model interventions in more detail to try and establish who makes a good role model for these pupils and for other groups.

Common across the policy and academic literature is the assumption that role model interventions must feature individuals who are sufficiently similar to the target group to provide a relevant point of comparison. However, the extent to which role models and “role aspirants” (Morgenroth, 2015) need to be similar, and the most relevant facets of similarity, are not well studied. For example, for white working-class boys most HE providers are focused on providing male university role models, but a discussion of matching on social background or ethnicity is less commmon (Baars et al., 2016; Hillman and Robinson, 2016; Hunter et al., 2018; Office for Fair Access, 2017; Raven, 2012). This approach is problematic because, based on the existing literature, the combination of sex, ethnicity and socioeconomic status is likely to be key in establishing role models as part of a particular social category.

However, the case for matching on demographic characteristics is perhaps trivial. A more interesting question is whether university students can act as inspirational role models for our target group at all. As touched upon earlier, the existing literature describes how white working-class boys tend to perceive university students as intrinsically middle-class and uncool; therefore, it is not clear that they will be seen as relatable or inspirational figures, even if they are apparently from the same background as pupils. Continuing this thread of reasoning, given that occupational choice is such a central part of male identity, we might expect white working-class boys to find it easier to relate to a young man who has pursued a more vocational post-school route which may be perceived as more traditionally masculine (Archer and Yamashita, 2003b). If this vocational role model could act as an effective advocate for the importance of school-leaving qualifications, we would be presented with a paradox: activities designed to increase interest in HE might be ineffective and may simultaneously have no effect on attainment while activities designed to increase interest in vocational options might actually be more effective at improving school outcomes, increasing a pupil's chance of progressing to HE but not their interest in doing so.

Returning to the theme of perceived similarity, there is also a clear case to examine the differential effect of a role model based on the extent to which they share characteristics with pupils. For the policy issue under consideration, it would be useful to know whether a role model who is effective at improving outcomes for white working-class boys would have the same effect on their female counterparts, as this information would help us understand the need for more or less tailored and targeted activities. Finally, it is important to note that there is an established body of literature which demonstrates how perceived similarity is malleable (see for example Burger et al., 2004). Any activity which could improve the perceived similarity of a role model, and boost the impact of an intervention, would be valuable in the context of educational outreach where it is not always possible to provide a perfect match between role models and role aspirants, particularly where the target group are underrepresented in the domain in question. All the points discussed above provide rich opportunities for further study.

1.5 Research question and intended contributions

In the preceding sections, I have outlined the need to develop new and better ways to improve education outcomes for white working-class boys who are among the worst performing groups in English schools. I have acknowledged the complexity of measuring social class but as I am interested in attitudes which are inherently related to themes of social identity, I have justified my focus on white working-class pupils.

Role models are often touted as a way to improve outcomes for white working-class boys but there is limited evidence on the causal impact of this approach. Therefore, my research question is simply this: can exposure to male role models improve attitudes to education among white working-class male pupils in English schools?

In the context of finite school time and resources, it is important to assess the relative efficacy of different role models at promoting pro-education behaviours and how to maximise the impact of such activities.

There are three main intended contributions from my research. First, I hope to provide new insight into how white working-class boys relate to academic education and whether role model interventions can be used effectively to improve their outcomes in school. There is very limited evidence on the best strategies for working with this group, so this will be a considerable contribution with direct policy applications. The second contribution will be to the small but growing number of field experiments on role model interventions. Historically this type of research has been heavily lab-based, so my work will provide a good example of testing an intervention with a sample of the population of interest and in a real-world setting. My research will also provide more detailed insights into how perceived similarity impacts on role model efficacy. Finally, my quantitative research will constitute a contribution to the literature on randomised controlled trials (RCTs) in education. Specifically, I provide a useful case study of collecting and comparing short- and medium-term measures of attitudes to education, and I demonstrate that it is possible to test a light-touch intervention as part of theory-driven trials in English schools.

The remainder of my thesis is structured as follows. Chapter 2 provides an overview of the relevant literature which spans several academic disciplines — from the sociological research into white working-class attitudes to education, through the social science literature on social influence and to the most recent empirical work on role model interventions. Through this chapter, I develop and refine my research question and hypotheses.

In Chapter 3, I review how social influence can be incorporated into economic models of education decision-making and develop my own simple model of how pupil behaviour may be positively influenced by a role model intervention. Chapter 4 sets out the methodological approach for this research, including my rationale for mixing quantitative and qualitative research methods. I also discuss the internal and external validity of my approach.

Chapters 5, 6 and 7 represent my empirical contribution. In Chapter 5, I present the results of an RCT across two schools (N$\sim$200) designed to test whether a university role model can have a positive impact on attitudes to education for white working-class boys and whether the effect differs for their female counterparts. Building on these results, in Chapter 6, I present the results of a larger trial across over 21 schools (N$\sim$7,000) designed to test a broader set of hypotheses about role model influence. In Chapter 7, I present the findings from a concurrent qualitative study through which I seek to provide a more nuanced description of how white working-class boys respond to role model interventions. Finally, in Chapter 8, I provide an overview of the contributions from this thesis, the limitations of my work and suggestions for future study.

Chapter 2

Literature review

2.1 Introduction

In the preceding chapter I argued that there is a clear need for more and better evidence on how to support the academic engagement of white working-class boys in English schools. Indeed, this issue has become one of considerable policy interest (Gov.uk, 2017; Education Committee, 2014) but universities, schools and other stakeholders lack robust knowledge on the best way to tackle it (Hunter et al., 2018). In this chapter I conduct a review of the literature to develop and refine the research question for this project.

I start by reviewing the sociological literature on white working-class boys. Section 2.2 provides an account of how these pupils tend to develop a negative relationship with formal schooling and which can inhibit their ability to invest in education. One strand of this literature focuses on how the school environment breeds "hierarchies of masculinity" in which males vie for social status by rejecting authority. It is simultaneously argued that schools are imbued with middle-class values and are essentially a hostile environment for white working-class pupils, prompting these pupils to reject the value system imposed upon them. Moreover, white working-class pupils are likely to receive messages from their family and friends which understate the value of formal education. I argue that, as a result of these processes, white working-class boys develop a social norm of rejecting academic education.

In Section 2.3, I review the social psychological literature which describes how we all come to understand acceptable behaviour by observing those around us. Specifically, Social Learning Theory describes how we all adopt group identities and are prone to adhere to our "in-group stereotype". On this basis, I suggest that one possible strategy for improving outcomes among my target group is to change the in-group stereotype via role model interventions. These interventions typically feature an individual who embodies some particularly laudable or desirable attributes or achievements and seeks to inspire others to follow in their footsteps. In Section 2.5, I outline a burgeoning literature on role models, both in laboratory and field settings, which shows that these interventions can be effective at influencing behaviour in a range of domains including education. The theory behind this approach suggests that it may be a good fit for tackling the norms of academic rejection among my target group; therefore, I set out the central research question for my project as whether role model interventions can improve attitudes to education among white working-class boys.

Although it is often implicit that perceived similarity is a prerequisite to role model influence, there is not a well-developed literature on this question. This gap in the evidence base raises an interesting question about how to develop the most effective role model interventions for white working-class boys. If we are seeking to tackle the underrepresention of these pupils in HE, it would seem natural to use a role model who embodies this route, such as a current university student. However, the literature discussed in Section 2.2 suggests that my target group tend to find university students as inherently unrelatable. By contrast, the literature suggests that white working-class boys prize the concept of paid work and manual occupations, therefore, it seems possible that a role model who can embody such a route whilst espousing the value of formal schooling may be seen as more similar to pupils and therefore be more effective. I further discuss how perceived similarity might be manipulated via light-touch activities. In Section 2.6, I conclude by summing up the implications of my literature for my research project.

2.2 Attitudes to education among white working-class boys

I first start by reviewing the sociological literature on how white working-class boys behave in school, their attitudes to education and how they are formed. Before I discuss this literature it is relevant to touch on the concept of "intersectionality" which refers to the idea that, in seeking to understand outcomes for a particular group, it's important to consider how characteristics such as ethnicity, class and gender overlap (Archer and Francis, 2006). As noted by Strand (2014a), the study of intersectionality has historically been qualitative in nature and it is rarer for quantitative education researchers to examine this issue explicitly. Therefore, my entry point to the literature is the sociological study of how class, gender and ethnicity intersect. Although there is a small body of work which is explicitly focused on my target group, the following section includes relevant studies that focus on ethnicity, class and gender, either independently or in combination.

There is a mature and detailed literature on how schools are are a key site in the production of "masculinities" (Archer et al., 2001; Connell, 1989). In a seminal study, Willis (1977) provided a compelling ethnographic account of how white working-class male pupils at an English secondary school developed masculine identities positioned within self-generated hierarchies of power. Specifically, Willis observed that male pupils tended to end up in one of two camps: "lads" who rejected the school's authority or so-called "ear 'oles" who listened to teachers. More broadly, schools can be conceptualised as a breeding ground for "hierarchies of masculinity" in which a male pupil's social status is linked to their perceived conformity (Connell, 1989; Ingram, 2011; Reay, 2002). In this context, disruptive behaviour is socially rewarding whilst perceived effort is associated with a social penalty (Francis, 2009). For example, Francis (2009) describes how pupils, and particularly boys, are aware that engagement in class can leave them vulnerable to being called a “boffin” or a “geek” — a label which can leave them open to verbal and physical bullying from other male pupils. Although this dynamic is generally framed as a result of male pupils vying for social power it has also been suggested that a “laddish” identity acts as a “self-worth protection” strategy so that poor performance will be attributed to lack of effort rather than lack of ability (Connell, 1989; Jackson, 2002).

Setting aside issues of masculinity, there is a sizeable body of research on how working-class pupils experience formal education. This literature is rooted in the “class cultural” perspective which argues that the historical context of education in the UK has imbued schools with an implicit bias towards middle-class culture (Reay, 2001, 2005). It is argued that this bias is evident in the positioning of some forms of language and culture as inferior or unwelcome within schools which systematically disadvantages working-class pupils (Reay, 2005; Durante and Fiske, 2017). Class culturalists also claim that setting children by ability serves to exacerbate the disconnect between schools and working-class pupils who are fixed in lower sets from an early age and generally overlooked by teachers in favour of more promising pupils (Archer et al., 2018). Moreover, the literature suggests that pupils in deprived areas or poorly performing schools may also be aware that they are getting a raw deal compared to young people elsewhere, thus compounding their negative feelings towards formal education (Hollingworth and Archer, 2010).

As a result of the issues discussed above, it is argued that working-class pupils are likely to associate formal education with an “entrenched sense of deficit...derived from repeated experiences of academic ‘failure’ ” (Archer and Yamashita, 2003a, pp.129). In response, they may invest in non-learner identities associated with modes of speech, behaviour and style which are rooted in anti-school culture. According to Archer and Hutchings (2007) “these performances provide a means for working-class young people to generate identity worth or value and to negotiate positions of social disadvantage...that derives from knowing they are 'looked down on' within schools and wider society". Once these modes of behaviour are established, they are source of social pressure for working-class pupils. Creating an identity which is simultaneously compatible with good performance in school and working-class values represents a considerable psychic cost and is a hidden barrier to pupil engagement (Ingram, 2009, 2011; Reay, 2002).

It is worth noting that many of the attitudes to school described above are mirrored in attitudes to HE. There is a strong body of evidence that working-class boys tend to associate HE participation with "otherness" and white men in particular find it difficult to reconcile the concept of university progression and middle-class graduate jobs with their notions of working-class masculinity (Hutchings and Archer, 2001). Those who do enter university are unfavourably characterised as middle-class, socially inadequate and unattractive (Archer et al., 2007) and working-class students who do decide to go to university must "negotiate a difficult balance between investing in a new improved identity and holding on to a cohesive self that [retains] an anchor in what [has] gone before"(Reay, 2001, pp.337). Of course it should be noted that, due the persistently poor performance of my target pupils throughout the education system, these pupils are less likely to be qualified to progress to HE than other pupils (Baars et al., 2016; UCAS, 2016) so the rejection of HE may be more philosophical than practical in many cases.

Across the literature discussed above, we see a recurring theme: pupils develop attitudes to education and norms of behaviour which are strongly rooted in their social identities. Of course, individual attitudes are heterogeneous and not simply a product of class, gender or ethnicity. However, if we are seeking to understand patterns of behaviour at a macro level, these factors do appear to play a significant role and, for white working-class boys, school presents a complex social landscape where they must maintain working-class and masculine identities that are at odds with investment in education.

As highlighted by Archer and Yamashita (2003a), there is a risk that "rational" education policies cannot address these issues. Instead, I would argue that it is necessary to directly target the social norms that drive negative patterns of behaviour. To this end, in the following section I turn to the social psychological literature to understand how group identities are formed,

2.3 A social psychological perspective

If social norms associated with masculine working-class identities are partly responsible for how white working-class boys disengage from formal academic education, how do these norms form and how might we change them? Social Learning Theory states that behaviour is learned via a process of observation and imitation (Bandura, 1977). According to this theory, children assimilate an understanding of the world and how to behave by observing the individuals around them. Children will selectively adopt behaviour, values and attitudes based on the level of similarity between themselves and those they observe and patterns of behaviour are embedded via a cycle of reward or punishment. For example, typically feminine behaviour is likely to be reinforced for a female child, and so stereotypical gender roles are perpetuated. This reinforcement of normative behaviour associated with ones social characteristics lays the groundwork for the development of "classed", gendered identities based on ethnicity discussed previously.

Social Identity Theory is a more dynamic theory of how individuals readily adopt group identities, even when these are arbitrarily constructed. This theory is based on a series of influential laboratory experiments which found individuals randomly assigned to trivial categories discriminated in favour of their in-group in the allocation of rewards (Tajfel, 2010; Tajfel and Billig, 1973). For white working-class boys, this process of group-identification is manifest in the peer group culture described previously.

Once operating within this structure, the success of the "pack" matters and an individual's self-esteem is tied-up with the success or failure of group members. Consequently, individuals will choose comparative measures that cast their position in the most favourable light (Reicher et al., 2010). This model can be used to explain how pupils amplify the masculine aspects of their behaviour to positively differentiate themselves from more studious individuals (Archer et al., 2001). Self-Categorisation Theory builds on Social Identity Theory by describing the process of "self-stereotyping", by which we understand our own identity "in terms of the characteristics we share with other group members" (Reicher et al., 2010, pp.17). For white working-class boys this means adopting an in-group stereotype, which is understood as fundamentally incompatible with academic engagement and success.

The social psychological perspective paints a clear picture of how we are all prone to adopt group identities which come with a range of social prescriptions about how we should behave. This theory provides an excellent fit for the description of how white working-class boys adopt powerful group identities within the school environment. Because the in-group stereotype sets the tone for acceptable behaviour, the key to influencing my target group may be to address the perceived in-group stereotype. Given that this stereotype develops via a natural process of observation and imitation (so called "modelling") I turn to a literature which has formalised this process via the use of role model interventions. In the next section I discuss the theoretical basis for such interventions.

2.4 Theoretical basis for role model interventions

Whilst the theories outlined above describe processes by which we are all influenced by others in our social environment, we typically associate the term "role model" with a set of particularly laudable or desirable attributes or achievements (Carrington and Skelton, 2003). The role model literature is relatively fragmented but there are two key theories of role modeling which I review here: the Motivational Theory of Role Modelling and the Stereotype Inoculation model.

The Motivational Theory of Role Modelling is a recent attempt to reconcile the various definitions in the literature and states that a role model can perform three functions (Morgenroth et al., 2015). First, they can demonstrate the behaviour which is required to achieve a particular goal — they are “behavioural models”; second, they show us that a particular goal is achievable — they are “representations of the possible”; and third they make a goal desirable — they are inspirational (Morgenroth et al., 2015). In these functions, there are clear parallels with the theories of social learning outlined above: role model interventions are seeking to provide an in-group “exemplar” — an individual who can set some norms of behaviour for a particular social group. However, in contrast to the more organic form of influence which occurs by exposure to people around us, role model interventions are nearly always designed to change the social norm and so role models typically deviate from the prototypical in-group member - hence their inspirational qualities (Morgenroth et al., 2015). The question of the extent to which an individual can both represent the in-group and encourage non-standard group behaviour is not trivial and this is discussed later in this chapter. The Motivational Theory of Role Modelling is also discussed in more detail in Chapter 7.

Another theory of role modeling is the Stereotype Inoculation Model which posits that role models have an additional function in helping reduce the negative effects of stereotypes (Dasgupta, 2011). The propensity for people to conform to the stereotype of their in-group is related to the concept of “stereotype threat” (Cohen and Garcia, 2005; Steele, 1997). More specifically, stereotype threat refers to “fulfilling a negative stereotype regarding the ability of one’s group (e.g., gender, ethnic, or social class) when this ability is assessed, thereby adversely affecting the performance being evaluated” (Stricker et al., 2015, pp.1). It is theorised that it is the individual’s preoccupation with the stereotype which impairs performance via three main mechanisms: “mere effort, working memory depletion, and conscious attention to automatic processes” (Spencer et al., 2016, pp.421).

In a seminal study in this field, Steele and Aronson (1995) administered a difficult verbal test to black and white participants; when told the test was a non-diagnostic problem-solving task, black and white participants performed equally well. When participants were told the test was diagnostic of ability, black students performed worse. Steele and Aronson's findings led to a succession of further studies demonstrating that a range of stigmatised groups, for example young people from lower socioeconomic backgrounds (Croizet and Claire, 1998; Spencer and Castano, 2007) and student athletes (Dee, 2014) are susceptible to stereotype threat (Walton and Spencer, 2009).

However, a parallel strand of research has also demonstrated that it is possible to develop interventions to alleviate this effect. For example, Spencer et al. (1999) eliminated the difference between men and women's test scores by describing a maths test as not producing gender differences. Elsewhere, a short written exercise has been shown to narrow the gap in tests for African American students (Cohen et al., 2006). It is important to note that whilst much of the literature focuses on improving immediate outcome measures, there is evidence that interventions can have enduring effects on educational outcomes (Walton and Cohen, 2007; Walton et al., 2015). The Stereotype Inoculation Model formalises the findings of these studies; specifically, Dasgupta (2011) asserts that role models can "act a 'social vaccine' that inoculates individuals against self-doubt". In other words, role models can help alleviate stereotype threat and are likely to disproportionately improve outcomes for negatively stereotyped groups (Dasgupta, 2011; Shapiro and Neuberg, 2007).

However, we must note that stereotype threat is thought to have the biggest impact on high-ability individuals in achievement domains. Whilst it is certainly possible to argue that white working-class boys are negatively stereotyped in school environments, this group generally has poor attainment. Therefore, although role models could act in this capacity for some high-achieving boys, this is not likely to be the dominant mechanism for our target group. Therefore, I adopt the Motivational Theory of Role Modelling as a better theoretical basis for the use of role models as means of influencing the in-group stereotype for white working-class boys but to what extent might we expect this to work in practice? In the following section I discuss how role model interventions have been shown to influence attitudes and behaviour, both in laboratory and field studies.

2.5 Role model interventions in practice

There is a substantial literature examining how a wide range of individuals can assume role model status, including teachers, community members, and celebrities (see for example Egalite et al., 2015; MacCallum and Beltman, 2002; Marx et al., 2009). However, for the purpose of this review I am primarily concerned with the effect of role models when they are introduced via an intervention. That is, I am less concerned with the way in which behaviours are transmitted via societal structures and more interested in mechanisms which allow us to disrupt these patterns. Therefore, I turn to the laboratory- and field-based literature that relates to the impact of role model interventions.

2.5.1 Laboratory-based studies

There is a body of lab-based literature which provides some useful insights on how role model interventions can improve outcomes for certain groups. One cluster of such studies focuses on women and career leadership. For example, Asgari et al. (2012) ran a series of experiments to test the effect of counter-stereotypical in-group role models on women's implicit leadership self-concept. When participants were exposed to photos and biographies of successful female leaders framed as similar to the self, this improved their implicit self-leadership beliefs. In a similar study, Lockwood and Kunda (1997) found that students who read a newspaper article about outstanding career role models increased self-reported beliefs about career success. Female role models have also been observed to improve actual performance — Latu et al. (2013) found that exposure to a subtle visual cue (an image of a well-known female politician) eliminated the pre-existing gender difference in the length of time women and men spoke when asked to deliver speeches. In line with the theoretical underpinning of role model interventions, Lockwood and Kunda (1997) find that gender-matched career role models are important for female role aspirants although they find that this is not the case for male participants. Similarly, Hoyt et al. (2012) suggest that the efficacy of leadership role models is mediated by a range of factors such as the role aspirants' prior beliefs about ability and perceptions of themselves, for example their self-efficacy.

There is a parallel body of lab-based research which examines how to tackle the under-representation of women in science, technology, engineering and medicine (STEM fields). For example, Stout et al. (2011) tested the effect of meeting an advanced peer studying maths on undergraduate STEM students. They found that those who met with a female peer were likely to express more positive implicit attitudes toward maths, show more implicit identification with the subject, and increase their effort on a test compared to those who met with a male peer. Similarly, Baylor and Plant (2005) tested the effect of female undergraduates interacting for 15 minutes with a digital "pedagogical agents" who delivered persuasive messages about the value of engineering. Individuals who were exposed to the intervention developed more positive beliefs about maths and science compared to a control group.

The literature discussed above is useful in three regards. First, it helps demonstrate that role model interventions can indeed have a positive impact on attitudes and behaviour. Second, it suggests that role model exposure can be via a range of channels, including static media, digital characters or in-person experiences. Third, it provides some evidence of the importance of perceived similarity with role models, although this is often implicit. However, this literature is subject to limitations inherent to laboratory-based research and is concerned with the precise measurement of small changes obtained within stringently controlled environments. Whilst this sort of research can provide some useful insights into whether and why role models work, I turn to field-based research to ascertain whether such interventions can have a meaningful real-world impact.

2.5.2 Field-based studies

There are a small but growing number of studies which demonstrate the effect of role model interventions. Some of these are naturally occurring experiments which use existing randomised processes in various situations to explore different outcomes between those who are exposed to an intervention and those who are not. One excellent example is the random allocation of cadets to "tactical officers" at the West Point military academy in the USA. Tactical officers do not teach cadets but are meant to play a role supervising their development — so essentially they are role models. At the end of their training period cadets are required to express a preference for a particular branch of the military (for example the medical corps). Using a sample of over 6,000 cadets, Kofoed and McGovney (2019) find that when a female cadet works with a female officer, the probability that a female cadet selects her tactical officer's branch as the first choice increases by 5.2 percentage points and the chance that it is in her top three choices increases by 16.6 percentage points. For black cadets paired with black tactical officers, there is a 6.2 percentage points increase in cadets ranking their officer's branch first. In a development context, Beaman et al. (2012) exploit the fact that some villages in India are randomly selected to have a female chief councillor. Using a sample of almost 500 villages and surveys administered to almost 5,000 participants, they find that the presence of a female councillor results in significant positive changes to the aspirations and attitudes of parents and young people to the roles and responsibilities of female villagers. Moreover, this practice appears to close the gender gap in educational attainment and reduce the amount of time girls spend on household chores. Moving on to true RCTs, Bernard et al. (2015) tested the effect of allocating individuals in 64 villages in rural Ethiopia to watch documentaries of people from similar backgrounds who had succeeded in agriculture or small business against the odds. Six months later they found a significant positive effect on a number of outcomes including behaviours relating to financial saving, the enrolment of children in school and spending on education.

There are also a number of studies which specifically focus on the effect of role models on performance in education. In the context of schools, Breda et al. (2018) ran a field experiment with over 17,000 secondary school pupils in France. Classes were randomly allocated to a one hour female STEM ambassador intervention in which an external role model visited the school and delivered a session using standardised materials. They find that treated female pupils had 30 per cent higher probability of enrolling in selective science programme after high school and there was also a sizeable effect on males.

In a recent British study, Silva et al. (2016) found that a talk by an inspirational role model increased the number of secondary school students stating they were interested in university and likely to attend by approximately eight percentage points. Sanders et al. (2018a) evaluate a real-world scale-up of this intervention in a programme where current university students visit local schools and colleges in England to provide information on the benefits of HE. They observe a significant increase in the pupils in these schools and colleges successfully applying to a selective universities. The effect is strongest in colleges which tend to contain a higher proportion of pupils from less advantaged backgrounds.

Outside of the European context, in a Ugandan field experiment with approximately 1,600 participants, Riley (2017) found that secondary school pupils who watched a movie featuring the story of an inspirational role model from a poor background were 11 per cent less likely to fail a high-stakes maths exam, with the biggest effect for lowest ability pupils. In Madagascar, Nguyen (2008) tested the effect of a role model providing information about the benefits of education. This study found that a successful role model increased test scores among pupils by as much as 0.27 standard deviations.

Role model effects have also been observed in letter-based communications. Sanders et al. (2018b) test the effect of sending letters from existing university students back to pupils with good grades in schools where most pupils went to the most local university. The letters encouraged recipients to widen their horizons and consider more selective institutions. They emphasised that the student writing the letter was from a similar background as the pupil receiving it. Pupils either received a letter from a male role model, sent to their school, or a letter from a female role model, sent to their home, both letters, or neither letter. Relative to the control group, pupils who received both letters were significantly more likely to apply to a more selective university (19.9 per cent versus 23.2 per cent) and there was a corresponding increase in applications being accepted. Similarly, Herrmann et al. (2016) tested the effect of sending a letter to undergraduate STEM students written by a female role model who normalised feelings of not belonging. They found that this intervention significantly improved course grades and lowered withdrawal rates for female students relative to a control group.

The theory in Section 2.4 and the studies discussed in this section suggest that role model interventions would be a good fit for tackling the norms of academic rejection among my target group — an approach which has not been tested in the academic literature. In fact, the use of role models more often applies to high-achieving pupils; therefore, testing a role model intervention in this project would allow me to develop evidence on a promising technique whilst simultaneously addressing a niche in the evidence base. On this basis I set out the central research question for my project as: can role model interventions improve attitudes to education among white working-class boys? However, this question raises sub-questions about who makes the most suitable role model for my target population and I discuss this issue in the following section.

2.5.3 Characteristics of role models

Across the literature, there is a common understanding that role model efficacy is contingent on a number of factors including perceived similarity with the role model. For some of the studies discussed above this is simply implicit in the research design (for example, many of the role model interventions are designed to appeal to the individuals in the target populations). However, some of the literature specifically examines whether there is a stronger role modelling effect when there is matching on demographic characteristics. For example, Nguyen (2008) found that the effect of the role model was strongest when they were from a similar background as the low-income pupils. In one lab study which explicitly sought to quantify the importance of matching, undergraduates were given the option to choose to learn about engineering from a number of digital role models in a 15 minute animated intervention (Baylor and Plant, 2005). Characteristics were systematically manipulated between role models so that they were categorised on factors like gender (male/female), age (young/old), attractiveness (attractive/unattractive) and coolness (cool/uncool). Participants were asked to rate the role model avatars on their characteristics and choose one to learn from. The all-female sample were most likely to want to be like, and most likely to identify with young female avatars, suggesting that gender and age are relevant factors for role modelling.

Beyond issues of similarity, the literature also suggests that role model success must be perceived as attainable for role models to be effective. For example, Bagès and Martinot (2011) worked with a sample of over 400 children in France who were exposed to a male or female role model before they took a hard maths test. Students were either informed the role model was successful at maths because they were gifted or because of their own efforts. The gender of the role model did not influence the test results overall but girls performed best when exposed to a role model of either gender who had been characterised as "hard-working". Similarly, Betz and Sekaquaptewa (2012) find that overtly feminine STEM role models seem to be less motivational for young girls relative to gender neutral role models. They hypothesise that this is because the combination of STEM identity and femininity is seen as particularly unobtainable. The importance of role models having earned their success is confirmed in other studies (Bagès et al., 2016; Lockwood and Kunda, 1997; Mcintyre et al., 2011). There is also evidence to suggest that, even if a role model violates expectations in terms of their gender, if they exhibit otherwise stereotypical traits this can have a negative effect on young people: Cheryan et al. (2013) found that women who were engaged in a two minute interaction with a male or female stereotypical computer science role model reported a reduced interest in computer science both immediately after the event and two weeks later.

This literature poses an important question for someone seeking to find the optimal role model for white working-class boys. If one's primary aim was to tackle the low progression of pupils to university, it is natural to assume that a role model who represents this route would be the most suitable choice. However, given what we know about how these pupils tend to regard university students (see Section 2.2), it seems unlikely that this choice of role model will be optimal as they are less likely to be seen as relatable or embodying an attainable goal. By contrast, a role model who embodies a vocational destination (such as an apprenticeship) could be seen as more relatable and as representing a more desirable post-school destination. Paradoxically, if this role model was able to effectively espouse the value of doing well at school, they could actually be more effective than a university role model at keeping pupils' future options open; this presents an interesting and novel point for investigation in my research.

2.5.4 Influencing perceived similarity

Perceived similarity depends on a wide range of factors like nationality, occupation, race, religion and geographical location and even very minor similarities appear to boost liking for, and cooperation with, one another (Bradner and Mark, 2002; Charness and Gneezy, 2000). A number of studies in social psychology demonstrate that perceived similarity can be experimentally manipulated. For example, informing participants that they have the same fingerprint patterns, birthday or name as another person have all been shown to boost perceived similarity and increase the chance that participants will comply with a request (Burger et al., 2004). However, as these approaches typically depend on supplying participants with fictitious information, there are few lessons for real-world application as is it unlikely that education professionals will be comfortable providing false information to young people about how they are similar to role models.

Instead we turn to a study which tested the effect of leveraging real similarities between individuals. In perhaps the most convincing work of this kind, Gehlbach et al. (2012) test an intervention designed to improve relationships between teachers and school children. Teachers and approximately 300 grade 9 pupils at a high-school in the USA completed a "get to know you" questionnaire which contained 28 questions about their views, hobbies and interests. Pupils were randomly assigned to receive feedback on how they were similar to their teacher (by identifying five matching survey responses - this was the treatment condition) or to receive feedback on similarities with a pupil in another state (the control condition). Treatment led to increased feelings of similarity between pupils and teachers but more interestingly it had a significant effect on attainment for black students. This "priming effect" has been observed generally in social interactions, for example, pairs of individuals become more cooperative when primed with a shared identity and less cooperative when primed with distinctive identities (McLeish and Oxoby, 2011).

A small number of studies have shown that the perceived similarity and impact of role models can be increased by highlighting the extent to which in-group status is shared with the targeted individual. For example, after taking part in a number of workshops, female high school students who were prompted to write about how they were similar to the female STEM role models they had encountered reported an increased sense of identification with the role model and fit in science, whilst those who did not participate in the writing exercise did not (O'Brien et al., 2017). Similarly, a study in which women were exposed to information about successful professional females found that "priming" participants with a shared college identity increased "leadership self-perceptions" relative to those who were not primed in this way (Asgari et al., 2012). Given the relative prominence of role model interventions in education, an activity which could help boost role model impact would undoubtedly be welcomed. There is a small but promising evidence base to support this approach and this is another good niche for me to contribute to the literature; therefore, I will also seek to explore a light-touch activity, such as those discussed here, in my research project.

2.6 Conclusion

In this chapter I have reviewed the literature which focuses on my target group. This research is largely sociological in nature and paints a vivid picture of how white working-class boys come to inhabit group identities based on a rejection of school authority, thus inhibiting positive engagement in education. From this literature, it is clear that any intervention to improve outcomes for my target group must address issues around identity and so I have turned to social psychological research to understand how individuals come to adopt attitudes and behaviours which they see as acceptable for someone like themselves.

At the heart of any social identity is an in-group stereotype which carries a set of social prescriptions for group members and one way to influence behaviour is to change this stereotype. Role model interventions are an approach which may be successful in this regard; therefore, I set out my central research question as: can role model interventions improve attitudes to education among white working-class boys?

Role model interventions typically feature an individual who demonstrates notable achievements in a particular domain. Therefore, in the context of academic education, the natural choice could be to expose pupils to individuals who embody this route such as university students. However, as discussed in Section 2.2, for these pupils, university students may be seen as inherently unrelatable and they may be more likely to respect individuals who embody vocational routes, such as apprenticeships. In other words, from the existing literature is it valid to assume that role models will be seen as more relevant to WWCBs when they embody a vocational route rather than an academic one (holding all else equal). Therefore, there may be an interesting tension between whether a role model can effectively inspire pupils to engage at school and inspire them to pursue academic post-school destinations. This puzzle is one which I propose to explore in my research project. Moreover, if we accept that perceived similarity is a determinant of role model efficacy, it is natural to question whether it is possible to influence it. I find a small number of studies which suggest that encouraging pupils to consider points of similarity with a role model may have a positive impact on the relationship; therefore, I also propose to test this approach in my research.

Based on my review, the gaps in the literature justify the research programme I have adopted. In the following chapter, I briefly review the economic literature on how social image influences behaviour in schools. I then create my own simple model of pupil behaviour and explore how the optimal level of educational investment changes when a pupil is exposed to a role model intervention. On this basis I develop several testable hypotheses which form the basis for my research design.

Chapter 3

A model of pupil behaviour

3.1 Introduction

Thus far in my thesis I have argued that there is a clear need for new research on how to improve educational outcomes for white working-class boys (Chapter 1). In the previous chapter I discussed how these pupils tend to hold social identities which are synonymous with the rejection of academic study and that role model interventions may be a suitable tool to address this issue (Chapter 2). However, so far I have concentrated on literature from the domains of sociology and psychology, with only some limited mention of specific economic studies which feature role model interventions. In this chapter, I will briefly review some highly relevant economic literature which focuses on how social image concerns can influence human behaviour and how individuals consume information.

First, I discuss the theory of "Identity Economics" which states that humans are all influenced by a set of prescriptions about how to behave which are tied to our social, rather than purely individual, identities (Akerlof and Kranton, 2000). I further discuss how this theory has been studied in relation to the phenomenon of "acting white" (Austen-Smith and Fryer, 2005; Fryer and Torelli, 2010) which describes how some minority groups impose costs on their members for engaging in pro-education behaviour. Both bodies of literature are highly relevant to my research as they seek to marry the sociological and psychological literature discussed in Chapter 2 with the rigour of economic modelling. Such an approach helps us translate sociological or psychological propositions into testable hypotheses about how we expect humans to behave under certain conditions and provides an excellent basis for generating new insights. Therefore, in the latter parts of this chapter I integrate the more qualitative assertions which are supported by my literature review into a formal model of pupil behaviour. Within this model I also seek to incorporate assumptions about how the efficiency with which individuals consume new information is dependent on a range of factors. By producing this model, I hope to provide a clearer explanation of how exposure to a role model might influence pupil investment in education.

The chapter proceeds as follows: in Section 3.2.1, I review a number of existing models which show how social image can influence behaviour. In Section 3.3, I then construct my own simple model to describe how a pupil might act when faced with an opportunity to invest in their education such as answering a question in class or signing-up for extracurricular activities. Using this model, in Section 3.4, I explore how the optimal level of investment changes when a pupil is exposed to a role model. In the context of a classroom the benefits of education are largely distant. By contrast, the literature reviewed in Chapter 2 suggests that, for white working-class boys, concerns around social image and feedback from peers, impose a steep and immediate cost on pro-education behaviour. Therefore, I argue that, any impact on behaviour in the classroom is likely to be due to the role model reducing the social penalty attached to the kind of activities discussed above. Section 8 summarises how this simple model supports the hypotheses for this research project.

3.2 Key literature

3.2.1 Social image and behaviour

"Identity Economics" is arguably the single biggest contribution to the literature on how social images affects behaviour (Akerlof and Kranton, 2000). In contrast to traditional economics, this framework is based on the idea that humans are not simply individual agents with a distinct set of personal preferences but part of social groups which themselves are associated with a set of prescriptions about acceptable and desirable behaviour. Drawing on Social Identity Theory (see Section 2.4) Identity Economics states that we have an internal map of social categories (based on factors like race, ethnicity, social class and gender) to which all people are assigned, including ourselves. Identity Economics recognises that individuals seek to act in such a way as to be consistent with their self-image, and participating in activities which are viewed as incompatible with one's identity is associated with a psychological cost. In economic terms, this means that standard utility functions need to be modified to include terms which capture utility due to identity concerns. Therefore, social prescriptions influence economic behaviour such that individuals are more likely to go with the grain of societal expectations.

Turning to the domain of education, a highly-relevant body of literature focuses on the issue of "acting white" (Austen-Smith and Fryer, 2005; Fryer and Torelli, 2010). This phenomenon "describes a set of social interactions in which some minorities incur costs for investing in behaviours characteristic of whites (e.g., raising their hand in class, making good grades, or having an interest in ballet)" (Fryer and Torelli, 2010, pp.380). This social pressure has been suggested as one of a number of factors behind the racial achievement gap which sees black children lag behind their peers in the US education system (Fryer and Torelli, 2010). Austen-Smith and Fryer (2005) formalise "acting white" into a two audience signalling model where young people's actions have different implications for employment versus social success. For minority groups, investing in education and skills which have a high value to employers can reduce their social standing — so a positive signal for one audience (an employer) can be a negative signal for another (one's social group). Using these assumptions, they derive a model in which some individuals who have the ability to succeed in the labour market choose not to invest in their education because of the immediate social penalty they will incur. Indeed, Fryer and Torelli (2010) seem to provide empirical evidence for this effect. By exploring the correlation between social status and attainment for a sample of young people in the US, they find that, among white pupils, social status is positively associated with higher grades. However, for black pupils attainment is positively associated with popularity up until a certain threshold, beyond which the pattern reverses. In other words, for black pupils getting the top grades seems to incur a negative social cost.

Both of the issues described above — a desire to be consistent with one's social identity and a social penalty for investing outside one's social group - could plausibly be used to help explain the behaviour of white working-class boys in school. As outlined in Section 2.2, the literature describes how these pupils come to embody social identities which are based on traditionally working-class masculine ideals including the rejection of academic education and aspirations to more manual occupations (Archer and Hutchings, 2007; Archer et al., 2015; Willis, 1977). Therefore, the social prescription for these pupils may impose a psychological cost to in-school engagement. Moreover, the peer-group culture through which these pupils enact their "anti-school" culture tend to administer severe social punishment on pupils outside of their ranks (Francis, 2009).

3.2.2 The cost of consuming information

Alongside the issue of how social image concerns affect behaviour, it is also relevant to consider how pupils consume new information about their education options. It is not realistic to assume that all pupils will consume information with the same efficiency and so we must ask whether certain factors may lead to heterogeneity in how pupils engage with a role model intervention.

As has been demonstrated in a wide range of behavioural sciences, humans do not process information as perfect economic actors and the financial literacy literature provides some helpful theory which can underpin more realistic microeconomic models of human behaviour. Because this literature conceptualises financial knowledge as a form of human capital investment, there are clear parallels with information-gathering in the domain of education. One finding from this literature is that individuals invest in financial knowledge to the point where the marginal time and money costs of doing so equal the marginal benefits (Lusardi and Mitchell, 2014). In other words, if the costs of accessing information outweigh the benefits, individuals will not engage in accessing that information. Therefore, it follows that the optimal level of information consumed depends on the cost function for information acquisition and that, for some subgroups it is rational to not invest in financial knowledge because the cost is too high (Lusardi and Mitchell, 2014). In a similar vein, the literature on "rational inattention" argues that people have limited information-processing capacity and so, even freely available information is not always accessed and used fully (Sims, 2003). Individuals must prioritise how to allocate their attention to the vast range of information available to them.

In the context of information interventions in education, the question is whether, and to what extent, pupils will invest in consuming the information on offer. McGuigan et al. (2016) build on the financial literacy literature, rational inattention models and other labour economics literature (including Heckman et al. (2006)) to provide a very helpful exposition of how this may play-out. As per the discussion above, they suggest a pupil will choose to consume information when the benefits outweigh the costs. Here the benefits depend on how useful a pupil perceives the information to be for their future which in turn depends on a range of factors, namely cognitive and noncognitive abilities, family background and motivation. For example, a pupil with higher abilities and a wealthy family is likely to perceive information on a range of post-school education options as more useful for their future than a less able peer from a low-income background who has more limited options available to them. Costs comprise fees but also "the opportunity cost of time [which] depends on the extent to which individuals are impatient or present oriented (i.e., high discount rates) and the speed at which they can process information (which depends on ability)"McGuigan et al. (2016, p.493).

McGuigan et al. (2016) test this model of information consumption as part of an experiment in which pupils are invited to access information about higher education on a free website. Specifically, they model use of the website as a function of those factors which determine the benefits and costs of information consumption, as outlined above. They validate the proposed model, finding some support for a correlation between measures of cognitive and noncognitive ability and website access, and a stronger relationship between family background and this outcome. They also find that being present oriented is weakly negatively associated with accessing the website. It is worth noting that girls were significantly more likely to access the website than boys.

Based on the discussion above, it is clearly important to question whether information on education options is consumed by those pupils who would benefit most, or whether it is simply accessed by those who are already on-track for success by dint of their ability or background. I consider implications for my model in Section 3.4.

3.3 Basic model of benefit versus costs

Drawing on the literature discussed above, I propose a simple model of how, for any given pupil, the optimum level of education is a function of benefits and costs including those related to social image. I describe this model in the following section.

Imagine a white working-class male pupil called Sean. Sean is provided with an opportunity to engage in an activity which represents an investment in his education. For example, he is invited to put up his hand in class to attend an after-school revision session to prepare for an upcoming high-stakes exam. In this situation, choosing to attend the session will likely have benefits in terms of improved performance in the exam and a knock-on effect on labour market outcomes in future. However, Sean does not see revision sessions as for "someone like him" and he knows that if he attends he might be teased by his classmates.

To distil this into a basic model, we can state that participating in such an activity yields some benefit but has an associated cost, including the social costs discussed above. I assume that for pupil i, the total benefit, B_i, of gaining education e, is:

$$B_i = b_i(e) \tag{3.1}$$

where $b_i(e)$ is the benefit of education e in terms of improved wages and related outcomes. I assume diminishing but monotonically increasing returns to education so that:

$$\frac{\partial B_i}{\partial e} > 0 \tag{3.2}$$

$$\frac{\partial^2 B_i}{\partial^2 e} < 0 \tag{3.3}$$

I simultaneously assume that the associated cost, C_i, is described by:

$$C_i = c_i(e) + s_i(e) \tag{3.4}$$

where $c_i(e)$ captures costs which are not related to social image (such as time and effort) and $s_i(e)$ is a cost relating purely to social image concerns. As per Austen-Smith and Fryer (2005) I assume that $c_i(e)$ is increasing and convex in education. Drawing on the same paper, I similarly assume that the social penalty is higher for higher levels of educational investment. Therefore, I assume the combined cost C obeys the following:

$$\frac{\partial C_i}{\partial e} > 0 \tag{3.5}$$

$$\frac{\partial^2 C_i}{\partial^2 e} > 0 \tag{3.6}$$

Figure 3.1 plots the marginal benefit and marginal cost of investing in education. In this model, a pupil will only undertake an action when the marginal benefit exceeds the marginal cost. Therefore, the optimal level of education is $\hat{e}$.

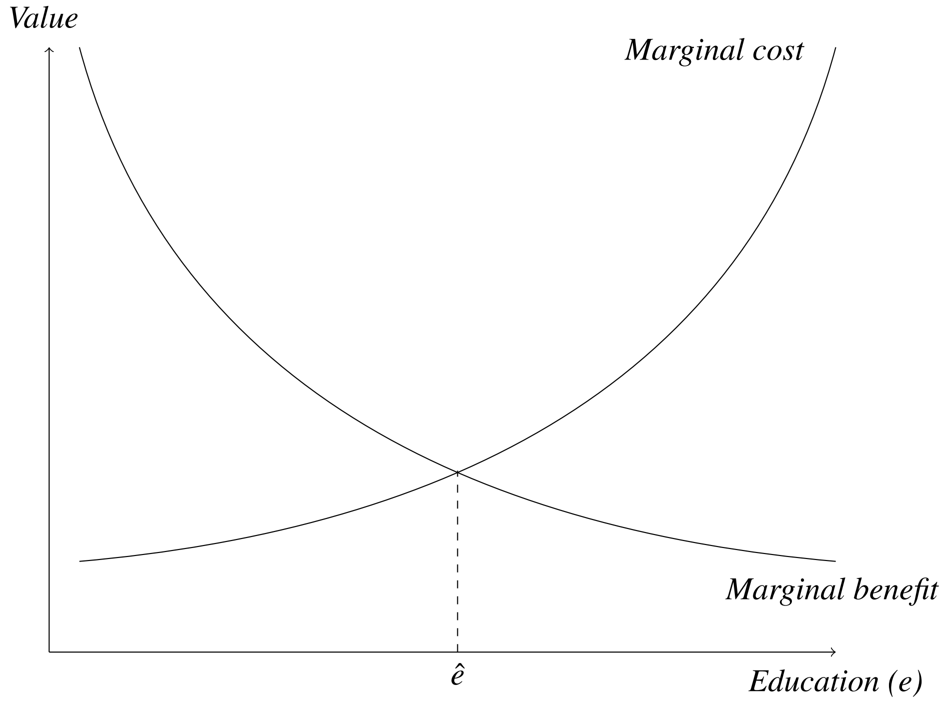


Figure 3.1: A simple model of the marginal cost and benefit of investing education

3.4 The effect of a role model intervention

Here it is pertinent to revisit the aim of the role model interventions I am developing and testing. As outlined in Chapter 1, although many role model interventions seek to promote the route which the role model embodies (e.g. going to university) I believe there is a more pressing need to help white working-class boys engage and succeed in academic education before they reach the end of compulsory schooling. Therefore, my question is whether role model interventions can influence, not just career aspirations, but primarily the extent to which my target group exhibit pro-education attitudes and behaviours while at school, which may set them on a path to good grades and whichever post-school destination they choose.

As outlined in the previous section, some of the costs associated with pupils' education choices are related to social image concerns. In Bursztyn and Jensen (2017), the social image concerns associated with any particular action are conceptualised as a product of three distinct components: the social desirability of being part of some group, how much an individual cares about being seen as a member of that group (i.e. their level of conformity), and the probability that they will be seen a a member of that group if they undertake the activity in question (which is linked to the individual's understanding of the in-group stereotype).

It is the final component of these social image concerns which maps best onto the effect of role models in this project. That is, rather than seeking to bolster the desirability of entering another group, or lessen the attachment of an individual to their current group identity, the main effect of the intervention will update an individual's understanding of the attitudes and behaviour which are associated with their in-group stereotype.

Based on the literature reviewed in Chapter 2, this in-group stereotype is linked to a set of attitudes which lead to a rejection of academic education and a lack of engagement. I believe a core component of these attitudes relate to the value which pupils' place on education; the literature suggests that white working-class boys may be less likely to perceive the value of schooling for their future than other pupils. By exposing pupils to an in-group exemplar who speaks about the value of education, I hope that the in-group stereotype will be updated for target pupils and that we will see an impact on the value they place on education and a knock-on effect on related behaviours too.

In chapter 2, I discuss how pupils' attitudes to education (which are linked to their perception of the in-group stereotype) will be measured via survey while the actual tangible impact on their behaviour will be captured by outcome measures which capture elements of a pupil's active engagement with pro-education activities (namely entry into a lottery to win education resources and scores on a maths test). Therefore, in the following chapter the "investment in education" to which I refer to relates to these small-scale behaviours. Although they are not sizeable investments, they are useful short-term measures which can help us understand the impact of my interventions as proof of concept for this approach more generally. In other words, if we see a small effect on my outcomes, then we may take this as a signal that more intensive or long-term activities involving role models may result in better long-term outcomes for pupils on a more significant scale..

Let's return to our example of Sean who has been invited to attend a revision session. However, this time let's imagine that Sean has just been exposed to a role model intervention in which a white working-class male has talked about the value of engaging in education and how it has enabled them to progress to the post-school route of their choice. As discussed in my literature review, a role model intervention may influence perceived norms of behaviour. Therefore, if the intervention is effective, we can assume that it changes the social prescription for boys like Sean and not only reduces the psychological cost of engaging in pro-education activities but lessens the social penalty associated with doing so. In my model, this means that a role model intervention leads to an exogenous shift of the cost curve which reduces the social costs of investing in education.

Assuming perfect information consumption, I expect the magnitude of these effects to depend on the perceived similarity of a role model (Akerlof, 1997; Festinger, 1954; Páez et al., 2008). Therefore, I assume that the impact of the intervention will be moderated according to a "distance-decay" whereby the effect weakens as the relevance of a role model to any individual pupil decreases (discussed further on the following pages). In the presence of the intervention, I modify expression 3.5 so that:

$$\frac{\partial C_i'}{\partial e} = \frac{\partial C_i}{\partial e} - w_{ir} I_r \tag{3.7}$$

Where I_r is a term which represents the effect of the intervention featuring a role model, r where:

$$I_r \in \{0,1\}$$

depending on whether a pupil is exposed to the intervention or not. I assume that w_{ir} is a weighting factor where:

$$w_{ir} = \begin{cases} \gamma_1 exp(-\gamma_2 d_{ir}^2) & \text{if } d_{ir} \leq l \\ 0 & \text{if } d_{ir} > l \end{cases} \tag{3.8}$$

where d_{ir} is some measure of distance between an individual, i, and a role model, r (which is a multi-faceted measure of how relevant the role model is to the individual), and γ_1 and γ_2 are parameters which control the magnitude of the effect of the intervention and the rate of decay. Drawing on Páez et al. (2008) I assume that there is an upper bound to $d_{ir} = l$, beyond which role models are not relevant enough to influence behaviour.

At this stage we must address the issue of information consumption. Based on the discussion presented in Section 3.2.2, I assume that the attention paid to the intervention (i.e. how much a pupil focuses on the video and actually acquires the information which it intends to convey) is a function of a range of characteristics. I adopt the same model as used by McGuigan et al. (2016) but I also incorporate a term which relates to the proportion of the treated group who are part of my target group. The intuition behind including this term is that these pupils face peer-group pressure to be disruptive in the classroom and not to engage in pro-education behaviour. As the proportion of a class increases, so does the probability of exposure of any individual pupil to members of their peer group during the period in which the intervention is implemented (i.e. they are more likely to be sitting near to them or be within their field of influence). This exposure is likely to make their anti-academic social identity more salient but also means they are prone to a greater social penalty from their peers. I therefore define the attention paid as:

$$Attention_i = \beta_0 + \beta_1 A_i + \beta_2 P_i + \beta_3 F_i + \beta_4 O_i + \beta_5 Prop + \beta_6 School + \mu \tag{3.9}$$

Where the attention paid to the video by individual i is function of a vector of abilities (A) (cognitive and noncognitive), the extent to which the individual is present oriented (P), family background (F), personal characteristics that might affect costs and benefits of obtaining additional information (O) and the proportion of the class who are WWCB (*Prop*). Beta 6 is school fixed effects.

Because attention necessarily mediates the effect of the intervention, we modify equation 3.7 to be:

$$\frac{\partial C_i'}{\partial e} = \frac{\partial C_i}{\partial e} - Attention_i w_{ir} I_r \tag{3.10}$$

I assume that the impact is on the shape of the curve, not the intercept. Therefore, the gradient of the marginal cost curve in the presence of the intervention is modified according to:

$$\frac{\partial^2 C_i'}{\partial^2 e} < \frac{\partial^2 C_i}{\partial^2 e} \tag{3.11}$$

Let's assume that we have two role models, *ra* and *rb* and for pupil i, *ra* is less relevant than *rb*. Then we assume:

$$w_{ira} < w_{irb} < 0 \tag{3.12}$$

On this basis we can amend the plot in Figure 3.1. Figure 3.2 shows a modified marginal cost curve in the presence of a role model intervention. Assuming attention is held constant, role model *ra* shifts the marginal cost curve from (1) to (2) and thus increase the optimal level of education from $\hat{e}$ to $\hat{e_2}$. Role model *rb* shifts the marginal cost curve from (1) to (3) and thus increases the optimal level of education from $\hat{e}$ to $\hat{e_3}$. So the relevant role model is less effective at increasing the optimal level of education.

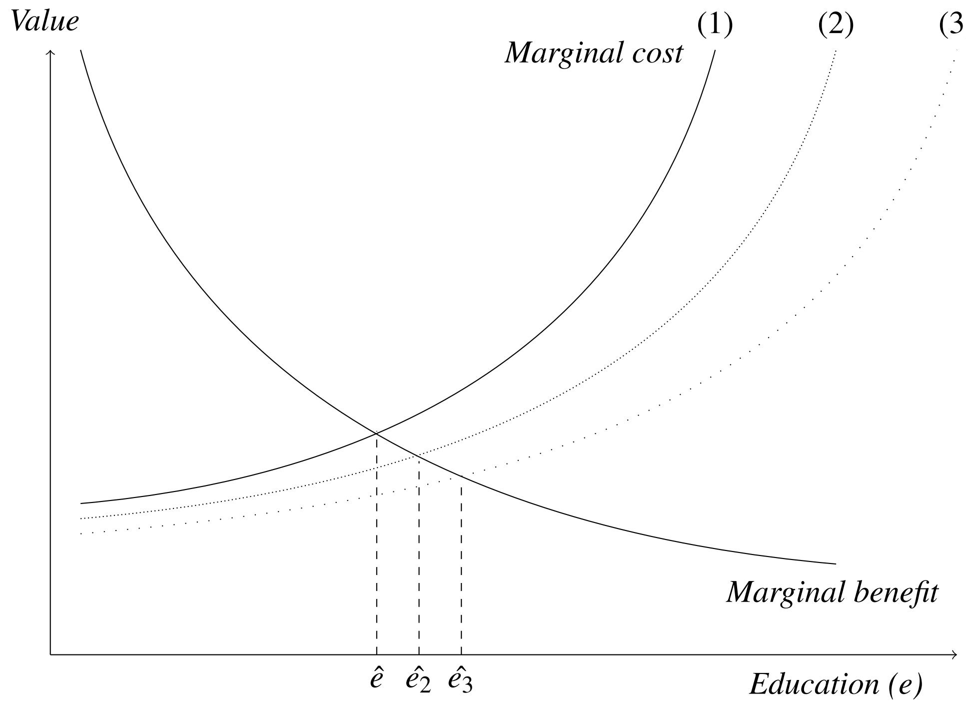


Figure 3.2: The marginal cost and benefit of investing education - marginal cost modified by intervention

I expect the magnitude of these effects to depend on a number of factors which determine the efficacy of a role model intervention. To think about these factors in more detail I draw upon the "Motivational Theory of Role Modelling" presented in Morgenroth (2015). Morgenroth suggests that there are different types of role model influence — for example, role models can provide a road map which shows role aspirants how to fulfil existing goals, or they can encourage role aspirants to adopt entirely new goals. A prerequisite for any type of influence, however, is that a role aspirant perceives the role model as just that — a role model, and this is contingent on the intersection of the role model and role aspirant attributes. A number of attributes are likely to be relevant in establishing a role modelling relationship. One key factor is likely to be shared in-group membership, but other factors, such as the degree of match between a role aspirant's goals and the goal which the role model embodies, and the role model's level of success, are also relevant.

More detail on the Motivational Theory of Role Modelling is given in Chapter 7 where I delve into the process of role modelling more thoroughly. For the purpose of the present chapter, I fold all of the factors which determine the efficacy of a role modelling relationship into simple terms in my more basic model. Specifically, I collapse the concepts of the extent to which an individual can be a role model (based on their in-group membership, the goal they embody and their level of success) into the concept of role model relevance as stated above.

3.5 Considering group effects

As outlined earlier in this chapter, the social image concerns associated with any particular action are a product of three components: the social desirability of being part of some group, how much an individual cares about being seen as a member of that group (i.e. their level of conformity), and the probability that they will be seen as a member of that group if they undertake the activity in question (which is linked to the individual's understanding of the in-group stereotype). As stated previously, it is the final component of these social image concerns which maps best onto the effect of role models described in Section 2.

Therefore, let's assume that a role model intervention has this effect on Sean and successfully influences his understanding of the in-group stereotype so that he sees investing in his academic schooling as compatible with his social identity.

However, we must also consider the setting in which we find him. As stated previously, Sean also faces costs to pro-education behaviour in terms of a social penalty from his peer group. We have not shifted Sean's desire to fit in with this group so we must consider the effect of the intervention in more detail.

Let's consider the case in which Sean is the only pupil treated in the class. Let's return to Sean once more and think about the setting in which we find him. If social costs are partly due to a social penalty which is meted out by other pupils, then we need to consider who might be able to observe his decision. If Sean is in a classroom with other pupils, we assume that at least some of them are part of his social group. However, it is fair to assume that the likelihood of Sean's actions being observed, and therefore the chance of a social penalty, increases as the proportion of his social group who are in the class increases. If we assume that white working-class boys are likely to form social groups with other pupils who share their characteristics, the implication for our model is that the marginal cost increases as the proportion of white working-class boys in a class increases.

But what about the case in which Sean is treated alongside his peers in a whole-class setting (as would be the case in most education interventions)? If the intervention influenced all of Sean's peers simultaneously, and they all updated their understanding of the in-group, then the social penalty associated with pro-education behaviour should be lessened. However, it is likely that peer group effects will impact the extent to which pupils can engage with the intervention in the first place, so as the proportion of the class who meet the target criteria increases, average information consumption decreases. In this scenario, even if a target pupil engages well with the intervention, they are likely to be aware that others in their peer group have not, and so their concerns about judgement from peers around pro-education behaviour are likely to lessen the effect of the intervention.

Moreover, even in the case where there is perfect information consumption among the target group and a group shift in terms of acceptable behaviour, outcomes collected directly after the intervention may not reflect this change. From

Sean's point of view, even if he has updated his in-group stereotype (for his broader social identity as a white working-class male) he will not have had time to establish whether the same is true for his immediate peers. Therefore, it is possible that the fear of a social penalty from peers is still likely to lead to lower treatment effects, even if this fear were unfounded.

Figure 3.3 presents this visually. Line 6 represents the marginal cost curve for a pupil in one classroom with a *low* proportion of white working-class boys and line 7 represents the marginal cost curve in the same classroom in the presence of the intervention. Similarly, line 4 represents the marginal cost curve for a pupil in one classroom with a *high* proportion of white working-class boys and line 5 represents the marginal cost curve in the same classroom in the presence of the intervention. Because of the steepening gradients of the curves, distance $\hat{e_4}$ to $\hat{e_{4^*}}$ is smaller than distance $\hat{e_5}$ to $\hat{e_5^*}$. Therefore, the relative increase in e due to the intervention is smaller in classes with a higher proportion of the target pupils.

3.6 Discussion

Drawing on the models discussed above in the context of my literature review, we can develop several testable propositions. First, I state my basic hypothesis: that male role models can help improve attitudes to education among white working-class male pupils (hypothesis 1). Second, if we accept that similarity is a feature which mediates role model impact and we simultaneously assert that young men on vocational courses are going to be seen as more similar to our target group than university students then we can hypothesise that exposure to a male role model who is an apprentice will improve attitudes to education among white working-class male pupils to a greater extent than exposure to a male role model who is a university student (hypothesis 2). The assumption about perceived similarity affecting impact also supports my third and fourth hypotheses: that exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils when pupils are encouraged to reflect on how they

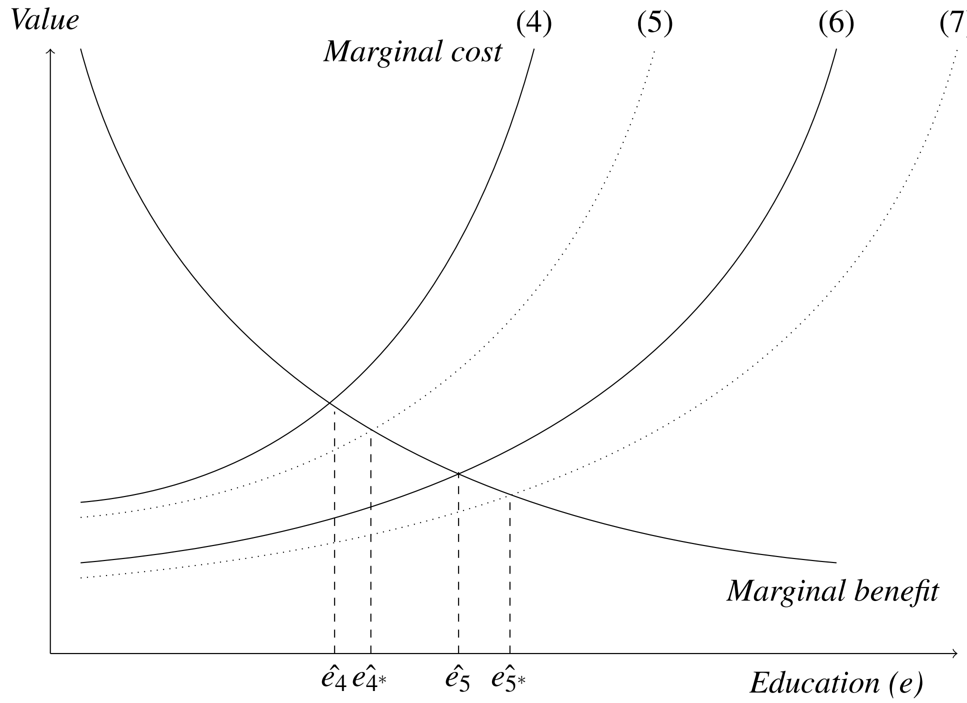


Figure 3.3: The marginal cost and benefit of investing education - marginal cost modified by intervention - for classes with a high and low proportion of target pupils

are similar to the role model (hypothesis 3) and that exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils (hypothesis 4). Finally, as discussed above, we must take into account how social pressure from a pupil's surroundings might play into the situation and so exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils in classes where white working-class male students constitute the minority of male pupils (hypothesis 5). We must also assume a differential effect of treatment by certain characteristics. As already described in Section 3.2.2, pupils with higher cognitive and noncognitive abilities are likely to pay more attention to the intervention, so it follows that, holding all else constant, exposure to a male model will lead to a greater improvement in attitudes to education among higher-ability pupils (hypothesis 6)[1].

[1]This hypothesis was added post-trial and so it was was not pre-registered and is included as exploratory analysis only

We should also consider whether the age of pupils will make a difference in terms of how they engage with, and are influenced by the intervention.We might expect older pupils to have higher cognitive abilities and therefore be more likely to pay attention to the video. There is also some evidence to suggest that younger children will be more present-oriented and so may find it harder to pay attention (Steinberg et al., 2009). However, based on the literature discussed in Chapter 2, there is also likely to be some effect of age on the peer group culture which could inhibit target pupils paying attention. Specifically, the effect of peer pressure may differ by year group because anti-academic attitudes appear to develop over a number of years and are part of a progressive dissociation with formal education. It also follows that older pupils may have a lower baseline in terms of the attitudes which my intervention will seek to influence. Therefore, there are several different factors which would need untangling in order to include a formal hypothesis based on age. Instead, I remain agnostic about the cumulative impact of these factors on the impact of the intervention but include this as exploratory analysis in Chapter 6.

Although it also follows that family background will influence the efficacy of the intervention, because my target population is fairly homogeneous (due to targeting) I do not include a formal hypothesis relating to this question. Likewise, my reasoning would also support a hypothesis that the intervention will be less effective for those who are more present oriented but, for parsimony's sake I do not take this hypothesis forward for testing in this thesis. The full set of hypotheses are given in Table 3.1.

3.7 Conclusion

In this chapter I set out to formalise the somewhat qualitative findings from my literature review into a model of pupil behaviour. By drawing on existing literature which seeks to combine a sociological and psychological understanding of human behaviour with economic principles, I have created my own model of pupil investment in education which is a simple function of costs and benefits. In this

RQ. Can exposure to male role models improve attitudes to education among white working-class male pupils in English schools?
H1. Exposure to male role models will improve attitudes to education among white working-class male pupils.
H2. Exposure to a vocational male role model will improve attitudes to education among white working-class male pupils to a greater extent than exposure to a male role model who is a university student.
H3. Exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils when pupils are encouraged to reflect on how they are similar to the role model.
H4. Exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils.
H5. Exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils in classes where white working-class male students constitute the minority of male pupils.
H6. Exposure to a male role model will lead to a greater improvement in attitudes to education among pupils with higher attainment.

Table 3.1: Research question and hypotheses

model, I explicitly state that these costs include social image concerns; that is, white working-class boys face an immediate and enduring social penalty from their peers if they exhibit positive engagement at school and this is accompanied by psychological discomfort due to violating an accepted group norm of anti-school behaviour. In practice, I suggest that this cost will decrease the optimum level of investment in education among this group.

Drawing on this literature described in Chapter 2, I have suggested that a role model intervention will introduce an exogenous shift in the marginal cost curve which can boost the optimal level of investment for pupils. That is, role models can help alleviate the social image concerns associated with positive engagement in education and therefore help promote more positive behaviour. By assuming that the efficacy of such an intervention is determined by role model relevance and attention paid by pupils, I have then generated several hypotheses about how a role model might influence pupils (see Table 3.1).

This chapter provides a crucial bridge between my literature review and the chapters which follow, helping to synthesise the existing research base into a set of project hypotheses which are well grounded in the evidence. In the following chapter I set out a research design to test these hypotheses via two RCTs and a qualitative study.

Chapter 4

Methodological approach

4.1 Introduction

In the preceding chapters I have made the case that there is a need for more and better evidence on how to improve educational outcomes for white working-class boys (Chapter 1). By reviewing the relevant literature I have identified the use of role models as one approach which may be helpful in this regard; moreover, there is a clear niche to contribute to a growing body of empirical evidence on such interventions (Chapter 2). Therefore, I adopt my central research question as: can role model interventions improve attitudes to education among white working-class boys? Using my literature review I have also formulated a simple model of pupil behaviour (Chapter 3) which supports several testable hypotheses which sit under this research question.

In this chapter, I set out my approach to testing these hypotheses and answering my research question. The chapter proceeds as follows: in Section 4.2, I provide a discussion of why my research is situated in the pragmatic research paradigm and give a rationale for a mixed-methods approach. In Section 4.3, I explain how my intervention distils a common policy activity so that my RCTs are essentially testing theory and the target population are defined in Section 4.4. Section 4.5

provides a detailed discussion of the research design for my RCTs and outlines how I have taken steps to ensure high internal validity. Similarly, Section 4.6 sets out the research design for my qualitative study. In Sections 4.7 and 4.8, I provide an overview of issues relating to external validity and ethics respectively before concluding with a summary in Section 4.9.

4.2 Methodological approach

There are three distinct components of a methodological approach: the chosen "paradigm" in which the research is situated, the research designs which are related to the paradigm and the specific methods which translate the approach into practice (Creswell, 2014, pp. 5). In the following sections I discuss each in turn.

4.2.1 Research paradigm

Although the philosophical underpinnings of research are often not explicit they form an important base for the choice of methods and have implications for how research findings are interpreted (Kivunja and Kuyini, 2017). Research paradigms do not have one universal definition but I subscribe to the view that they encapsulate a set of beliefs into a "general philosophical orientation about the world and the nature of research that a researcher brings to a study" (Creswell, 2014, pp. 5). Each research paradigm comprises a set of assumptions about epistemology (the nature of knowledge), ontology (beliefs about the nature of existence) and methodology (Kivunja and Kuyini, 2017). A wide range of accepted paradigms exist but a few dominate the research landscape and bear a short discussion.

"Positivism" is a research paradigm which is based in the traditional "scientific method" of enquiry. Positivists believe in an objective social reality which the researcher is able to observe without changing it. This paradigm is based on a deterministic philosophy which focuses on understanding "cause and effect" through observation and measurement and is strongly associated with quantitative and experimental research methods. Crucially, Positivists seek to create law-like generalisable statements about the world which can be tested and verified (Creswell, 2014; Saunders et al., 2009).

By contrast, "Interpretivism" relies on understanding the experience of individuals and how they interface with the social world. Rather than seeing the world as an objective reality which can be studied, Interpretivists believe there are multiple socially constructed realities and accept that interaction with a researcher has an impact on the research findings (Saunders et al., 2009). This means that Interpretivists make "meaning of their data through their own thinking and cognitive processing of data informed by their interactions with participants [and] there is the understanding that the researcher will construct knowledge socially as a result of his or her personal experiences of the real life within the natural settings investigated" (Kivunja and Kuyini, 2017, pp. 33). This research paradigm is strongly associated with qualitative research methods and, rather than seeking to generate generalisable statements, the aim is to understand individual viewpoints in particular contexts (Kivunja and Kuyini, 2017).

"Pragmatism" is a paradigm that sits between Positivism and Interpretivism. Proponents of Pragmatism argue that it is "not possible to access the 'truth' about the real world solely by virtue of a single scientific method as advocated by the Positivist paradigm, nor is it possible to determine social reality as constructed under the Interpretivist paradigm" (Kivunja and Kuyini, 2017, pp.35). Instead, Pragmatism focuses on using the right method of research for any particular research problem. In doing so, Pragmatists do not enter the debate about the nature of knowledge and existence but "study in the different ways [they] deem appropriate, and use the results in ways that can bring about positive consequences within [their] value system" (Saunders et al., 2009, pp.12). The Pragmatic paradigm provides a suitable basis for mixed methods projects which combine qualitative and quantitative methods (Cohen et al., 2002; Creswell, 2014). Although historically, quantitative and qualitative approaches have been characterised as epistemologically incompatible, there is growing agreement that this is an unhelpful dichotomy and that mixed methods research is a valid and effective way to find real answers to real questions (Johnson and Onwuegbuzie, 2004; Johnson et al., 2007).

A researcher's choice of paradigm is generally dependent on the standard practice within a discipline, a researcher's personal beliefs and the question they are trying to answer (Creswell, 2014; Saunders et al., 2009). My research project is rooted in a question with direct policy relevance and application and I am personally motivated to answer the research question with all the tools at my disposal; therefore, this project is based in the Pragmatic research paradigm and so I turn to a discussion of which particular methods are most suited to my research question.

4.2.2 Methodology

My research project is deductive; that is, I formulated a theory on the basis of existing research and sought to test it through my own enquiry (Saunders et al., 2009). In Chapter 3, I provided a simple model which underpins a few key hypotheses. At the heart of these hypotheses is a concern with cause and effect, namely how exposure to a role model intervention can influence attitudes to education among white working-class boys. Choosing a Pragmatic paradigm means that I am free to adopt whichever methods are most suitable to testing these hypotheses. Therefore, it is pertinent to review the options available to me.

Assessing the impact of an intervention in any context presents a challenge. Ideally, we would like to compare the outcome for a person who is exposed to an intervention against what would have happened in the absence of that intervention. However, because an individual cannot be both "treated" (exposed to an intervention) and "untreated", we are never able to simultaneously measure the outcome in both scenarios; this is known as the "fundamental problem of casual inference" (Holland, 1986). Moreover, for the vast majority of cases, it is not valid to simply compare outcomes between people who have been exposed to an intervention against those who have not, because there are likely to be systematic differences between those two groups. If we take school outreach as an example, pupils who are chosen or volunteer to take part in activities are likely to be systematically different from those who do not participate, often in terms of their demographic characteristics but also on a range of unobservable factors such as intrinsic motivation (Slavin, 2002). The Potential Outcomes Framework demonstrates how a naive comparison of outcomes for treated versus non-treated individuals introduces selection bias due to the non-comparability of these groups (see Appendix 9.1 for an algebraic exposition) (Rubin, 1974).

Randomised Controlled Trials (RCTs) offer a solution to this issue. By randomly allocating participants to treatment or control groups, RCTs remove "any systematic correlation between treatment status and both observed and unobserved participant characteristics" to enable an internally valid estimate of the treatment effect (Burtless, 1995). In other words, experimental techniques purport to uncover a causal relationship between an intervention and outcomes. RCTs are widely regarded as an excellent way of deriving robust evidence on "what works" across a range of policy areas (Cartwright et al., 2009; Connolly et al., 2017; Hutchison and Styles, 2010), however, they are subject to a range of criticisms and some commentators question their label as the "gold standard" of evaluation, stating that this conveys a false sense of security in the approach (Cartwright, 2007, 2013).

Notwithstanding issues around internal validity, which are less profound and can be addressed on a case-by-case basis (see Section 4.5.6), the primary criticism of RCTs centres on issues of external validity. Often RCTs are used to provide what is seen as robust evidence on whether or not a particular programme, policy or activity is effective in reaching its aim, but critics highlight that RCTs normally only test an intervention in a particular context and with a particular sample of individuals (Cartwright, 2007, 2013; Deaton and Cartwright, 2018). Often the trial sample is not representative of the overall population of interest because certain types of individuals or institutions are more or less likely to participate in research projects. Indeed, even multiple studies which demonstrate the same finding in different contexts or areas do not provide definitive proof that a causal claim will hold elsewhere (Cartwright, 2013). Moreover, even when we test something with the whole population of interest, it is possible that this population, and the way they respond, may change over time (Cartwright, 2013). So although RCTs can tell us the average effect of an intervention on individuals in the context of the trial, we should be cautious when we consider what effect such an intervention might have on an individual in another context (Cook and Thigpen, 2019; Rothwell, 2005).

Therefore, according to critics, causal claims based on RCTs are overstated. By treating the causal process as a "black box", trials do not consider the "support factors" (i.e. the contextual factors) which must be in place for an intervention to operate" (Cartwright, 2007; Deaton and Cartwright, 2018; Cartwright and Munro, 2010). As stated by Cartwright (2013, pp. 110), "no intervention, or aspect of an intervention, can be expected to produce the same results, or the same subset of the results, in a new setting as in a study unless the right facts about causal roles and support factors are in place."

So how can researchers address these criticisms? In terms of the point about external validity and different contexts, part of the issue hinges on the perceived primacy of RCTs in the hierarchy of research evidence. As cautioned by Deaton and Cartwright (2018, pp. 10), a "binary concept of external validity is often unhelpful because it asks the results of an RCT to satisfy a condition that is neither necessary nor sufficient for trials to be useful, and so both overstates and understates their value." Therefore, an individual trial must be judged on its own merits and the evidence it produces should be considered alongside other relevant research as necessary.

To address the issue of RCTs operating like a "black box" commentators argue that trials should be coupled with other empirical, theoretical and conceptual work (Cartwright et al., 2009; Deaton and Cartwright, 2018). Specifically, they call for researchers to test theory, exploring causal structures and why interventions may or may not have an effect in different contexts. In this sense, the critics of RCTs align with the “Realist” method of evaluation. In Realist theory, interventions are seen as theories embedded in social systems and causation is due to a range of mechanisms which might, or might not, operate in certain contexts; that is, Realists explore how an intervention actually changes behaviour rather than focusing on cause and effect (Pawson and Tilley, 1997). Realists are method-neutral but quantitative methods are normally used for assessing context and examining outcomes whereas qualitative approaches are used to understand processes (Pawson and Tilley, 1997; Pawson et al., 2004).

Bearing in mind the methodological advantages of RCTs I judge a well-designed trial to be a suitable tool to provide an accurate picture of whether my intervention has an effect on pupil outcomes. However, I also take steps to address the criticisms of the approach discussed above. First, and perhaps most simply, I provide a considered discussion of external validity in how I interpret my findings so that my claims are not overstated.). Second, my research design is grounded in a thorough and reasoned review of the literature and I seek to test an intervention which distils a common policy activity; therefore, my RCTs are a direct test of theory rather than a black box test of some policy programme or activity. Third, in line with the Realist school of evaluation (and as permitted within the bounds of the Pragmatic research paradigm) I include a qualitative element to explore how individuals respond to my intervention and thus strengthen the understanding of any causal process.

Is it important to clarify what I hope to achieve by the inclusion of a qualitative element. If the RCT is able to test all of the hypotheses listed in Chapter 3, then what should the qualitative element add? As per the discussion above, the qualitative methods used should help elucidate any causal impact and so should focus on understanding *how* and *why* the target group respond to their intervention. With this in mind, there are two main methods to choose from: focus groups and in-depth interviews. Interviews are widely used in social science research as they offer participants the chance to provide their own opinions and convey their experience of an intervention directly to the researcher (Tracy, 2013). Interviews are particularly useful as a tool for discussing issues which might not be easily discussed in a group setting or might not be apparent in the context of general participant observation. In the context of this research project, we expect that pupil interaction could obscure pupils' true attitudes to education because (as outlined in Chapter 2) white working-class boys come under social pressure to exhibit a certain type of behaviour and attitudes towards school. Therefore, it is more suitable to conduct interviews for the purpose of this project.

4.2.3 Mixed methods

Having settled on a RCT and interviews as my chosen research methods, I must turn to a discussion of how to mix these approaches. As per the choice of methods, it is the research question which determines the most appropriate method for mixing (Creswell, 2014; Creswell, J. W. and Clark, 2017). There are no dependencies between the two elements so an independent, concurrent approach is most appropriate, in which the qualitative and quantitative data collection happens independently but over the same period as this makes most efficient use of the data collection window and minimises the time burden on participating schools (Creswell, 2014; Creswell, J. W. and Clark, 2017). In practice, this means pupil interviews can take place during RCT implementation. I choose a "convergent" mixed methods design which means that the qualitative and quantitative data are collected in parallel, analysed separately and then mixed at the point of interpretation to develop a more complete understanding any causal mechanism at play (Creswell, 2014; Creswell, J. W. and Clark, 2017).

Having established the overarching research design, in the following sections I will outline the quantitative and qualitative methods more fully, but it is first relevant to discuss the intervention design in some detail.

4.3 Intervention design

The research question and hypotheses specify only that the research will focus on male role models but it is necessary to operationalise that term before we progress any further. In particular, in this section I specify the format and the content of the role model intervention.

4.3.1 Intervention aim

As outlined in Chapter 2, white working-class boys seem to hold a particular set of attitudes that inhibit their engagement in academic education, both in secondary education and beyond. In Chapter 3, I described how, although role model interventions often seek to promote the route which the role model embodies (e.g. going to university) in this project I am more interested in addressing the "anti-academic attitudes" held by this group which underlie their rejection of academic education both at school and after compulsory education. My focus on these attitudes is in-line with my desire to help improve overall school outcomes for my target group rather than promoting any particular post-school destination. Moreover, because low attainment is the primary barrier for white working-class boys seeking to progress to university or to apprenticeships, it makes sense to start further "upstream" and focus on their relationship with formal schooling more broadly. Therefore my desired outcome is improved engagement in education while at school. A discussion of how I proposed to measure engagement is given later in this chapter.

What then is the overall aim of my intervention? For the purpose of external validity and policy interest, I will focus on the model of an older individual espousing the value of a given post-school route. However, the intervention content will link this post-school route to messages about the value of secondary education for pupils' futures. Rather than a simple message that a particular route is best, the core message will be that good grades at school are a necessary key to unlocking whichever path a pupil chooses to follow.

At this point it is worth exploring the concept of attitudes to education in more detail. The relevant literature for this purpose focuses on the concept of "student engagement" which describes how individuals relate to education and their behaviour in education settings. Christenson et al. (2012) sets out several different types of student engagement, namely cognitive (e.g. self-regulation), behavioural (e.g. participation in classroom activities) and emotional (e.g. belonging and identification with school). Examination of the different forms of engagement suggests that emotional engagement is the most relevant for my purpose as it is clearly linked to the emotive connection of pupils with academic education — one focus of my literature review. Considering these attitudes at a more granular level, the concept of valuing education appears to be the most relevant to the literature presented in Chapters 2 and 3 where I describe how the in-group stereotype for white working-class boys may be associated with a set of attitudes about how education is not valuable for them. Therefore, the aim of this intervention is to improve attitudes to education by influencing pupils to perceive education as more valuable to their future. In turn, I hope this will make pro-education behaviour more compatible with pupils' understanding of the in-group stereotype and therefore more likely. The choice of an exact outcome measure is discussed in Section 4.5.1. Here I should emphasise, as I have elsewhere, that my research is a test of theory; so I am interested in even small effects on such outcomes as a step on the journey to more substantial effects on behaviour which may be achieved by more intensive role model interventions.

4.3.2 Intervention format

In many initiatives designed to "raise aspirations", pupils engage with a role model via a face-to-face interaction, typically as part of a group-based activity (Gartland, 2014). However, as will be outlined in Section 4.5.2, because the project focuses on a subgroup of pupils within the general population, it is necessary scale this project across a number of schools to run a viable RCT. To use "real-life" role models would require them to attend all of these schools spread across multiple geographical areas and is beyond the scope of this project in terms of resourcing. Therefore, I base my intervention on video case studies which are easily scalable across a large-scale trial. This approach has been used successfully elsewhere, for example, a trial using role models to promote the National Citizen Service in England found that videos were more effective at generating interest among the pupil audience than an on-stage presentation from alumni (The Behavioural Insights Team, 2016). The video boosted preliminary sign-up rates by approximately eight percentage points whilst the on-stage performance did not have a statistically significant effect (probably because the video intervention was more consistent in quality). A similar strategy has been tested in education interventions, for example Oreopoulos and Dunn (2013) found that exposure to a short online video about post-compulsory education led to a significant increase in the number of Canadian students stating that they aspired to complete at least a college degree.

For the purpose internal validity, it is desirable that all individuals in a treatment group receive the same version of an intervention. Using video case studies means that the intervention can be tightly controlled and is not prone to the fluctuation in quality which can affect in-person presentations. However, we should also acknowledge that this tight control leaves an RCT open to criticism that the intervention being tested is artificial and not an accurate reflection of an activity which might be delivered in a real-world setting (Deaton and Cartwright, 2018). In this instance, it is easy to rebut this criticism as I openly acknowledge that this trial is not evaluating a scalable activity; rather, the aim is to distil a common policy into a concentrated form which can be tested. Indeed, this approach is in line with the view espoused by critics of RCTs who say that trials should seek to generate theory rather than simply assessing cause and effect for multifaceted programmes of activity (Cartwright, 2013; Deaton and Cartwright, 2018).

4.3.3 Intervention content

For the purpose of my quantitative research it was necessary to compare two "types" of role model: those on academic routes (i.e. university students) and those on vocational routes (i.e. apprentices). As discussed in Chapter 3, role model relevance is multi-dimensional. To enable a fair comparison, it was necessary to hold as many factors constant as possible aside from those to be manipulated experimentally. Therefore, for the purpose of my research I required all role models to be white British and male. I specified that academic role models must be the first in their family to attend university and all individuals needed to be content to self-identify as a potential role model for white working-class boys. The role model specification is given in Table 4.1. To account for the localised nature of masculinity, different versions of the intervention materials were developed for different project areas (more detail on the project areas is given in Chapter 6).

To ensure the case studies were comparable across role model types and project areas, I developed a template for the video so that all role models covered very similar topics, namely their route into university or an apprenticeship, the benefits of their chosen pathway, the value of GCSEs (particularly English and maths) and a piece of motivational advice for pupils in school (see Appendix 9.2 for more detail). In all of the university role model case studies I required that they stated they were first in their family to attend university.

Hypothesis 3 required that pupils were encouraged to reflect on how they were similar to the role model. This aspect of the intervention was originally conceived as a worksheet which pupils would complete after watching a video case study.

Role model type	**Description**
Academic role model	Undergraduate
	White British male
	First in family to attend university
	Self-identifying as a potential role model for white working-class boys
	From the same region as target pupils
Vocational role model	As above except an apprentice rather than undergraduate

Table 4.1: Role model specification for intervention

However, in discussion with school staff it became clear that this would introduce an unacceptably high additional printing burden on schools (on top of the requirement to print surveys). It is important to note that the trial design relied on administering the treatment at the level of classes via tutorial sessions which are typically around 20 minutes long. Therefore, all of intervention delivery and data collection needed to take place within the envelope of these sessions. With these considerations in mind, the "similarity prime" element of the intervention was commuted to a short animated addition to end of the video case studies in which pupils were asked to think of two things they had in common with the role model and write them down on a piece of scrap paper.

4.4 Defining the target population

The most valid measures of social class rely on parental occupation. However, these data are not recorded in administrative datasets and it is not realistically possible to collect this from pupils with any degree of reliability. Therefore, I was restricted to using measures of income as imperfect proxies for social class (see Section 1.2 for a more detailed discussion).

FSM eligibility is the marker most frequently used to identify pupils from low-income homes. In 2018, approximately 15 per cent of pupils in state-funded secondary schools were FSM-eligible (Department for Education, 2019); however, recent analysis of social class in Britain suggests that approximately 29 per cent of the population fit into traditional "working-class" categories (Savage et al., 2013). Therefore, it was valid to include pupils who were from low-income homes but not FSM-eligible in the targeting criteria. According to the ACORN postcode segmentation tool, approximately 33 per cent of residential UK postcodes are categorised as belonging to the two poorest demographic groups (ACORN groups four and five) (more detail is provided in Appendix 9.3) (CACI Limited, 2017).[1] Therefore, for

[1] ACORN is a segmentation tool which divides the UK population into demographic types on the basis of postcodes.

the purpose of this project, "working-class" pupils were defined as those who had been FSM-eligible in the last six years or who lived in ACORN 4 or 5 postcodes. The final pupil targeting criteria are given in Table 4.2.

4.5 Quantitative research design

My quantitative research included two RCTs, both focused on the same research question but designed to test different hypotheses (see Chapter 3 for the full list of hypotheses). The first RCT (which I will call the "developmental trial") was designed to test a subset of the hypotheses and provide some preliminary evidence on the efficacy of my intervention before running a second trial (the "full trial") which was designed to test the full set of hypotheses.

In this section, I first briefly review my choice of outcome measures. I next outline the broad considerations around statistical power before providing a more detailed description of the developmental and full trial in turn. I then discuss threats to internal validity and how they were addressed in both trials.

4.5.1 RCT outcome measures

As outlined in Section 4.3.1, my desired outcome is improved engagement in education. Specifically, I hope to increase the perceived value of education among target pupils. I propose to measure this outcome over a relatively short period after implementation given the light-touch nature of my interventions.

Self-report surveys are the most common method for measuring student engagement and, within this field, it is often argued that data on students' subjective perceptions is vital alongside more objective measures of the behavioural aspects of engagement (Fredricks et al., 2011). The emotive component of engagement is not directly observable and so must be measured via surveys and inferred from behaviours (Fredricks et al., 2011). A self-report method is also most suitable for my research which is large-scale field research with a limited budget. To choose

Characteristic	Data source	Criteria
White British	School demographic data	Ethnicity = White British
Working-class	Free school meals status	Eligible in last six years = Yes
		AND/OR
	Postcode mapped on to the ACORN categorisation of local areas	ACORN = category 4 (“financially stretched”) or 5 (“urban adversity”)
Male/Female	School demographic data	Gender = Male/Female

Table 4.2: Pupil targeting criteria

the most appropriate measure, I reviewed the available self-report instruments and assessed the extent to which they mapped onto the attitudes to education which I describe in Chapter 2. The most prominent existing survey is the “Identification with School” (ISQ) survey which is designed to measure two dimensions of emotional engagement: belonging in school and the value of school (Fredricks et al., 2011; Voelkl, 1996). The latter subscale maps well onto the attitudes to education discussed in Chapter 2 and is the primary outcome measure which I adopted across my quantitative research. The literature suggests the value subscale has a Cronbach alpha of over 0.7 indicating an acceptable degree of internal consistency. The overall ISQ score has been found to correlate with academic achievement indicating that it is measuring attitudes which have some explanatory power when it comes to actual behaviour or performance in school (Fredricks et al., 2011; Voekl, 1997). A full list of the value subscale items is given in Appendix 9.4.

For both trials I included two secondary outcomes to examine any parallel impact on pupil aspirations and knock-on effects on education-related behaviour. Namely I included interest in university and interest in apprenticeships measured on a five-item Likert scale (as per Silva et al., 2016). In the first RCT, pupils were also asked to rate their interest in A-levels. Drawing on Bursztyn et al. (2017), in both trials, pupils were invited to enter a lottery to win education resources. In the developmental trial the prize was a physical bundle of revision resources (pens, paper etc.) whereas in the full trial the prize was £200 of online tutoring. In the latter case, the survey sheet informed pupils that the £200 would buy them "between 6 and 10 personal tutoring sessions which will focus on helping you do better at school". Entry into this lottery was used as an outcome measure as higher sign-up rates imply more positive attitudes towards education.

In the full trial, I included three additional secondary outcome measures. As per a number of existing studies, the first was attainment in a low-stakes maths test (tailored by year group) which simulated the type of task a pupil might typically be expected to complete at school (Fryer et al., 2012; Levitt et al., 2016). The other outcomes were measures of pupil effort and attendance for the weeks over which the trial took place (as reported by schools). All of these additional secondary outcomes were intended to measure whether, if the intervention had an impact on attitudes, it had a knock-on effect on behaviour.

In the developmental trial, outcome data was collected via a survey administered directly after the intervention was delivered. In the full trial, I also sought to to measure the enduring effect of the intervention so the survey was administered again three weeks later. In this second session, pupils in the treatment arms were also shown a short reminder clip of the role model from their trial arm. The pupil was then asked to rate their similarity to the role model and how much they set an example they would like to live up to. These are not outcome measures but, based on the literature discussed in Section 2.4, the aim is to provide some additional context to my main RCT results. Both of these additional survey items were measured on a scale from 1 (low) to 7 (high), based on a scale used in Betz and Sekaquaptewa (2012).

4.5.2 RCT power

Level of randomisation

To conduct an RCT, it is necessary to identify a level of randomisation and choose the units which will be allocated to different trial arms. In simplest design, individuals are the unit of randomisation and are allocated to different conditions. This design is the most efficient in terms of statistical power for a given sample size. By contrast, cluster randomised controlled trials allocate clusters of individuals (whole classes or schools, for example) to different trial arms. This approach can be more susceptible to imbalance between arms and reduces the effective sample size because there is a degree of non-independence between outcomes for individuals within the cluster and power calculations must be amended accordingly (Torgerson, 2001). An exposition of the sample size formulae for clustered RCTs is given in Appendix 9.6. Despite their drawbacks, clustered RCTs are often used to prevent contamination between treatment and control groups and are sometimes the only viable option due to practical considerations (Torgerson, 2001).

My project involves exposing large numbers of pupils to light-touch video interventions and so this was the primary practical concern guiding the randomisation strategy. Preliminary discussions with schools staff soon confirmed that it would not be possible to implement individually randomised trials by asking individual pupils to access videos on computers (because schools couldn't guarantee access to computer facilities across all classes) or by splitting existing classes of pupils into new treatment groups to watch videos in assemblies (because of the scale of the coordination task). Therefore the practical constraints of my work dictated that the trials be clustered at the level of some existing unit above the individual.

I therefore had two clear options: randomise at the level of classes or schools. Randomisation at the school level would have meant recruiting a very large number of schools to provide sufficient units for a balanced randomisation to be possible; therefore, I based my research on clustered RCTs with classes as the unit of randomisation. Tutor groups were chosen as the specific classes in question because subject classes are more likely to be streamed by ability whereas tutor groups are generally mixed, making it easier to balance the randomisation in terms of attainment. Working with tutor groups also offered a clear opportunity to pitch the intervention as an activity which could be easily slotted into an existing period in the school day, rather than requiring subject teachers to amend their lessons to enable participation.

The decision to cluster at tutor group level is therefore pragmatic. Because tutor groups are not necessarily the most relevant grouping for pupils (who are also grouped into classes for different subjects), there is a case to consider whether a wider cluster might include more pupils' true peers. Therefore, in chapter 6 I also compare the intra-cluster correlations at class and school level, to see whether the correlation is any higher if you include a wider pool of pupils and, as a robustness check, re-run my analysis clustering the standard errors at the level of the school, as well as the class.

Clustered sample size calculations can be amended to also incorporate other factors which dictate the power of an experiment. For example, including covariates in analysis reduces the between-cluster variability and improves power (Ribeiro et al., 2018). Conversely, variable cluster size can have a detrimental effect. Where substantial variability exists, the use of a mean cluster size in power calculations will lead to an underestimation of the required sample size and (Rutterford et al., 2015). However, while methods exist to examine the role of both of these factors independently (the positive role of covariates and the negative role of cluster size variability), there is currently no closed form solution which incorporates both simultaneously (Rutterford et al., 2015). I discuss how I took these factors into consideration in sections 4.5.3 and 4.5.4 respectively.

Determinants of statistical power

At a very basic level, to analyse the results of a RCT, we compare the means of the outcomes in the treatment and control groups and decide whether the results differ significantly. Whenever we analyse this kind of data, there is always a risk that we mistakenly detect a difference between the groups when in fact there is not one (a "false positive" or "type one error") or that we find there is no difference when in fact there is one (a "false negative" or "type two error"). The "statistical power" of the test is the probability that we *correctly* find a difference between the treatment and control groups (calculated as one minus the probability of a type two error) (Connolly et al., 2017).

Power relies on several factors including the parameters we choose for our statistical testing, the expected size of the difference in outcomes between treatment and control, and sample size. With regard to my test parameters, the statistical convention (which I adopt) is to set the probability of a type one error at five per cent which means "if you repeated an experiment many times in the absence of a genuine effect, you would on average find one apparently statistically significant result in every 20 attempts" (Hutchison and Styles, 2010, pp.41). Therefore, our statistical procedures have a degree of in-built uncertainty and replication is needed to verify the results of any particular trial. Whenever designing a trial we must also decide whether we use a "one-sided" or "two-sided" test to compare treatment and control. A one-sided test is best for power but only detects differences in one direction (for example, only improvements due to the intervention) whereas a two-sided test explicitly looks at whether the treatment group performed either better *or* worse than control. As per convention, and because I am interested in any impact on outcomes whatever the direction, I base my power calculations on two-sided tests (Hutchison and Styles, 2010).

As the statistical choices discussed above are largely dictated by convention, the key decisions around trial design largely hinge on sample size and the expected size of the difference in outcomes between treatment and control. Put simply, the larger the sample, the smaller the difference we are able to detect (all other things being equal). Conversely, running a trial with insufficient participants can result in low power and a high chance of false positives.

Effect sizes

To compare findings from across the literature, we use a standardised “effect size”. Perhaps the most commonly used effect size is Cohen’s δ which is the “difference in means between treatment and control groups, divided by the pooled standard deviation of the two groups” (Hill et al., 2008, pp.172) (see Appendix 9.5 for effect size formulae used in this thesis). The traditional rule of thumb for RCTs is that an effect size of around 0.2-0.3 is small, 0.5 is medium and 0.8 is large (Cohen, 1988). However, meta-analyses have found that effect sizes relating to interventions in education rarely exceed 0.4-0.5 (Hattie, 2009; Lipsey and Wilson, 1993). Moreover, when we narrow down the search to only look at experimental studies the estimated mean effect size decreases dramatically with estimate ranging from 0.06 to 0.16 (Cheung and Slavin, 2016; Lortie-Forgues and Inglis, 2019; Sanders and Ni Chonaire, 2015). The relatively smaller effect sizes for experimental studies may be due to a combination of lower rates of bias inherent in the RCT methodology itself, less selective reporting by researchers and more rigorous practice around pre-registration for trials versus non-experimental work (Lortie-Forgues and Inglis, 2019).

It should be noted that many of the trials in the meta-analyses mentioned above use standardised tests as their outcome measure. This approach is associated with smaller effect sizes because attainment on these kind of tests is very difficult to move; indeed, this focus on high-stakes tests appears to be partly responsible for prevalence of large-scale underpowered trials (Lortie-Forgues and Inglis, 2019). I am not using standardised tests as an outcome measure in my trials because my light-touch intervention is unlikely to have an impact at this level. This approach is appropriate because I do not purport to be testing an intervention which can itself be scaled and implemented to have a dramatic effect on pupil outcomes. Instead, I claim only to be testing a discrete aspect of a common policy and essentially my primary aim is to build theory (as discussed in Section 4.2). The use of a survey measure as my primary outcome is in-line with the advice of Lortie-Forgues and Inglis (2019) who recommend using appropriate validated measures which have a "theoretically well-established causal link" as a way to improve power without compromising on usefulness.

4.5.3 Developmental RCT design

The developmental trial was designed as a pilot to provide preliminary evidence on the efficacy the methods and procedures to be used on a larger scale. The pilot design focused on hypothesis 1 ("Exposure to male role models will improve attitudes to education among white working-class male pupils") and hypothesis 4 ("Exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils"). As a pilot, I developed a number of objectives and criteria against which I would assess success on these objectives. These objectives are presented in Chapter 5.

As outlined in Section 4.5.2, practical considerations dictated that the trial be delivered at classroom-level in tutorial sessions so this was a cluster RCT. A simple two-armed design which tested the effect of a university role model against control was suitable for testing the hypotheses stated above, as shown in Table 4.3, and the outcome measures for this trial are summarised in Table 4.4.

Arm	Clusters	Allocation
1	N/2	Treatment — university role model
2	N/2	Control — no role model

Notes: Where N is the total number of clusters (tutor groups) in the trial.

Table 4.3: Developmental RCT design

Type	Outcome	Format
Primary	ISQ score	Survey score (1-5)
Secondary	Interest in university/apprenticeships/A-levels	Survey score (1-5)
Secondary	Lottery entry	Binary (0 or 1)

Table 4.4: Developmental RCT outcome measures

For my power calculations, I assumed that I would include two schools as this was the minimum viable sample for a pilot of multi-site implementation. Year 9 pupils were chosen as the target group as they were less likely than older pupils to be involved in exams or preparation for exams, thus making them easier to access for the purpose of this project. Based on analysis of administrative schools data, I assumed each year would include at least six classes and that each class would contain six pupils (i.e. this would be the cluster size). I further assumed that, as tutorial groups are small and fairly standard in size, that cluster size variability would be low and therefore I would not need to account for this in my power calculations as, if the coefficient of cluster variation is below 0.23, an adjustment is unnecessary (Rutterford et al., 2015). I also assumed that, as I was collecting a range of data which are highly predictive of education outcomes, covariates would explain 70 per cent of the variance in the outcomes, based on estimates of this value taken from the education evaluation literature. Based on these assumptions, I estimated that this trial would be powered to detect an effect size of 0.6 (see Appendix 9.7).

4.5.4 Full RCT design

The full trial was designed to test the full set of hypotheses which relate to two facets of the intervention which must be manipulated experimentally, namely the type of role model and the similarity priming activity. I included an expanded sample of Years 8 and up to maximise statistical power and because all year groups are of interest. The trial used a factorial design so that each of these two factors became an independent variable with two possible levels (“university” versus “apprenticeship” and “prime” versus “no prime”). Factorial designs are an efficient way of testing multiple intervention factors with a limited number of clusters (Collins et al., 2009). Table 4.5 demonstrates how factorial designs allow us to "recycle participants by placing every subject in one of the levels of every factor" (Collins et al., 2009, pp. 210). This table shows a 2×2 factorial design with four possible treatment arms. The "main effect" is defined as "the difference between factor levels, averaging across conditions" (Dziak et al., 2012, pp. 154). A third of clusters are allocated to a control arm to create an equal-sized comparator group for each combined treatment arm. The outcomes for this trial are given in Table 4.6. This trial was pre-registered on egap.com (see Appendix 9.10).

Arm	**Clusters**	**Role model type**	**Prime type**
1	N/6	University	Prime
2	N/6	University	No prime
3	N/6	Apprenticeship	Prime
4	N/6	Apprenticeship	No prime
5	N/3	Control	-

Notes: Where N is the total number of clusters (tutor groups) in the trial.

Table 4.5: Full RCT design

For factorial RCTs, standard power calculations are used when comparing levels of different factors but again it was necessary to adjust for clustering as mentioned previously (Dziak et al., 2012). I drew on data collected as part of my de-

Type	**Outcome**	**Format**
Primary	ISQ score	Survey score (1-5)
Secondary	Interest in university/apprenticeships	Survey score (1-5)
Secondary	Lottery entry	Binary (0 or 1)
Secondary	Maths test score	Score (0-10)
Secondary	Attendance	Proportion (0-1)
Secondary	Effort	Teacher ratings

Notes: The format of the effort ratings is discussed in more detail in Chapter 6.

Table 4.6: Full RCT outcome measures

velopmental trial to further inform my power calculations. As reported in Chapter 5, in the outcome data for my developmental trial (when restricting the sample to WWCB only) there were 6 classes per school, per year with a mean class size of 7 pupils and a standard deviation 2.5 pupils. In my power calculations for the full trial I assumed there would be 6 WWCB per cluster as I realised that I may need to expand my sample to include schools in areas with lower numbers of my target pupils.

Using a conservative estimate of the ICC=0.1 from the pilot and, without taking into account variable cluster size, the clustered design would suggest that the required sample size should be inflated by a factor of 1.5 (the so called "design effect") versus an unclustered design to maintain the same power. I then needed to consider how to take into account any variation in cluster size and covariate explanatory power. The developmental RCT data implied a coefficient of variation of the cluster size (defined as the ratio of the standard deviation of cluster size to mean cluster size) of approximately 0.35. Based on the formula presented in Annex 9.6, and the coefficient of variation estimated as described above, the inflation factor would be 1.57 if I were to take into account variable cluster size. Conversely, my pilot data and the broader education literature suggested that covariates could account for a sizable proportion of the variance in outcomes and a reasonably conservative estimate of this parameter (10 per cent) would reduce the design effect to 1.4. Because there is no closed form function which permits power calculations to take into account both considerations, I decided to prioritise the role of covariates in my power calculations as I judged the likely impact of this consideration to be greatest. I also assumed my conservative treatment of the ICC would act to counter the optimism in my approach.

4.5.5 RCT analytical strategy

Both RCTs use the same analytical strategy, and regression was conducted using the following model. Ordinary least squares regression was used for continuous

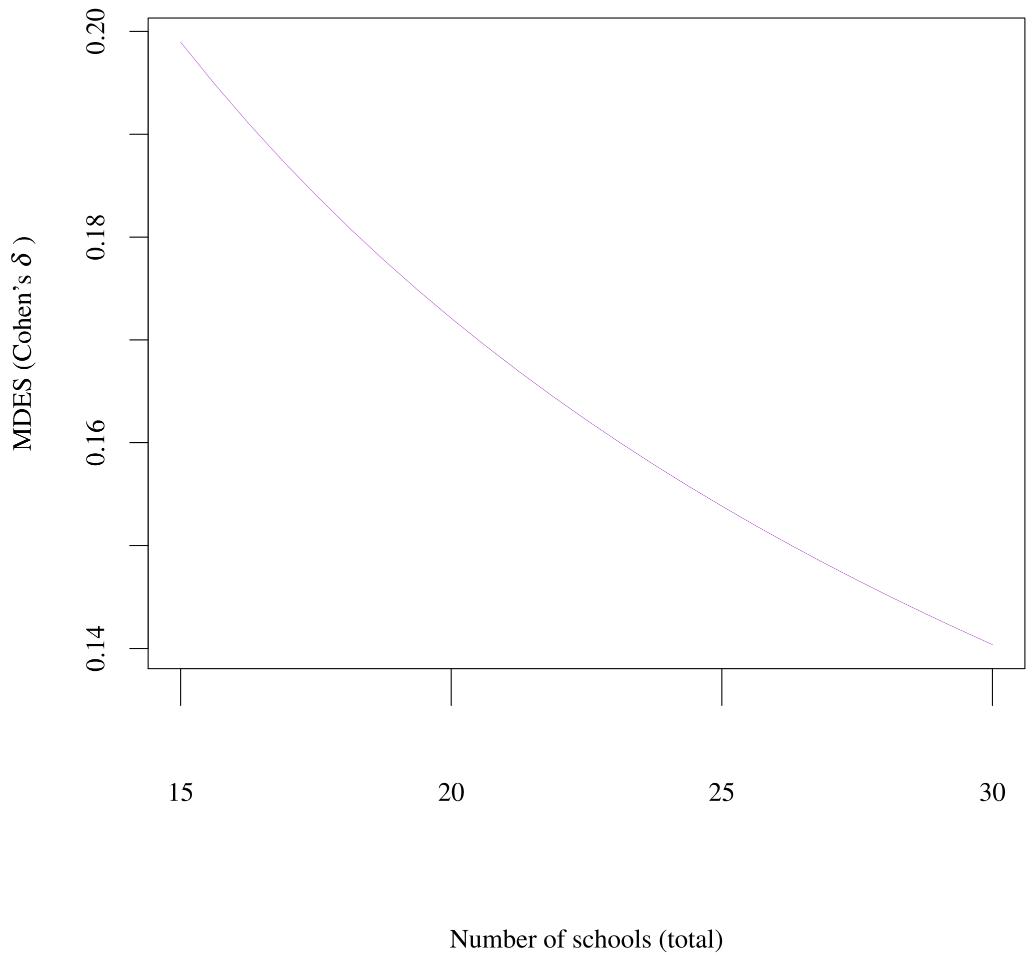


Figure 4.1: Power curve for factorial design — MDES for main effects

Notes: MDES for detection of of main effects in factorial cluster RCT. Assumes six participants per cluster (tutor group), 24 clusters per school, an ICC of 0.2 and covariates accounting for ten per cent of both between- and within-cluster variance.

outcomes and binary logistic regression for the lottery entry outcome which is binary. The model is shown below in Equation 4.1.

$$Y_{ij} = \beta_0 + \beta_1 T_j + \beta_2' \boldsymbol{X_i} + \beta_3' \boldsymbol{C_j} + \beta_4' \boldsymbol{S_j} + \varepsilon_{ij} \tag{4.1}$$

where i denotes the individual (pupil), j is the cluster (class), Y is the outcome variable, β_0 is a constant, T is a binary treatment indicator (which takes values of 0 for control and 1 for treatment), $\boldsymbol{X}$ is a vector of pupil characteristics, $\boldsymbol{C}$ is a vector of class characteristics and $\boldsymbol{S}$ is a vector of school dummy variables. To enable statistical inference given the structured nature of the data, I used cluster-robust standard errors (Campbell and Walters, 2014). Therefore, ε is an error term where standard errors are clustered at the class-level. The exact covariates used in each trial are discussed in the relevant sections of Chapters 5 and 6.

4.5.6 Internal validity of RCTs

RCTs are subject to a range of threats which can undermine internal validity and bias our findings. Here I will briefly review the main issues which can occur and describe how I mitigated them in my trials.

"Spillover" occurs when individuals are affected by a treatment to which they are not assigned (Gerber and Donald, 2018; Glennerster and Takavarasha, 2013). For example, in the context of education research it is entirely plausible that an intervention which improves motivation among a certain group of treated pupils might have a knock-on effect on pupils who weren't treated just by a natural process of social influence. The problem with spillover is that it undermines the basic assumptions of our trial and can reduce the measured difference in outcomes between treatment and control groups, biasing our treatment effect towards zero (Gerber and Donald, 2018). In the context of my trials, the risk of spillover is mitigated by clustering at the class-level (Rhoads, 2011). For outcome data which is collected immediately after the intervention, clustering like this is a good way of ensuring that pupils are only exposed to the treatment which they are assigned and that there can be no spillover between trial arms. Although this design cannot rule out spillover downwardly biasing the treatment effect for the outcomes measured three weeks after the intervention, I judge that the intervention is sufficiently light-touch for this to be of minimal risk.

Non-compliance with the trial protocol can also bias the estimate of the treatment effect (Gerber and Donald, 2018; Glennerster and Takavarasha, 2013). The effect of this bias will depend on the nature of the non-compliance, but it is easy to imagine a wide range of scenarios in which pupils allocated to a trial arm are actually treated as if they are in another arm. The most obvious source of non-compliance in education research, where time and resources are a valuable commodity, is that schools fail to implement, or only partly implement, the intervention as specified. Conversely, if school staff like materials they may decide to run an intervention with pupils who should be in the control group, or provide different materials for this group to compensate for their lack of treatment. In all of these cases, non-compliance would downwardly bias the treatment effect. A less consciously motivated source of non-compliance could simply be incorrect implementation of the randomisation because it is not clear how to run the trial.

To maximise compliance with the trial protocol in my trials I carefully briefed the lead member of staff in each school. As well as providing detailed written documents for the school leads and senior leadership, I also provided summary information sheets for the staff who would be implementing the trials. Schools were informed that they would be free to use the intervention materials at the end of the project, so there was no need for staff to compromise the trial by using them more widely within the implementation window. To ensure that the randomisation strategy was followed correctly, schools were provided with individually-labelled session plans for each of the participating classes. These plans were clearly labelled with the group name and guided tutors through the appropriate activities, depending on the trial arm the class had been allocated to. For treatment groups, the briefing contained a link to an online web-page which hosted the correct video intervention for their trial arm so it would be difficult for school staff to implement the wrong activity. The sessions required minimal preparation by the tutor.

Another threat to internal validity is sample attrition (Gerber and Donald, 2018; Glennerster and Takavarasha, 2013). Attrition can occur at multiple stages of a trial — for example, between randomisation and implementation or between implementation and data collection (Hutchison and Styles, 2010). Aside from reducing sample size which has implications for power, attrition is particularly problematic when data is missing for certain types of participants (Gerber and Donald, 2018). For example, if attrition means that we do not have outcome data for all female participants in the treatment arm of a trial, it is no longer possible to say that our treatment and control arms are sufficiently similar to make a valid comparison. In other words, the attrition undermines the trial design by introducing systematic differences between the groups. The risk of attrition is somewhat minimised in my trials because school attendance is mandatory and most of the outcome data is collected immediately after the intervention. However, patterns of attrition are examined for each of the trials to quantify the extent of attrition and understand the implications for my results.

The final key threat to internal validity is the propensity of participants to alter their behaviour simply as a consequence of being in an experiment (so-called "evaluation-driven effects") (Glennerster and Takavarasha, 2013). Evaluation-driven behaviour is arguably a significant risk in my trials. For example, it is possible that "demand effects" will occur whereby participants alter their behaviour in order to either confirm or undermine the hypothesis they think is being tested (Glennerster and Takavarasha, 2013). In practice, this could mean that if white working-class boys perceive an intervention to be directly targeted at them, this could artificially inflate or depress their responses. To minimise this risk, parents were provided with general information about the aims of the project which did not emphasise the targeting of the intervention materials. Moreover, the treatment was delivered via tutors in schools and embedded within pupils' normal timetable. Thus the research character of the trials was not emphasised to pupils at the time of delivery. Pupils were not aware of multiple trial arms within a school so the trials were singly blinded. It was not possible to ask tutors to implement the sessions without giving them some information about the aims of the project so the trial was not double blinded.

4.6 Qualitative research design

As discussed in Section 4, my project included a qualitative element to provide a better understanding of the causal process. Specifically, the qualitative methods focused on understanding *how* and *why* the target group responded to the intervention. Having settled on interviews as the most appropriate method for this purpose (see Section 4.2), in the following Section I provide more detail on the interview questions and structure, sampling approach and analytical strategy. I also discuss how I ensured this research is plausible, credible and trustworthy.

4.6.1 Interview questions and structure

As recommended by Creswell (2014), while the central research question for this project applies across the quantitative and qualitative methods, I developed some additional sub-questions from which the interview questions flow. In Chapter 2, I discuss how the literature suggests that the impact of the intervention will rely, in part, on perceived similarity with the role model, whether what they are doing is seen as desirable, whether what they are doing is seen as achievable and whether they are seen as successful. Therefore, the questions which form the framework for the interviews are based on these themes (see Table 4.7).

Using these sub-questions I developed a research guide for semi-structured interviews with individual pupils (see Appendix 9.47). The interviews were designed to be 20 minutes long. Pupils were shown a one-minute reminder clip, either of

Question
1. How do pupil's perceptions of perceived similarity with the role model vary by role model type?
2. To what extent do pupils perceive different role models as embodying desirable career destinations?
3. How do pupils' perceptions of the role model's career success depend on role model type?
4. To what extent do pupils perceive different role models as embodying attainable career destinations?

Notes: Where role model "type" refers to academic versus vocational role models.

Table 4.7: Qualitative research sub-questions

the university or apprenticeship role model and then asked questions about the role model they had seen. Then they were shown the clip of the other role model and the process was repeated. The order in which the clips were shown (university first or apprentice first) alternated between interviews to avoid systematic ordering effects. Pupils were also asked a number of questions about their own aspirations to provide context to their answers.

4.6.2 Sampling for interviews

The interview participants were drawn from the pool of RCT participants and interviews took place at three schools. To sample participants, schools were sent a list of pupils who met the criteria used for targeting in the RCT (see Section 4.2) and within this list the key member of staff was asked to choose four pupils for interview. No further criteria were provided except that certain schools were asked to focus on particular year groups so that pupils were sampled from across the age distribution.

Pupils were initially approached about the interview by the key staff member in their school. They were given further information upon attending the interview and asked if they would like to take part. All pupils who were selected agreed to take part and gave verbal and written consent to this effect.

4.6.3 Interview data analysis

For each interview, the qualitative data was recorded, transcribed, then coded. The codes were determined according to emerging themes which distil the cumulative responses of pupils into insights about how the pupils responded to the role models in the intervention.

4.6.4 Ensuring trustworthy, authentic and credible qualitative research

Internal validity is a concept which has traditionally applied to quantitative studies and there is some ongoing debate about how the concept should apply to qualitative research (Creswell, 2014). Instead, it is more suitable to seek to conduct research which is trustworthy, authentic and credible (Creswell, 2014). As per Section 4.5.6 for my quantative methods, I now discuss some of the risks to the quality of my qualitative research and how they are addressed.

One key threat to good qualitative research is researcher bias which can lead to selective recording of information and biased interpretation of the research data (Merriam and Tisdell, 2015). Therefore, it is necessary to take steps to address both descriptive validity (the accurate recording of information) and interpretative validity (Johnson, 1997). To this end, all my interviews were recorded and transcribed to provide an unbiased record of the dialogue between myself and the research participant. To strengthen interpretive validity, quotes or description which draws closely on participants' accounts were used where possible to allow pupils to "speak for themselves" (Johnson, 1997). Theoretical validity was enhanced by linking my findings back to the existing literature (Johnson, 1997).

4.7 External validity

External validity refers to how well my research findings might be expected to generalise to the wider population. First I discuss the external validity of the quantitative research in particular and then I provide a discussion of the overall external validity of my research project.

4.7.1 External validity of RCTs

One common criticism of experimental techniques is that they provide evidence on an artificial intervention in an artificial setting (Deaton and Cartwright, 2018). For example, testing education resources in a lab-setting with a high fidelity implementation is clearly not a good proxy for how materials are actually used in schools. In reality, it is likely that materials are adapted or changed by teachers and they are normally accessed in the context of a busy classroom environment. My research project addresses this threat by testing the intervention as part of field experiments which take place in real classroom settings. Therefore, I can be relatively confident that pupils are responding as they would to similar materials typically used in careers IAG sessions. Although I have taken precautions to maximise fidelity of implementation (see Section 4.5.6), the intervention sessions are still run by teachers and so the overall delivery bears some resemblance to how materials might be used in the "real world". More broadly, my intervention is not based on "unusual and hard-to-replicate inputs" and so there is scope for testing and scaling this approach in other contexts (Glennerster and Takavarasha, 2013, pp. 394).

Another threat to external validity is the "Hawthorne effect" whereby research participants' behaviour changes because they know that they are being studied (Glennerster and Takavarasha, 2013). This effect could lead participants to alter their response to the intervention or the way they answer surveys; for example, pupils might pay greater attention to the intervention than they would outside the context of the research and this could clearly undermine the extent to which the findings might generalise (Hutchison and Styles, 2010). As discussed in Section

4.5.6, to mitigate this risk, tutors were asked to run the sessions as part of normal tutorial classes and the research character of the trials was not emphasised to pupils at the time of delivery.

Another criticism of RCTs is that results are only applicable within the context of the trial. Therefore, if the sample is not representative of the population of interest this raises questions about whether the findings can generalise (Hutchison and Styles, 2010). I have attempted to mitigate this threat by working in secondary schools spread across multiple geographical areas and specifying that my target pupils are a particular sub-group of the general population gives a clearer steer on how my findings could be scaled. However, due to the opt-in nature of research such as my own, it is very difficult to argue that the schools taking part in my research are a representative sample in any respect. By virtue of having participated in my project they have demonstrated that they are among the schools which are the most motivated to improve attainment for white working-class boys. The implications for my findings are discussed in Chapter 8.

Attrition is a further threat to external validity in trials. As noted by (Barry, 2005, p.1), "to evaluate if the external validity of a study is weakened, dropouts from the treatment and comparison groups should be examined across several characteristics. If drop-outs are similar to each other, but are not representative of those who remain in the study, the external validity of the study is weakened". In other words, if the sample for whom data is collected is not representative of the recruited sample, there are clear implications for external validity because there may be systematic differences between those who do and do not appear in the data. Patterns of attrition are therefore examined to understand any implications for my results.

4.7.2 External validity of the whole project

Aside from the practical risks to external validity discussed above, critics of RCTs pose more profound questions about whether a trial's findings can ever be generalised (see Section 4.2.2 for a discussion). Because trials focus on average treatment effects for a particular group of people at a particular time, they state that many RCTs overclaim external validity. Moreover, by taking a "black box" approach, they argue that RCTs offer us little insight into casual mechanisms, making it hard to understand whether there is a basis for external validity.

My research project is designed to counter these criticisms effectively. First, my research design is rooted in theory; indeed, rather than testing a programme of policy which combines several composite elements, I have attempted to distil a common policy into its key components. By testing this intervention, my ambition is to contribute to theory rather than to make grand causal claims about the intervention itself. Moreover, and as discussed in Section 4.1, the aim of a mixed-methods approach is to strengthen the external validity of the trial by allowing me to triangulate findings using quantitative and qualitative approaches (Mayoh and Onwuegbuzie, 2015). Therefore, this approach overcomes the some of the traditional criticisms of RCTs (that they provide few insights into causal processes) and of qualitative studies (that the findings are not generalisable).

4.8 Research ethics

In the preceding sections I have provided a comprehensive account of my research plan which comprises quantitative and qualitative research methods. All elements of this research design were subject to ethical review by the University College London Research Ethics Committee.[2] In this section I discuss some of the key ethical considerations for this research.

4.8.1 Working with vulnerable young people

This project involved working with vulnerable participants, namely young people from low-income homes. Although it is preferable to work with less vulnerable

[2]Ethical approval for this trial was gained from the UCL Research Ethics Committee with Project ID number: 11263/001.

groups, given that the intervention was specifically designed to be beneficial for these pupils and that there was a very low risk of harm, the rationale for testing with this population was defensible in this instance.

To protect participants, I worked closely with teachers who act as gatekeepers and were asked to identify any potentially vulnerable learners who they felt should be excluded. Parental opt-out consent was also required, providing another level of safeguarding for children. However, as the intervention was not dissimilar to activities which a pupil might complete as part of standard careers classes, teachers agreed that the risk of harm was very low. For the interviews, I followed appropriate safeguarding protocol in my interaction with pupils and was sure to avoid any potentially sensitive or distressing topics.

4.8.2 Collecting individual-level data

The project required that schools provided personal and sensitive data on pupils. These data were used to identify the target group, to appropriately randomise pupils to treatment and control arms in the RCTs and to provide important covariates for my quantitative analysis.

Before collecting data, schools were required to ensure that parents understood the nature of the project and the data requirements.[3] Schools were provided with information sheets for parents which described the aims of the research and clearly explained the intention to collect and match data as described. However, I reasoned that explicitly stating a focus on white working-class boys as a poorly performing group could be upsetting for pupils and parents. Therefore, the project description was more general and referred to “supporting students to do their best at school”.

[3]For Year 12 or 13 this information went directly to the pupil rather than to parents.

4.8.3 Randomisation

The nature of RCTs is that the treatment must be withheld from some students. Although there is some limited research to support the hypothesis that inspirational role models are an effective tool for improving academic outcomes, the research base is far from concrete and there are no studies of the effect on white working-class boys in particular. Therefore, we can be said to be in a state of "equipoise" and a RCT approach can be justified.

However, because I did not plan to track long-term outcomes for pupils in my study, there is no requirement to withhold treatment from the control group beyond the timelines of the project. Since the completion of the research, schools have been provided with a report on my findings and access to the intervention materials to roll-out as appropriate.

4.9 Summary

My research design flows from a focus on my central research question: can exposure to male role models improve attitudes to education among white working-class male pupils in English schools? By operating in a pragmatic research paradigm I have opted to choose a mixed-method research approach which allows me to draw on the strengths of both quantitative and qualitative approaches to provide the most complete and robust answer to this question as possible. Specifically, my research project combines two RCTs with in-depth pupil interviews.

In my developmental RCT I tested my intervention with a sample of Year 9 pupils across two schools to understand whether a university role model could have a positive impact on attitudes to education among white working-class boys and the relative effect on their female counterparts. The full RCT employed a more complex trial design with an expanded sample and tested the full set of project hypotheses by also exploring the relative impact of university role model versus an apprenticeship role model, whether prompting pupils to consider points of similarity of the role model would have a positive impact, and whether the effect of the intervention would be greatest for target pupils in classes where white working-class males were in the minority. My qualitative study took place in parallel and comprised a set of semi-structured interviews with pupils to understand how they responded to the intervention with a view to exploring the causal chain.

In sum, this chapter has made several important contributions. First, it has provided a strong methodological base for my research. Second, I have described how, rather than evaluating a scalable programme, my light-touch intervention essentially distils a common policy activity — namely the use of role models in education — into something which can be tested to inform theory. Third, I have provided detailed research designs for the quantitative and qualitative elements in turn. Fourth, I have discussed issues around external validity for the RCTs and the overall research and finally, I have summarised some of the main ethical issues relating to this project. In the following chapters I set out the empirical findings from my developmental RCT (Chapter 5), full RCT (Chapter 6) and qualitative study (Chapter 7).

Chapter 5

Testing the effect of an academic role model

5.1 Introduction

So far in this thesis I have set out the argument that there is a pressing need to improve educational outcomes for white working-class boys (Chapter 1). Moreover, by exploring sociological literature on how pupils develop attitudes to education, I have identified role model interventions as a possible route to improving how these pupils relate to formal schooling (Chapter 2). Role model interventions are common in the world of education outreach but the evidence base for this approach is still relatively small and there are gaps in our understanding of how it can be optimised.

One particular gap relates to our understanding of how perceived relevance mediates role model impact. This question is interesting from an academic and policy perspective; if role models are used to inspire pupils to follow a particular route, how much do that role model's demographic characteristics matter? And does the route which they represent inadvertently influence their perceived similarity with the target audience? Earlier in this thesis I set out a simple model of how a role model intervention might influence white working-class boys' attitudes to education and generated several resultant hypotheses (Chapter 3). I then set out my plans for testing these hypothesis via two RCTs and an embedded qualitative study (Chapter 4).

In this chapter I present an overview of the first of my RCTs which was implemented as pilot study. The aim of a pilot study is to provide preliminary evidence on the efficacy of an intervention; specifically it should test “the methods and procedures to be used on a larger scale and...search for possible effects and associations that may be worth following up in a subsequent larger study” (Thabane et al., 2010, p.1). In the case of this study, its primary purpose was to be a “dummy run” for my subsequent work to help inform the design and management of the larger planned trial but as a secondary concern I also use this to provide preliminary analysis of the effect of the intervention.

The role model for this trial was a white British male university student from the North East of England and the aim was to test whether exposure to a light-touch video intervention featuring this role model would have a positive effect on attitudes to education among my target group. I also wanted to test whether, among white working-class pupils, there would be a differential effect on boys versus girls.

In section 5.2, I outline the objectives for this pilot and criteria for assessing success against these objectives (Eldridge et al., 2016). In Section 5.3, I outline the process by which I recruited two schools and the role model to participate in this trial. In Section 5.4, I then describe how pupils were randomised into two trial arms clustered at classroom level. In Sections 5.5 and 5.6, I discuss how the trial was implemented, rates of data collection, attrition and balance across trial arms. I then present an overview of my outcome data in Section 5.7.

In Section 5.8, my primary analysis shows that the intervention did have a positive and statistically significant impact on attitudes to education among white working-class boys (“WWCBs”) but there was no effect on white working-class girls (“WWCGs”). Secondary analysis focused on survey outcomes concerned with academic progression (namely A-levels and university), scores in a low-stakes maths test and entry into a lottery to win a bundle of revision resources (based on the theory than pupils with more positive attitudes to education would be more likely to enter). This analysis found that the intervention had a significant negative effect on self-reported interest in university among WWCBs and no effect on any of the other outcomes. For WWCGs, the intervention had a significant negative effect on three of the four secondary outcomes related to post-16 academic aspirations.

In Section 5.9, I discuss performance against my objectives for this trial and how the results support my stated hypotheses about the positive impact of role models on attitudes to education and a differential effect by gender. A summary of how this chapter contributes to the overall thesis is given in Section 5.10.

5.2 Objectives

Drawing on Thabane et al. (2010), the aim of this trial was to explore the feasibility of the process, management and scientific elements of the research. To assess the trial in each of these areas, I developed a number of objectives and criteria against which I would assess success on these objectives (Eldridge et al., 2016). These are captured in Table 5.1 below.

A secondary objective was to assess how pupils respond to the intervention by providing preliminary analysis of the impact of the trial. However, as cautioned by Lancaster et al. (2004) the small sample sizes involved in pilots means we should not place too much confidence in such findings. Therefore, this analysis is provided to signpost avenues for further analysis in my larger trial rather than as definitive in its own right. In the following sections I will outline how this trial was implemented and the aforementioned analysis before returning to a discussion of the pilot objectives in Section 5.9.

	Objective	Criteria
1	To assess feasibility of recruiting participants	More than five schools volunteer to take part after a month of recruitment activities.
2	To assess feasibility of the proposed targeting criteria	Data is available and of sufficient quality to apply targeting criteria and the target sample is big enough for proposed research design.
3	To investigate the acceptability of intervention to schools and participants	In observing the delivery of the intervention, no harm is evidenced and it appears acceptable to school staff and pupils.
4	To investigate fidelity of intervention delivery	School staff are observed to be able to deliver the intervention with fidelity and do not report issues with intervention delivery.
5	To assess the feasibility of using the the proposed outcome survey	Pupils appear to understand the survey and are able to complete the form within the time allocated. For completed surveys, the number of blank items is low. Analysis of the ISQ survey suggests it has a reasonable degree of internal consistency.
6	To synthesize data to inform the sample size for a full trial	Required data is collected

Table 5.1: Developmental RCT objectives

5.3 Recruitment

5.3.1 School recruitment

Based on preliminary analysis of administrative data, the North East of England appeared to be a region where a high proportion of pupils would meet my target criteria for white working-class pupils (see Appendix 9.3). Digital recruitment material was distributed via a collaborative network of schools in this region and seven expressed an interest in participating. Following introductory phone calls to outline the project requirements, two schools were selected to take part on the basis that they demonstrated staff buy-in and had a suitable demographic profile (see Table 5.2). The schools were slightly smaller than the average for state-funded English secondary schools but both had a higher proportion of white British and FSM-eligible pupils than the country overall. Both schools also had an Ofsted rating of "Good" which is the modal rating for schools in England (Ofsted, 2017).[1]

School	Setting	Total pupils in school	White British	FSM-eligible	Ofsted rating
S1	Urban	750	97%	26%	Good
S2	Urban	850	92%	22%	Good
All-England average		950	68%	12%	-

Notes: The size of the school is rounded to the nearest 50. Both schools were located the North East of England in urban areas. Both schools were non-selective, non-religious, mixed-sex and contained a higher proportion of White British and FSM-eligible pupils than the average across all state-funded English secondary schools. In the most recently available national school inspection data, both schools received a rating of "Good". These data was obtained from national administrative datasets.

Table 5.2: Developmental RCT — profile of participating schools

For ease of implementation this trial focused on year 9 pupils (aged 13-14). Upon joining the project the schools were required to distribute appropriate project information to parents via a letter which was approved by the UCL Research Ethics Committee and Data Protection Teams. After the appropriate window had elapsed for parents to provide opt-out consent (as per the ethical approval for this project) schools then shared demographic data on pupils for the purpose of randomisation, discussed in more detail below.

5.3.2 Role model recruitment

The role model for this trial was recruited via a consortium of universities in the North East of England and met the criteria for the "academic" university role model

[1] At the end of 2017, 56 per cent of state-funded secondary schools in England were judged to be "Good" which means they provide well for the needs of their pupils. The remainder of schools were categorised as either "Outstanding" (23 per cent), "Requires Improvement" (15 per cent) or "Inadequate" (six per cent).

discussed in Chapter 4. He was a former student ambassador at a university based in the same city as the participating schools. The intervention was a five-minute video of the university role model speaking about his journey into higher education and the importance of school qualifications (particularly GCSEs) for any post-school destination. A screenshot is given in Appendix 9.11.

5.4 Randomisation

This trial was randomised at the level of classes and data was collected on all the pupils in the relevant year group. Classes were then allocated to either the treatment or control arm and all pupils completed the survey as part of a classroom session (as per the description in Section 4.3.2).

However, as this project is focused on the outcomes for white working-class pupils, individuals with these characteristics were then identified in the outcome data. Therefore, the description of the randomisation which follows is focused on this subset of the population who were white British and had been FSM-eligible at some point in the last six years and/or came from one of the two least advantaged ACORN postcode categories (discussed in more detail in Section 4.4). Of the full sample of pupils, approximately 86 per cent met the "working-class" criteria and 79 per cent were "white working-class".

Classes were randomly allocated to either the intervention or control arms using code written in R statistical software (R Core Team, 2019). The total number of classes and pupils in each trial arm is shown in Table 5.3. In the randomised data, there were 13 classes with a mean class size of 21 pupils and a standard deviation 5.5 pupils. When restricting the sample to WWCB only, there were 13 classes with a mean class size of 9 pupils and a standard deviation 2.6 pupils.

Arm	Description	Weighting	Classes	Pupils	WWCB	WWCG
Treatment	Role model video	1	7	115	55	52
Control	No video	1	6	152	58	46
Both arms	**-**	**-**	**13**	**267**	**113**	**98**

Table 5.3: Developmental RCT — classes and pupils in the randomisation

5.5 Implementation and data collection

Schools were given written briefings for each tutor group which outlined the session plan depending on whether they were in the intervention or control group. Tutors in the treatment group were asked to show the intervention video (hosted on a website) before administering a survey and test. In the control arm tutors were instructed simply to administer the survey and test. Tutors were given printable copies of double-sided survey and test sheets which were labelled with pupil names and tutor groups. An example tutor briefing is given in Appendix 9.12 and a copy of the survey/test sheet is presented in Appendix 9.13.

Implementation happened two weeks before the end of term and on the same day in both schools. I observed implementation for five of the classes in one school and the tutors appeared to find the materials easy to follow. The key member of staff in each school reported that the sessions had all taken place as specified and completed survey and test sheets were returned for all the classes.

Attrition is summarised in Table 5.4. Flow diagrams which show the number of pupils, classes and schools at each stage of the trial for WWCBs and WWCGs are given in Figures 5.1 and 5.2. Outcome data was collected for 89 (79 per cent) of the WWCBs and 76 (78 per cent) of the WWCGs who were randomised. This was mainly because the intervention took place at the end of term and some pupils were on extracurricular trips or on holiday. In S1, one small class (containing three WWCBs) was also removed for an undisclosed reason.

In Table 5.5 I check whether attrition was related to trial arm allocation or pupil characteristics. If we look at the full sample of pupils, those with a special educational need are significantly less likely than other pupils to be present in the outcome data. However, if the sample is restricted to WWCBs or WWCGs, attrition does not differ significantly by trial arm allocation. Unfortunately, further analysis presented in Appendix 9.14 shows that, for WWCBs attrition was significantly higher for FSM-eligible pupils and those with a special educational need. Implications are discussed in Section 5.9.

	WWCBs		**WWCGs**	
	Treatment	**Control**	**Treatment**	**Control**
Randomised	55	58	52	46
Outcome data	41	48	42	34
(As proportion of randomised)	(74.5%)	(82.8%)	(80.8%)	(73.9%)

Table 5.4: Developmental RCT — proportion of pupils for whom outcome data was collected by trial arm

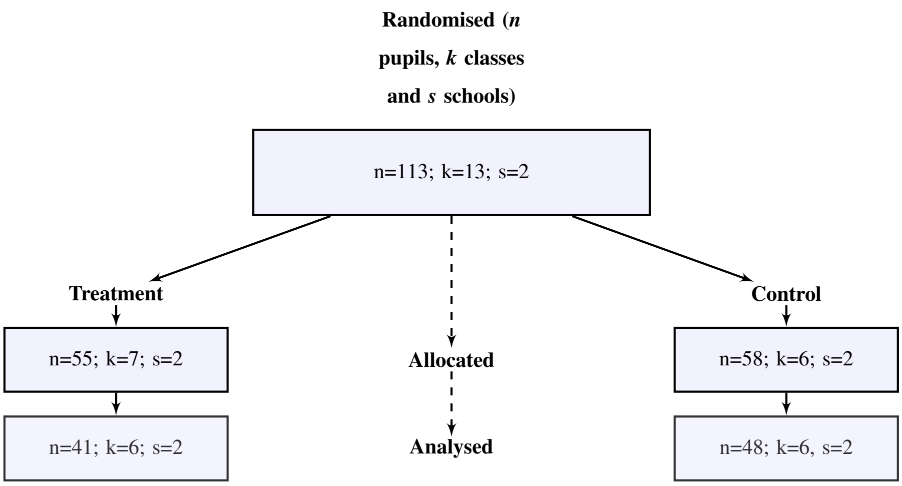


Figure 5.1: Developmental RCT — participant flow diagram for WWCBs

Notes: A participant flow diagram showing the number of WWCBs (n), classes (k) and schools (s) at every stage of the trial, from randomisation through to analysis.

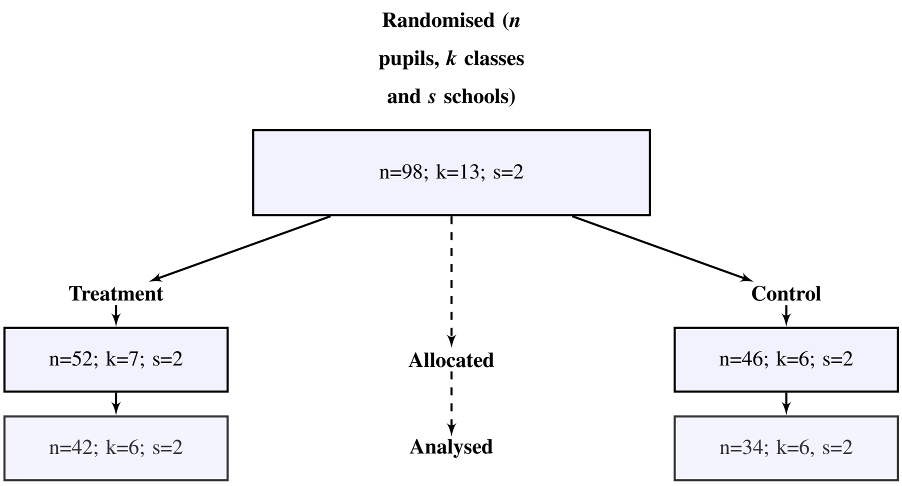


Figure 5.2: Developmental RCT — participant flow diagram for WWCGs

Notes: A participant flow diagram showing the number of WWCGs (n), classes (k) and schools (s) at every stage of the trial, from randomisation through to analysis.

	Present in outcome data		
	All pupils	WWCBs	WWCGs
Treatment	−0.073	−0.687	0.189
	(0.332)	(0.506)	(0.418)
FSM	−0.457	−1.033	−0.556
	(0.378)	(0.646)	(0.610)
SEN	-1.095^{**}	-1.058^{+}	−0.557
	(0.358)	(0.579)	(0.665)
Maths score	−0.372	−0.258	−0.348
	(0.269)	(0.376)	(0.265)
Constant	2.417^{**}	3.015^{**}	2.547^{**}
	(0.294)	(0.696)	(0.526)
Observations	259	111	97

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. Whether the pupil is present in the outcome data is coded as one (yes) or zero (no). Presence is modelled as a function of binary indicators for treatment and a number of other variables (shown) using binary logistic regression. All models control for a school dummy variable.

Table 5.5: Developmental RCT — attrition of sample between randomisation and outcome data collection

5.6 Description of pupils in collected data

Before describing the pupils in the collected data, it is useful to review the demographic variables used throughout my analysis. As specified previously, "FSM" is a binary indicator of whether a child has been eligible for free-school meals in the last six years, "SEN" is a binary indicator of whether a child has any special educational needs and "ACORN 4/5" is a binary indicator of whether a child lives in an ACORN 4 or 5 postcode. I also collect and control for "month of birth" which is a discrete measure of age within each year group. As one of the outcome measures is a maths test, prior attainment is captured using scores in Key Stage 2 maths which takes the form of a standardised continuous point score which I will refer to as the "maths score". Finally, I also generate a class-level measure of the proportion of the class meeting the WWCB criteria which is standardised and used as a covariate in some models as specified in the following sections.

In the data collected, there were 12 classes with a mean class size of 17 pupils and a standard deviation 4.5 pupils. When restricting the sample to WWCB only, there were 12 classes with a mean class size of 7 pupils and a standard deviation 2.5 pupils. A summary of the characteristics of the overall sample of WWCBs and WWCGs for whom data was collected is given in Table 5.6. Balance checks are presented in Appendix 9.15. There are no statistically significant differences between the intervention and control groups but the treated WWCBs are slightly more likely to be FSM eligible and have slightly higher reading Key Stage 2 scores in maths ($p < 0.1$). Random assignment means that this difference occurred by chance (Glennerster and Takavarasha, 2013) but the analysis reported in the following sections controls for FSM eligibility and maths scores as part of a vector of pupil characteristics to take this issue into account. There is no imbalance between trial arms for WWCGs.

	WWCB	**WWCG**	**All pupils**
White British	1.0	1.0	0.93
Female	0.0	1.0	0.47
FSM	0.54	0.39	0.40
SEN	0.30	0.30	0.28
ACORN 4/5	0.98	1.00	0.86
Maths score	0.01	-0.14	0.00
	(0.99)	(1.07)	(1.00)
Observations	**89**	**76**	**209**

Notes: For binary variables, the proportion of pupils meeting the criteria is stated. For the standardised maths score, the mean and standard deviation (in parentheses) is presented.

Table 5.6: Developmental RCT — characteristics of all pupils in data

5.7 Outcome measures

The outcomes collected directly from pupils are the "Identification with School Questionnaire" (ISQ) score (scaled between one and five), interest in university (between one and five), likelihood of applying to university (between one and five), interest in A-levels (between one and five), likelihood of taking A-levels (between one and five), score on a low stake maths test (maximum score of ten) and entry into a lottery for a chance to win online tutoring (binary). For all measures, a higher score indicates a more positive attitude or behaviour relating to education. Table 5.7 provides an overview of the outcomes combined across trial arms by pupil group (for WWCBs, WWCBs and all pupils).

As the ISQ is a score calculated using a seven item survey, it is important to assess the validity of this measure and so I calculate Cronbach's alpha for the full sample of pupils (N=205) and find the value is 0.71 which indicates an acceptable level of internal consistency. I also calculate the ICC and find it rages from 0.05 to 0.1 depending on the outcome measure of interest, suggesting that intracluster correlation may have had a smaller value than I had anticipated in my power calculations (see Chapter 4.2 for more detail). I also calculate the ICC for both the full sample of pupils and for the WWCB sub-sample. I find it ranges from 0.05 to 0.1 depending on the outcome measure of interest, suggesting that intra-cluster correlation may have had a smaller value than I had anticipated in my power calculations (see Chapter 4.2 for more detail).

	WWCB		WWCG	
	Treatment	**Control**	**Treatment**	**Control**
Primary outcome				
ISQ total	3.81	3.41	3.57	3.59
	(0.64)	(0.70)	(0.52)	(0.53)
Secondary outcomes				
University interest	3.10	3.33	3.38	3.88
	(1.10)	(1.26)	(1.15)	(1.17)
University likely	2.98	3.17	3.33	3.68
	(1.11)	(1.24)	(1.04)	(1.04)
A-level interest	2.98	3.17	3.33	3.68
	(1.03)	(1.12)	(1.00)	(0.88)
A-level likely	3.10	3.33	3.38	3.88
	(0.92)	(0.87)	(0.82)	(0.78)
Maths test	6.90	6.06	6.67	6.26
	(2.40)	(2.55)	(2.60)	(2.12)
Lottery entry	0.62	0.68	0.63	0.56
Observations	41	48	42	34

Notes: Mean outcome given with standard deviations in parentheses where appropriate. "ISQ total", "university interest", "university likelihood", "A-level interest" and "A-level likelihood" are all scored out of five and "maths score" is out of ten. "Lottery entry" is binary. The total sample for the survey data relates to pupils who responded to any one of the survey items but the actual sample size for the individual items ("ISQ total" etc.) is lower due to incomplete surveys.

Table 5.7: Developmental RCT — outcomes by pupil group and trial arm

5.8 Results

As stated in Chapter 4, in the following analysis I use ordinary least squares regression for continuous outcomes and binary logistic regression for the lottery entry outcome which is binary. Primary analysis focused on whether intervention impacts upon ISQ scores and the relative direction and size of the effect for WWCBs and WWCGs. Secondary analysis focused on how WWCBs and WWCGs responded to the survey outcomes concerned with academic progression (namely A-levels and university), scores in a low-stakes maths test and entry into the lottery. Data was analysed using using code written in R statistical software (R Core Team, 2019) and formatted using the "stargazer" package (Hlavac, 2018).[2]

5.8.1 Primary analysis

My primary results are summarised in Table 5.8 and show that there is a positive and statistically significant relationship between intervention and survey score for WWCBs. In practice, this equates to WWCBs in the intervention group rating approximately three of the seven constituent survey items one point higher. There was no such effect for their female counterparts and columns nine and ten show that the effect on white working-class pupils was indeed driven by males.

[2]Relevant sections of the actual code can be accessed at: https://github.com/ElizaKozman/someonelikeme.git

	ISQ score									
	WWCB				*WWCG*				*WWC*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Role model	0.405**	0.405**	0.422**	0.421**	−0.014	0.017	0.031	0.040	0.234*	0.014
	(0.142)	(0.139)	(0.153)	(0.151)	(0.102)	(0.094)	(0.094)	(0.108)	(0.099)	(0.110)
Proportion WWCB				−0.157				0.167		−0.046
				(0.719)				(0.364)		(0.438)
Male									0.018	−0.191
									(0.098)	(0.139)
Role model x Male										0.419*
										(0.176)
Constant	3.343**	3.199**	3.124**	3.209**	3.560**	3.519**	3.632**	3.565**	3.366**	3.513**
	(0.086)	(0.166)	(0.295)	(0.436)	(0.062)	(0.178)	(0.260)	(0.287)	(0.212)	(0.274)
Observations	86	86	84	84	76	76	75	75	159	159
Maths control	N	N	Y	Y	N	N	Y	Y	Y	Y
Other controls	N	Y	Y	Y	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Maths control" is Key Stage 2 maths score and "other controls" are FSM eligibility (binary), SEN status (binary) and month of birth. "Proportion WWCB" is the proportion of the class who are WWCBs. All models control for a school dummy variable. Models 1-4 relate to WWCBs, models 5-8 relate to WWCGs and models 9-10 relate to all white working-class pupil. Note that there is some discrepancy between the number of observations reported here and in the previous table because Table 5.7 relates to pupils who responded to any one of the survey items but the sample size for "ISQ total" is lower due to incomplete surveys.

Table 5.8: Developmental RCT — primary analysis — ISQ score

5.8.2 Secondary analysis

The results of my secondary analysis are summarised in Tables 5.9 and 5.10. The intervention did not have an impact on how interested WWCBs were in A-levels or how likely they thought they were to take them. There was also no effect on self-reported likelihood of attending university but the intervention appears to have had a negative effect on self-reported interest in this route. The intervention had a significant negative effect on three of the four outcomes for WWCGs: interest in A-levels and university and the likelihood of taking A-levels. There was no significant effect on maths test scores or lottery entry for either group.

	WWCB				*WWCG*			
	A-level		*University*		*A-level*		*University*	
	Interest	Likely	Interest	Likely	Interest	Likely	Interest	Likely
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Role model	−0.256	−0.150	−0.321*	−0.026	−0.431**	−0.435**	−0.521*	−0.183
	(0.230)	(0.111)	(0.153)	(0.165)	(0.166)	(0.168)	(0.223)	(0.205)
Proportion WWCB	−1.000	−1.171*	0.006	−0.234	−0.109	−0.093	0.060	0.526
	(1.218)	(0.572)	(0.877)	(0.880)	(0.485)	(0.545)	(0.774)	(0.621)
Constant	2.796**	3.079**	3.084**	2.827**	4.076**	4.034**	3.899**	3.831**
	(0.309)	(0.146)	(0.210)	(0.182)	(0.170)	(0.179)	(0.238)	(0.229)
Observations	86	86	86	86	75	75	75	75
Maths control	Y	Y	Y	Y	Y	Y	Y	Y
Other control	Y	Y	Y	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Maths control" is Key Stage 2 maths score and "other controls" are FSM eligibility (binary), SEN status (binary) and month of birth. "Proportion WWCB" is the proportion of the class who are WWCBs. All models control for a school dummy variable. Models 1-4 relate to WWCBs, models 5-8 relate to WWCGs.

Table 5.9: Developmental RCT — secondary analysis — post-16 aspirations

	WWCB		*WWCG*	
	Maths test	*Lottery*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)
Role model	−0.256	−0.167	−0.431	0.367
	(0.510)	(0.631)	(0.801)	(0.431)
Proportion WWCB	−1.000	2.058	−0.109	1.687
	(2.687)	(2.618)	(2.771)	(1.386)
Constant	2.796^{**}	0.057	4.076^{**}	0.427
	(0.535)	(0.650)	(0.735)	(0.398)
Observations	86	82	75	74
Maths control	Y	Y	Y	Y
Other control	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. “Maths control” is Key Stage 2 maths score and “other controls” are FSM eligibility (binary), SEN status (binary) and month of birth. “Proportion WWCB” is the proportion of the class who are WWCBs. All models control for a school dummy variable. Models 1-2 relate to WWCBs, models 3-4 relate to WWCGs. Lottery entry is binary and analysed using binary logistic regression.

Table 5.10: Developmental RCT — secondary analysis — maths test and lottery entry

5.8.3 Robustness checks

To test the robustness of my findings I expanded my dataset by imputing values where survey items were missing. I first used manual imputation to estimate ISQ totals for three pupils who had failed to answer all of the survey questions by using the mean score for items they did respond to. I also used multiple imputation to estimate a value for the ISQ total and other survey responses where pupils had responded to at least one of the other survey questions.[3] For both approaches, as data were missing for between two and three pupils per survey outcome this was a trivial exercise; my findings do not change when using imputed data and so I do not report these results. Similarly, the lottery entry box was left blank for only seven of the pupils in the final dataset. As a robustness check, I revalued these missing entries as a rejection of the lottery and reanalysed the data but, given the small number of pupils affected, this does not have any impact on the findings reported earlier.

5.8.4 Exploratory analysis

As exploratory analysis, I explore the impact of the intervention on pupils who are not white working-class, as shown in Table 5.11. The sample size for this analysis is very small and we do not see any significant effect of the intervention on any of the outcome measures.

[3]Using the "miceadds" package in R (Robitzsch et al., 2019) to generate five imputed datasets based on demographic information and existing survey responses for each pupil.

		A-level		University			
	ISQ	*Likely*	*Interest*	*Likely*	*Interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
University role model	0.161	−0.006	0.256	0.127	0.003	0.929	−1.508
	(0.184)	(0.139)	(0.297)	(0.346)	(0.278)	(0.757)	(1.010)
Constant	3.419**	2.871**	3.126**	3.354**	3.318**	5.791**	2.736**
	(0.099)	(0.169)	(0.265)	(0.443)	(0.202)	(0.866)	(0.975)
Observations	38	38	39	38	38	39	39
Maths control	Y	Y	Y	Y	Y	Y	Y
Other control	Y	Y	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Maths control" is Key Stage 2 maths score and "other controls" are gender, FSM eligibility (binary), SEN status (binary), month of birth and the proportion of the class who are WWCBs. All models control for a school dummy variable.Lottery entry is binary and analysed using binary logistic regression.

Table 5.11: Developmental RCT — exploratory analysis — effect on non-WWC pupils

5.9 Discussion

5.9.1 Discussion of quantitative results

As a pilot, we should be cautious about how we discuss the results of the preceding analysis. Because pilot samples are small, and the primary aim is normally to address feasibility concerns, it is not appropriate to place undue significance on these kinds of results (Lancaster et al., 2004). However, pilots can also be used to generate estimates of the treatment effect, as in this trial, when this analysis used to identify effects which are avenues for follow-up in a larger study (Thabane et al., 2010). The analysis presented here is for that purpose and will supplement more robust analysis with a larger sample, presented in Chapter 6.

My primary analysis shows that the intervention had a positive impact on ISQ scores for WWCBs but no such effect on their female counterparts. The impact translates into an effect size of 0.6 standard deviations which is large in the context of education research where the average effect size is closer to 0.1 standard deviations for attainment outcomes (see Section 4.5.2 for a more detailed discussion of effect sizes).

The asymmetry in my primary analysis is also seen in the impact on academic aspirations. The intervention had a significant negative effect on three of the four outcomes for WWCGs: interest in A-levels and university and the likelihood of taking A-levels. There is less of a striking pattern in the effect on boys although the intervention is associated with a significant negative impact on interest in university. I find no effect of the intervention on maths test scores or lottery entry for either group.

Here it is important to flag that, although we see some negative effects, for WWCBs and particularly for WWCGs, this does not provide concrete enough proof of harm to discontinue testing the intervention. As mentioned earlier in this section, this is a pilot with a small sample and so any quantitative findings should be used with caution. The small sample means we should not place a lot of confidence in these results; however, they provide a useful signpost for avenues which we should (and indeed plan to) investigate in the full trial.

These findings provide some preliminary evidence for hypotheses one and four: that exposure to male role models will improve attitudes to education among WWCBs and that the effect will be lesser for WWCGs. However, the negative impact on university interest among boys, and the broader negative impact for girls was somewhat unexpected and bears some further scrutiny. As the focus of the role model video was firmly on the value of GCSE qualifications for a wide range of post-school destinations, it is perhaps not surprising that the intervention did not have a positive impact on attitudes to A-levels and university. The result suggests that the intervention may have motivated WWCBs to gain qualifications for their chosen career without instilling any desire to pursue academic options. Although the role model was relatable, the fact that his video included an anecdote about having to resit an A-level before meeting university entry requirements may have led to uncertainty among pupils about their own chances of success and thus led to the kick-back effect we observe.

The internal validity of this trial is reasonably high. Intervention delivery was tightly controlled by teachers and so we can be confident that randomisation was implemented as specified (although I could not observe every single session). Because the outcome data was collected in classes directly after the intervention, spillover is not a risk here and my analysis shows that attrition between randomisation and data collection should not have biased the results. However, the small sample size brings some unavoidable uncertainty to the results.

In terms of external validity it is unfortunate that, in my sample of WWCBs, attrition between randomisation was significantly higher for FSM-eligible pupils and those with a special educational need. This attrition means that I must caveat my findings as applying to a particular subset ofschool pupils who participated in my sessions and recognise that this cohort is not entirely representative of the general population. It is also important to acknowledge that this trial featured one role model and took place with a small sample of pupils in a single year group, in two schools in a particular geographical area of the country. Both schools were located in the North East of England in urban settings. In both schools, the proportion of white British pupils was over 90 per cent (versus approximately 89 per cent across the region and 70 per cent nationally) and the proportion of FSM-eligible pupils was more than 20 per cent (versus approximately 19 per cent across the region and approximately 12 per cent nationally). So in general we can say that the trial took place in schools which were largely representative of the sample of state-funded secondary schools across the region but were more likely to contain white and FSM-eligible pupils than the wider pool of these schools in England. Both schools also had an Ofsted rating of "Good" which is the modal rating for schools in England and in the north East (Ofsted, 2017) and approximately 73 per cent of secondary schools in the North of England (according to the Regional School Commissioner areas of operation) are in urban areas so the schools were largely representative of other schools in their region in this regard. Therefore, one must be cautious about about extrapolating the results to the broader population. I seek to address this weakness in my second RCT which involves multiple role models and a bigger sample of pupils spread across a number of year groups, schools and areas of the country (see Chapter 6).

5.9.2 Performance against pilot objectives

As presented in Section 5.2, I set a number of objectives for this pilot trial to determine suitability for progression to large-scale roll out. I comment on each of these objectives in turn and identify modifications which were taken forward for the full trial.

The first objective was to assess the feasibility of recruiting participants for my work. As described in Section 5.3, recruitment was via a collaborative network of schools and I used digital recruitment materials and follow-up phone calls to communicate the scope of involvement. My criteria for meeting this objective was that more than five schools volunteer to take part after a month's recruitment activity and I met this target, with seven schools volunteering in total. Teachers were supportive of the research aim and design and I found that many were keen to do more work with the target group in question. Therefore, the general level of appetite to participate was good and, although I only went forward with two schools (the minimal sample to test a multi-site design) my experience suggested that recruitment for a larger trial would be feasible. It should also be noted that, although in this pilot I focused on a single year group for practical purposes, the plan was always to include Years 8-11 in the full trial. As I was recruiting full schools onto the project, my objective relates to school recruitment only as this is the critical factor for gathering a sample of participants.

My second objective was to assess the feasibility of the proposed eligibility criteria for identifying target pupils. The first criteria for meeting this objective was that data was available and of sufficient quality to apply the targeting criteria (based on postcode and free-school meals eligibility data). I found that schools were easily able to provide high quality administrative data which could be converted into targeting metric. A second criteria was that the target sample be big enough to facilitate the proposed research design and this was met as around 80 per cent of pupils in the participating schools were classified as "white working-class".

My third objective was to investigate the acceptability of intervention to schools and participants. I observed implementation of the intervention sessions with five classes of pupils and saw that no harm was evident in how pupils experienced the intervention. School staff did not express any concerns about the video, in fact they stated that it was in line with normal careers session resources. Therefore, this objective was met.

In treating this trial as a "dummy run" for a larger trial, one key question was whether schools would be able to deliver the classroom sessions according to the trial procedure. Therefore, one objective was to investigate fidelity of intervention delivery. My criteria for success on this objective was that school staff be observed to deliver the intervention with fidelity and not report any issues with implementation. In the event, I found these criteria to met, as within the five sessions I observed, staff were able to implement the intervention as specified and staff at the other school did not report any issues in this regard. One issue I did observe was that, in some classes, staff were more rigorous about enforcing silence and lone-working on surveys. Therefore, one clear modification for the full trial was to enhance messaging to staff about how pupils should watch the video and complete the survey sheets in silence, to encourage more consistency across classes in this regard. I also observed that staff had very little time to prepare for implementation, generally reading the instructions on the tutor briefing sheet for the first time within the session. Therefore, it became clear that these instructions needed to be concise and straightforward to follow, suggesting some small changes to these materials for the full trial. Another point of learning was that, although there was sufficient time to implement the sessions as required, timelines were generally tight as classes were invariably delayed in starting with a delay while pupils got seated and settled down. Therefore, in recruitment for the full trial, this extra time was factored into the session description when communicating the requirements to schools.

My fifth objective was to assess the feasibility of using the proposed outcome survey. Via my observation, I found that my pupils seemed comfortable with the survey questions and were able to complete the form within the time allocated. On completed forms, the number of blank survey items was low and analysis of the ISQ survey found it had a reasonable degree of internal consistency. Therefore, all of my criteria for success on this objective were met). My final objective was to synthesise data to inform the sample size for a full trial. Through this pilot I collected estimates of the intracluster correlation coefficient (ICC), cluster size and other parameters.

There are a number of limitations to this pilot which bear some short discussion. The clearest is that the trial only included one year group based in two schools in the North East of England. It is possible that recruitment in other areas of the country may be more difficult if there are localised programmes of outreach or research which schools are involved in, therefore recruitment feasibility may be lower than predicted based on this trial. The second objective relating to target criteria and the size of the available target group is also likely to depend on the exact area of the country in which schools are located and so I must anticipate that the sample may decrease upon expansion into areas which have a lower proportion of pupils who are from working-class backgrounds. Similarly, I can only synthesise data collected from these schools to inform sample size calculations for my full trial, and I must accept that they will not be representative of the wider sample of schools I wish to work with.

Success against the other objectives, particularly fidelity of implementation and feasibility of the survey is not likely to have been affected by the geographical location of the schools in my trial, but could be affected by the small number of classes I observed. Specifically, I could have inadvertently chosen a school with practicality conscientious staff and pupils whereas those in the wider population would have been less fastidious in following my instructions. Moreover, by observing classes I could have caused staff and pupils to pay greater attention to the session materials than they would have otherwise.

Some of these limitations could only be solved by working with a bigger group of schools for my pilot which would be counter intuitive as the aim of the pilot is to provide small-scale proof of concept before scaling-up. In general, I believe the limitations are sufficient to caveat, but not undermine, the success of the pilot against my stated objectives. I have noted some small changes to the messaging to be used in the main trial above but I do not think that the pilot results warrant any substantive changed to the main trial protocol; I therefore posit that the appropriate outcome for this pilot is “continue without modifications, but monitor closely”, based on a the classification provided by Thabane et al. (2010).

5.10 Conclusion

This chapter details the implementation and results of an RCT to test whether a short video of a local university student talking about the value of school could have an impact on attitudes to education among WWCBs and if there would be less of an effect on their female counterparts. Specifically, I measured the impact of my light-touch intervention on self-reported attitudes to education, interest in and likelihood of progressing to A-levels or university, performance in a low-stakes maths test and entry into a lottery to win education resources. I found that the intervention did have a positive and statistically significant impact on ISQ scores for WWCBs but a null or negative effect for their female counterparts.

Through this pilot I demonstrated that the trial design is feasible and ready for scaling-up to a larger sample of schools. The trial provides some empirical evidence which I can use to help answer my research question; however, these results must be treated with caution as they are from a small-scale pilot and should be used to supplement more robust investigation in the full RCT only. By providing proof of concept for the method of randomisation, implementation and data collection, this trial forms an excellent precursor for my second RCT which I go onto describe in Chapter 6.

Chapter 6

Academic versus vocational role models

6.1 Introduction

Previously, I have set out my research design which comprises two RCTs and a qualitative study all focused on the central research question: "can exposure to male role models improve attitudes to education among white working-class male pupils in English schools?" (Chapter 4). In the preceding chapter, I described the first of my RCTs which was designed to test whether a video case study of a university role model could improve attitudes to education among white working-class boys in school and to examine the relative effect on their female counterparts (Chapter 5). I found that the intervention did have a positive and statistically significant impact on white working-class boys' attitudes to education (based on survey data) but there was a null or negative effect on their female counterparts.

The current chapter builds on these results with a more complex RCT designed to test multiple hypotheses simultaneously. Specifically, I compare a university role model against an apprenticeship role model and test the effect of a "similarity priming" activity within these arms via a factorial design. In Section 6.2, I outline the process by which I recruited over 20 schools and eight role models to participate in this trial. In Section 6.3, I then describe how pupils in Years 8 to 13 were randomised into five trial arms clustered at classroom-level. In Sections 6.4 and 6.5, I discuss how the trial was implemented, rates of data collection, attrition and balance across trial arms. I then present an overview of my outcome data in Section 6.7.

In Section 6.8, my primary analysis shows that being exposed to a role model had a small but significant positive impact on self-reported attitudes to education among my sample of white working-class boys and this was driven by the university role model. There is no main effect of the apprenticeship role model or priming activity on this outcome. Secondary analysis focused on interest in university or apprenticeships, scores in a low-stakes maths test and entry into a lottery to win £200 of online tutoring (based on the theory than pupils with more positive attitudes to education would be more likely to enter)[1] as well as school data on attendance and effort. This analysis found that there was no effect on any secondary outcomes except the lottery entry for which exposure to a role model led to an increase in entry which was present immediately after the intervention and three weeks later. I find no effect of any intervention on WWCGs.

In Section 6.9, I show that my results are robust to various forms of imputation to account for missing data and in Section 6.10, I provide some exploratory analysis of other data collected in the trial. In Section 6.11, I discuss how these results support my stated hypotheses about the positive impact of role models on attitudes to education and a differential effect by gender. A summary of how this chapter contributes to the overall thesis is given in Section 6.12.

[1]The survey sheet informed pupils that the £200 would buy them "between 6 and 10 personal tutoring sessions which will focus on helping you do better at school".

6.2 Recruitment

6.2.1 School recruitment

Schools were recruited via a combination of conference presentations, adverts in newsletters, social media coverage and direct email invitations.[2] The recruitment materials specified that schools should be state-funded secondaries based in England and contain a high proportion of white-British boys from disadvantaged backgrounds but no numeric eligibility criteria were given. This approach was taken because the pupil-level eligibility criteria (specified in Section 4.4) mean that pupils who are not FSM-eligible were still classified as part of the target population if they were from certain geographical areas. However, schools did not have access to information on the latter, so setting hard eligibility criteria could have meant inadvertently excluding suitable participants. In practice, a pragmatic approach to recruitment was taken and a small number of schools with relatively low numbers of white British disadvantaged pupils were accepted onto the project. Two schools in particular (S11 and S18) had a lower proportion of white British pupils versus the average in state-funded English secondary schools but were included to boost the overall sample, albeit marginally.

Schools were invited to express their interest via a form on the project website or email. They were then sent an information pack with more detailed information, covering data protection, ethics, implementation and data collection. All schools were also asked to participate in an introductory phone-call to outline the project requirements and mutually agree whether they would be able to take part. Schools were only formally welcomed to the project after this conversation.

[2]The Department for Education recently released contact details for schools via a Freedom of Information request. This list was used to send targeted emails to schools where the number of FSM-eligible pupils, and the number of white British pupils, exceed the national average. Schools were sent project information leaflets and a link to the project website which can be accessed at: www.https://someonelikeme.uk/

On the basis of ex-ante power calculations (see Section 4.5.2), the recruitment target was 30 schools. The project was initially advertised in three geographical areas: the South (comprising parts of the South East and South West regions), the East Midlands and the West Midlands, with the intention to run the trial in the Autumn term of 2018. However, recruitment was lower than hoped and despite initial interest from many of schools, only 12 moved forward to the point of randomisation. The low rate of conversion from interest to participation was partly due to a change in data protection regulation which came into force over the recruitment period and led many schools to believe they were unable to share data for research purposes.

To address low uptake, the project timeline was extended to include a second wave of recruitment which also covered a new geographical area: the East of England. A further 12 schools were recruited to take part and were randomised into the second wave of the trial in Spring 2019. Therefore, the final randomised sample contained 24 schools split across two waves (as shown in Table 6.1 below) and across four project areas (a map is presented in Appendix 9.16). Based on the discussion of statistical power presented in Chapter 4, this sample was still sufficient to run a trial powered to detect an effect size smaller than 0.2 (Cohen's δ) for main effects.

	Wave 1	**Wave 2**	**Total**
East of England	0	4	4
East Midlands	3	2	5
South	4	5	9
West Midlands	5	1	6
Total	**12**	**12**	**24**

Table 6.1: Full RCT — number of schools in randomisation by project area and wave

6.2.2 Role model recruitment

A version of the intervention materials was developed for each project area for schools in the East of England, East Midlands, West Midlands and South, the "university" and "apprenticeship" role models were based in a similar part of the country to the pupils (and to each other). Table 6.2 presents the location of the role models by project area. Schools were allocated to intervention materials based on their location in one of the project areas.[3] The role models themselves were recruited via requests to universities and colleges in the relevant areas.[4] All role models took part in a two-hour filming session which was cut down into a five minute video clip. To ensure the role model videos were as comparable as possible across role model types and project areas, the content was developed according to a template so that all of the role models covered very similar topics, albeit tailored to their own life-story and context. Every role model spoke about a challenge they had overcome in their education, their route into university or an apprenticeship, the benefits of their chosen pathway and a piece of motivational advice for pupils in school. All of the university role models mentioned that they were first in their family to attend university and all of the role models discussed the value of GCSE qualifications, particularly English and maths, for their chosen destination. Screenshots and of the full videos are given in Appendix 9.17.

Project area	University role model	Apprenticeship role model
East of England	University of East Anglia (Norwich)	Norwich
East Midlands	Nottingham Trent University	Nottingham
South	University of Southampton	Portsmouth
West Midlands	University of Birmingham	Birmingham

Table 6.2: Full RCT — location of role models by project area

[3]Noting that schools in the "South" project area were spread across the South West and South East.

[4]Role models were all white British, male and studying or working in the same part of the country where they grew-up. For university role models they were requested to be the first in their family who attended HE.

6.2.3 Profile of participating schools

Table 6.3 provides some more information about the participating schools. One school (S11) was a boys-only school but the remainder were mixed-sex and had non-selective entry criteria and no religious character. Schools ranged in size considerably — from 500 to 1,500 pupils — but were distributed fairly evenly about the average for state-funded English secondary schools. The majority were in urban areas and only two schools were located in rural areas (which equates to approximately eight per cent of the total sample compared to an all-England average of 15 per cent).

Although some schools had a lower proportion of white British and FSM-eligible pupils than the national average, taken as a whole, the schools contained a higher proportion of white British pupils (77 per cent versus 68 per cent) and a higher proportion of FSM-eligible pupils (16 per cent versus 12 per cent) than the average across all state-funded English secondary schools. Of the participating schools, one school had an Ofsted rating of "Outstanding" (four per cent compared to 23 per cent across England), 16 schools were rated as "Good" (67 per cent compared to 56 per cent across England), six schools were rated as "Requires Improvement" (25 per cent compared to 15 per cent across England) and one school was rated "Inadequate" (four per cent compared to six per cent across England) (Ofsted, 2017). Therefore, schools rated as "Good" and "Requires Improvement" were overrepresented in the sample whilst those at the extreme ends of the rating scale were underrepresented. More broadly, the proportion of schools rated as "Good" or "Outstanding" sits at 71 per cent versus a national average of around 80 per cent, suggesting the overall sample contained lower-performing schools than the wider population of state-funded schools in England.

In Table 6.4, the characteristics of participating schools aggregated by are are presented next to the all-region average. This table shows that schools in my sample from the East Midlands and West Midlands were smaller than the all-region average, while participating schools in the South and East of England were not very different from the regional average. On average, participating schools in the East Midlands were also smaller than across the region, containing a lower proportion of white British pupils and a greater proportion of FSM-eligible pupils. Participating schools in the West Midlands were also smaller than the regional average and contained a higher proportion of white British pupils. Participating schools in the South and East of England both contained a higher proportion of FSM-eligible pupils than the wider regions. Schools in urban areas were over-represented in every region except the West Midlands. Participating schools in the South and East of England were more likely to be rated "Good" or "Outstanding" , and schools in the West Midlands, less likely to be rated "Good" or "Outstanding", by Ofsted than the broader sample of schools in the respective regions. The profile of participating schools provides important context for the trial and the implications for external validity are discussed in Section 6.11.

Upon joining the project, schools were required to complete three tasks. First, they were asked to sign a data sharing agreement and then required to send a "privacy notice" and information sheet home to parents (or directly to pupils in Years 12 and 13). These documents were approved by the UCL Research Ethics Committee and Data Protection Teams and outlined the details of the project and the pupils' rights. As academic research, the project relied on the "public task" legal basis for processing data which meant that explicit pupil opt-in consent was not required. However, in line with standard ethical practice in this field, pupils and parents were able to withdraw from the project via opt-out consent (further details of the ethical considerations are in Section 4.8). After these materials were distributed and responses collected, schools were asked to provide demographic data on their pupils for the purpose of randomisation. They committed to removing any pupils who opted-out of the project prior to sharing the data; however, any requests which were submitted after the deadline were implemented by myself. The following section outlines how the remaining sample was randomised into trial arms.

School	Area	Setting	Total pupils	White British	FSM-eligible	Ofsted rating
Wave 1						
S1	EM	Urban	500	95%	10%	Good
S2	EM	Urban	650	88%	8%	Good
S3	EM	Urban	800	91%	21%	Requires Improvement
S4	S	Urban	550	94%	19%	Good
S5	S	Urban	900	85%	21%	Good
S6	S	Urban	1,150	76%	7%	Good
S7	S	Urban	1,400	71%	4%	Good
S8	WM	Urban	400	98%	11%	Requires Improvement
S9	WM	Rural	650	96%	11%	Requires Improvement
S10	WM	Rural	550	92%	15%	Good
S11	WM	Urban	650	38%	15%	Outstanding
S12	WM	Urban	1,050	87%	16%	Good
Wave 2						
S13	EE	Urban	600	64%	27%	Requires Improvement
S14	EE	Urban	1,350	86%	15%	Good
S15	EE	Urban	1,100	85%	15%	Good
S16	EE	Urban	1,000	61%	19%	Good
S17	EM	Urban	950	100%	20%	Requires Improvement
S18	EM	Urban	1,500	23%	19%	Good
S19	S	Urban	700	67%	20%	Good
S20	S	Urban	750	68%	33%	Requires Improvement
S21	S	Urban	850	86%	33%	Inadequate
S22	S	Urban	1,200	74%	20%	Good
S23	S	Urban	1,200	90%	12%	Good
S24	WM	Urban	950	82%	15%	Good
		Sample average	**900**	**77%**	**16%**	—
		All-England average	**950**	**68%**	**12%**	-

Notes: The schools were located in four areas: the East Midlands ("EM"), South ("S"), West Midlands ("WM") and East of England ("EE") and the majority were in urban settings. All schools were non-selective, non-religious and mixed-sex apart from S11 which was an all-boys school. School size is rounded to the nearest 50. The sample averages are weighted means (based on school sizes). The all-England average is for state-funded secondary schools. Data was obtained from national administrative datasets.

Table 6.3: Full RCT — profile of participating schools

Area		Urban	Average school size	White British	FSM-eligible	Good or Outstanding
EM	Participating schools average	100%	900	70%	17%	60%
	Regional average	81%	1000	756%	13%	77%
S	Participating schools average	100%	1000	79%	17%	78%
	Regional average	82%	1000	78%	10%	82%
WM	Participating schools average	67%	700	81%	14%	67%
	Regional average	87%	900	63%	16%	78%
EE	Participating schools average	100%	1000	76%	18%	75%
	Regional average	82%	1000	74%	10%	85%

Table 6.4: Full RCT — profile of participating schools by area

6.3 Randomisation

In a scale-up from the developmental trial, this trial included pupils in Years 8 and up. Year 7s were excluded on the basis of discussions with school staff who thought they would be too young to benefit from the intervention. Year 12s and 13s were included where schools wanted to include them (as a pragmatic decision to increase sample size), but in practice only handful of participants were in these year groups.

This trial was a cluster RCT so randomisation took place at the level of tutor groups which are nested within schools. In consultation with participating schools, some small groups which sat outside the normal tutorial system (i.e. for pupils with particular educational or behavioural needs) were excluded from the trial as it was felt that they would not necessarily enjoy or engage with the materials. This approach also maintained the integrity of the research design which is based on tutor groups being a fairly standard size across schools.

Although full groups of pupils were allocated to trial arms, I was only concerned with the outcomes for male and female pupils who meet my "white working-class" criteria — namely those who were white British and had been FSM-eligible at some point in the last six years and/or come from one of the two least advantaged ACORN postcode categories (discussed in more detail in Section 4.4). Of the randomised sample, approximately 59 per cent met the "working-class" criteria and 42 per cent were "white working-class". The description of the randomisation which follows is restricted to pupils who meet this "white working-class" criteria — specifically "WWCBs" (white working-class boys) and "WWCGs" (white working-class girls).

Schools were stratified by area and tutor groups were allocated to one of five arms using code written in R statistical software (R Core Team, 2019). A description of the arms is given in Table 6.5. The randomisation was weighted so that the control group was roughly twice as large as the any of the other individual arms as per the factorial design outlined in Chapter 4. As the trial took place over two waves, the randomisation was split into two batches; however, for the purpose of balance checks the randomised lists were combined at the second stage to check the whole sample.

In total, the randomisation contained 748 classes across the 24 schools. There were 16,406 pupils in these classes, 3,576 of whom met the WWCB criteria and 3,329 of whom met the WWCG criteria. The total number of classes and pupils in each trial arm, and for each wave, is shown in Table 6.6.

Trial arm	Randomisation weighting	Name	Description
Arm 1	1	Uni and prime	University role model video & prime activity
Arm 2	1	Uni	University role model video
Arm 3	1	App and prime	Apprentice role model video & prime activity
Arm 4	1	App	Apprentice role model video
Arm 5	2	Control	Business as usual

Table 6.5: Full RCT — trial arm description and randomisation weighting

6.4 Implementation and data collection

Following randomisation, schools were given briefings for each tutor group which outlined the activities which tutors should deliver. Tutors in trial arms 1-4 were

	Classes	Pupils	WWCB	WWCG
Wave 1 (12 schools)				
Arm 1 (Uni+prime)	52	1,235	267	258
Arm 2 (Uni)	52	1,249	262	239
Arm 3 (App+prime)	51	1,202	236	229
Arm 4 (App)	50	1,208	226	219
Arm 5 (Control)	99	2,388	562	489
All arms	**304**	**7,282**	**1,553**	**1,434**
Wave 2 (12 schools)				
Arm 1 (Uni+prime)	75	1,567	345	340
Arm 2 (Uni)	74	1,512	328	309
Arm 3 (App+prime)	74	1,528	338	314
Arm 4 (App)	74	1,501	334	306
Arm 5 (Control)	147	3,016	678	626
All arms	**444**	**9,124**	**2,023**	**1,895**
Wave 1 and 2 combined (24 schools)				
Arm 1 (Uni+prime)	127	2,802	612	598
Arm 2 (Uni)	126	2,761	590	548
Arm 3 (App+prime)	125	2,730	574	543
Arm 4 (App)	124	2,709	560	525
Arm 5 (Control)	246	5,404	1,240	1,115
All arms	**748**	**16,406**	**3,576**	**3,329**

Table 6.6: Full RCT — classes and pupils in the randomisation for wave 1, wave 2 and both waves combined

instructed to show videos as appropriate before administering the survey and test.[5] In arm 5 (the control arm), tutors were instructed to go straight into administering

[5]Tutors were directed to the correct video intervention via routing on the project website. All tutors were first asked to enter a web address which took them to a landing page for their trial arm. Then they were asked to choose the name of their school from a list which took them to the right video for their geographical area. This approach minimised the complexity of the web address which tutors had to enter.

the survey and test. The instructions did not differ in any other regard. Schools were also provided with printable copies of double-sided survey/test sheets which were labelled with pupil names and tutor groups. An example tutor briefing and survey/test sheet are given in Appendices 9.18 and 9.19.

Unfortunately, following randomisation, three schools dropped out of the project: S8, S21 and S22. The key staff member at S21 explained that they could no longer participate as they had changed their tutorial system so there was no period in which to run the sessions. The other schools did not provide any explanation for their withdrawal. Here it is pertinent to examine the profile of the schools which dropped out in more detail. The schools which dropped out ranged in size quite considerably (either side of the sample average). They all contained a high proportion of white British pupils, with only one dipping slightly below the sample and regional average. The proportion of FSM-eligible pupils again ranged either side of the sample average but one of the schools was among the top-two most disadvantaged schools in my sample on this metric. All of the schools which dropped out were in urban areas (the modal setting for my sample) and two were below the modal Ofsted rating for my sample, with ratings of “Inadequate” and “Requires Improvement”.

To recognise the change in sample, I present Tables 6.7 and 6.8 which summarise the profile of participating schools. Removing the drop outs does not change the sample average substantially across the characteristics examined although the remaining schools are arguably slightly higher-performing in terms of Ofsted rating, with 1 of the 21 rated as “Outstanding” (5 per cent versus 4 per cent in the original sample), 15 rated as “Good”” (72 per cent versus 67 per cent in the original sample), five rated as “Requires Improvement” (23 per cent versus 25 per cent in the original sample). The removal of the dropouts also boosts the average performance of participating schools relative to their regional averages (in the South and West Midlands), and reduces the proportion of FSM-eligible pupils in the South to be more comparable to the regional average, but otherwise does not make a substantial difference to the regional averages.

In the remaining 21 schools, a key member of staff was tasked with printing the tutor briefings and survey/test sheets, distributing these as appropriate and coordinating the delivery of the sessions. As it was not possible to observe implementation, I relied on feedback from the key staff members to assess how well the trial was run. I spoke with nearly all of the key staff following implementation and where this wasn't possible I requested comments via email. Staff reported that they and their colleagues had a good understanding of the instructions and that implementation was generally smooth.[6] Some sessions weren't implemented due to staff absence or other school issues and in one school (S23) all of Year 11 was removed post-randomisation because of changes to the timetable which meant they no longer had tutorial sessions. The same school was also delayed in running session 1 and therefore ran out of time to run session 2 before the end of term.

Following each session, sheets were collected centrally by the school and then returned in batches. The administrative outcome data (attendance and effort) was collected after the end of the term in which the sessions took place. A full overview of participant flow for WWCBs and WWCGs is given in Figures 6.1 and 6.2. For both groups, a number of pupils were excluded from the randomisation because they were either in Year 7 (an ineligible year group) or not in the tutorial system (as discussed earlier in this section). It is important to note that the randomised sample was larger for WWCBs than WWCGs as there was one all-boys school in the project. This school also had a large number of mixed-age tutor groups, hence the larger excluded sample for WWCBs than WWCGs.

Unfortunately, there is a substantial attrition between randomisation and data collection (summarised in Tables 6.9 and 6.10). The three schools which dropped out contained 501 WWCBs (14 per cent of the total in the randomisation) and 427

[6]One staff member commented "Once I got my head around what I had to do, it was really simple and easy to implement. The tutors didn't even really need to do any preparation and it was straight-forward for them to run the sessions"

School	Area	Setting	Total pupils	White British	FSM-eligible	Ofsted rating
Wave 1						
S1	EM	Urban	500	94.9%	10.0%	Good
S2	EM	Urban	650	88.4%	8.4%	Good
S3	EM	Urban	800	91.0%	20.5%	Requires improvement
S4	S	Urban	550	94.4%	18.8%	Good
S5	S	Urban	900	85.3%	20.9%	Good
S6	S	Urban	1150	75.7%	6.6%	Good
S7	S	Urban	1400	70.6%	4.2%	Good
S9	WM	Rural	650	95.7%	11.4%	Requires Improvement
S10	WM	Rural	550	91.9%	15.2%	Good
S11	WM	Urban	650	37.7%	14.8%	Outstanding
S12	WM	Urban	1050	87.0%	15.9%	Good
Wave 2						
S13	EE	Urban	600	64.1%	26.9%	Requires improvement
S14	EE	Urban	1350	86.4%	14.7%	Good
S15	EE	Urban	1100	84.9%	14.7%	Good
S16	EE	Urban	1000	60.5%	18.7%	Good
S17	EM	Urban	950	99.9%	19.6%	Requires Improvement
S18	EM	Urban	1500	22.9%	19.1%	Good
S19	S	Urban	700	66.7%	19.7%	Good
S20	S	Urban	750	68.4%	32.8%	Requires Improvement
S23	S	Urban	1200	89.8%	11.8%	Good
S24	WM	Urban	950	81.7%	14.5%	Good
	Sample average		**900**	**76%**	**16%**	—
	All-England average		**950**	**68%**	**12%**	-

Notes: The schools were located in four areas: the East Midlands ("EM"), South ("S"), West Midlands ("WM") and East of England ("EE") and the majority were in urban settings. All schools were non-selective, non-religious and mixed-sex apart from S11 which was an all-boys school. School size is rounded to the nearest 50. The sample averages are weighted means (based on school sizes). The all-England average is for state-funded secondary schools. Data was obtained from national administrative datasets.

Table 6.7: Full RCT — profile of participating schools — post dropout

Area		Urban	Average school size	White British	FSM-eligible	Good or Outstanding
EM	Participating schools average	100%	900	70%	17%	60%
	Regional average	81%	1000	756%	13%	77%
S	Participating schools average	100%	950	78%	14%	85%
	Regional average	82%	1000	78%	10%	82%
WM	Participating schools average	60%	750	80%	15%	80%
	Regional average	87%	900	63%	16%	78%
EE	Participating schools average	100%	1000	76%	18%	75%
	Regional average	82%	1000	74%	10%	85%

Table 6.8: Full RCT — profile of participating schools by area — post dropout

WWCGs (13 per cent of the total in the randomisation) which sets a low ceiling for the rate of data collection which is possible. One further school did run session 1 but lost the data internally so it was never returned (the school contained 166 WWCBs and 135 WWCGs). If we exclude these schools, session 1 data was actually collected for approximately 87 per cent of the randomised sample. There is not 100 per cent data collection due to imperfect implementation (as discussed above). It should be noted that the rate of data collection in individual schools ranged from 62 per cent to 98 per cent which may be due to variation in school buy-in.

Whilst the administrative outcome data is somewhat immune to implementation issues, attendance and effort measures were not provided by all schools either because they were not routinely collected (in the case of effort) or the school lacked the resourcing to respond to this request.[7] These data were also not collected for school S23 where session 1 was implemented too close to the end of term for it to be comparable to other schools.

The rate of data collection (as a proportion of the randomised sample) for WWCBs and WWCGs is summarised in Tables 6.9 and 6.10. Further analysis given in Table 6.11 regresses whether a pupil was present in the outcome data on a

[7] Several schools reported that they had just lost their data manager and were stretched in terms of being able to respond to data request.

number of variables including trial arm allocation. There is no significant association between trial arm and data collection; therefore there is not differential attrition by trial arm. However, for the survey data I conduct additional analysis to check for differential attrition by pupil characteristics (see Appendix 9.21) and find that, in both the session 1 and session 2 data, there is significantly higher attrition for FSM-eligible pupils. In the session 2 data for WWCBs, there is significantly higher attrition for pupils with special educational needs. I also find that prior maths attainment is positively associated with data collection whilst year group is negatively associated with data collection for session 2. These findings imply that pupils with these characteristics were either less likely to be present at the sessions than other pupils or they were less likely to complete the survey sheets. Implications for external validity are discussed in Section 6.11.

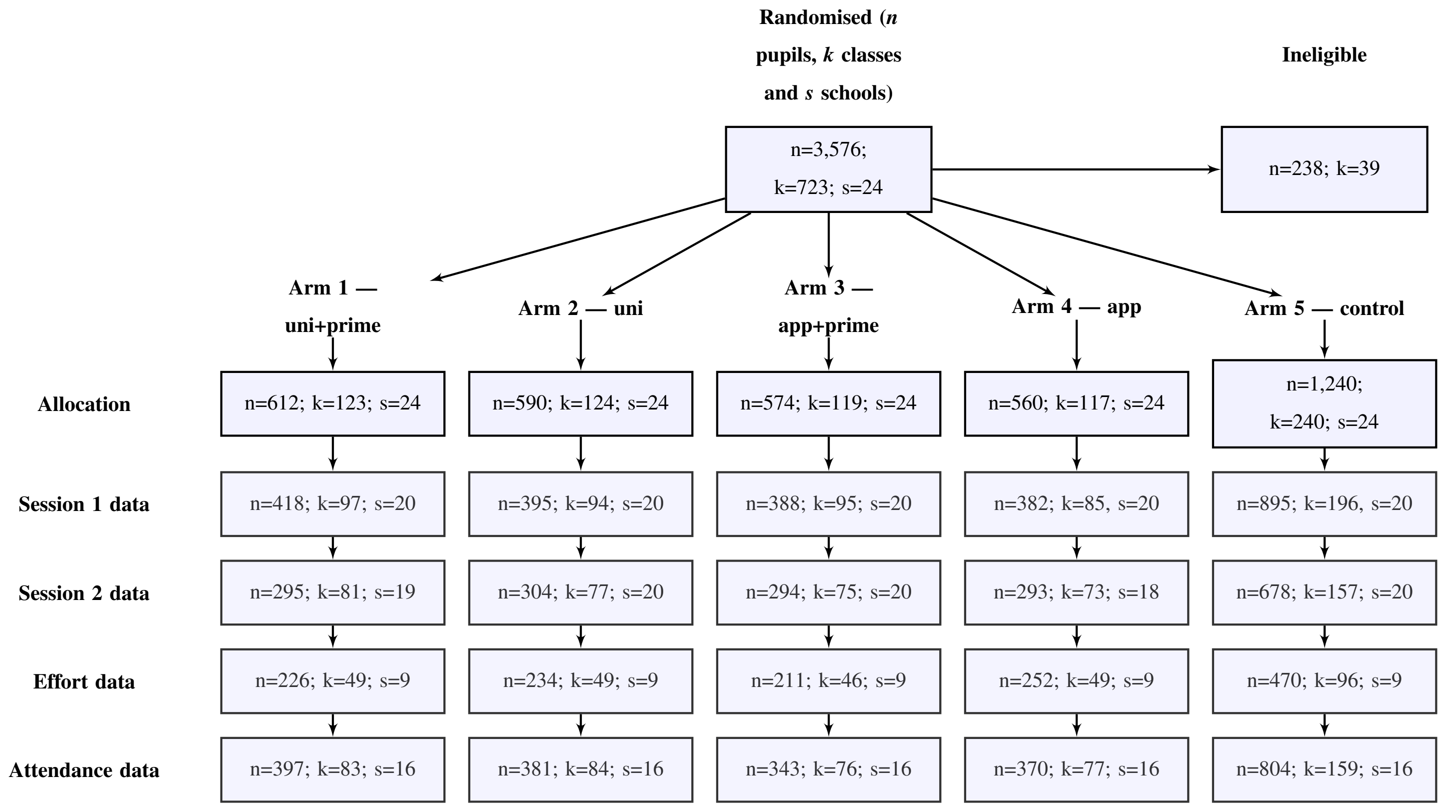


Figure 6.1: Full RCT — participant flow diagram for WWCBs

A participant flow diagram showing the number of WWCBs (n), classes (k) and schools (s) at every stage of the trial, from randomisation through to analysis. Ineligible pupils were either Year 7 pupils in mixed-age tutor groups or pupils in small groups outside the main tutorial system.

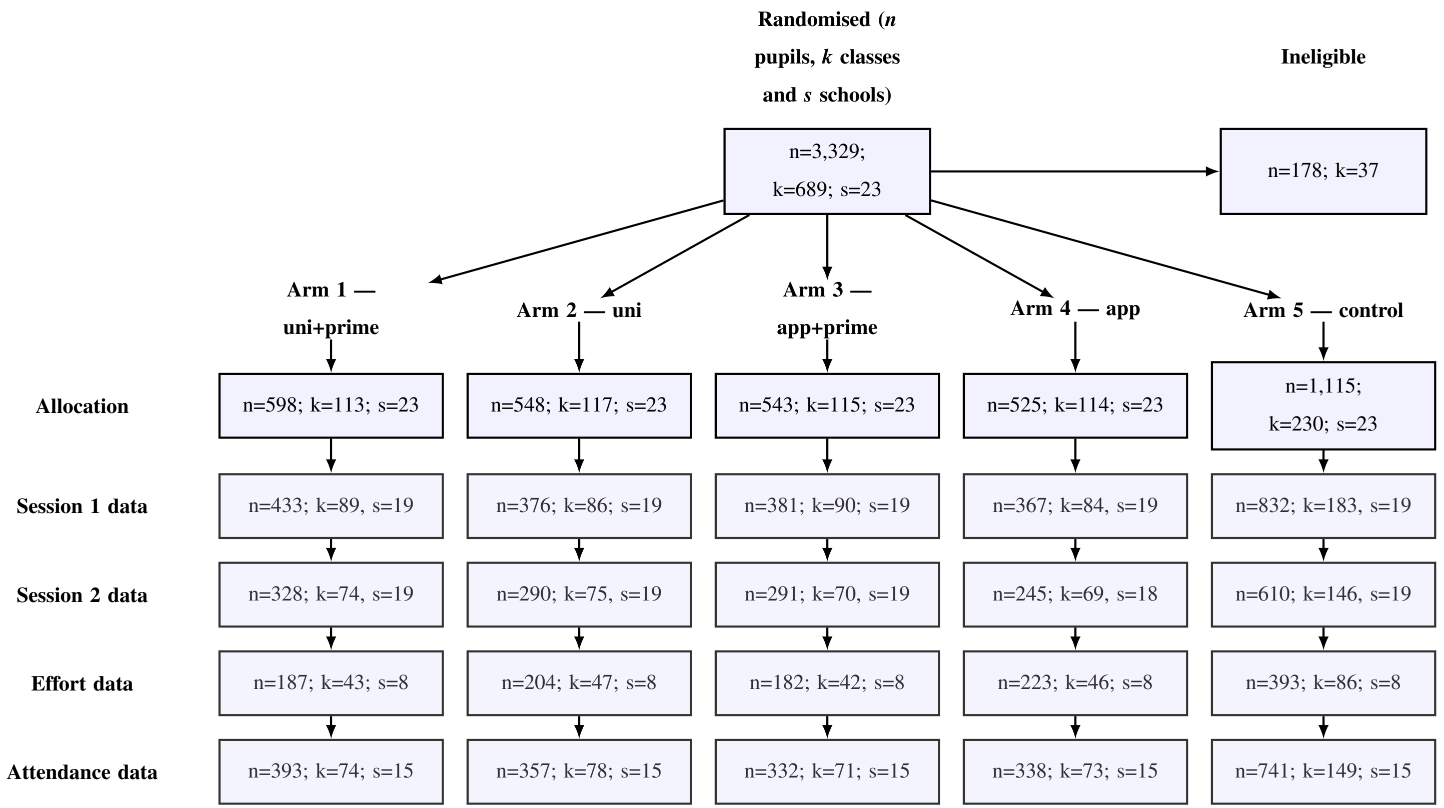


Figure 6.2: Full RCT — participant flow diagram for WWCGs

A participant flow diagram showing the number of WWCGs (n), classes (k) and schools (s) at every stage of the trial, from randomisation through to analysis. Ineligible pupils were either Year 7 pupils in mixed-age tutor groups or pupils in small groups outside the main tutorial system.

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	All arms
Randomised	612	590	574	560	1,240	3,576
Session 1 data	418	395	388	382	895	2,478
	(68.3%)	(66.9%)	(67.6%)	(68.2%)	(72.2%)	(69.3%)
Session 2 data	295	304	294	293	678	1,864
	(48.2%)	(51.5%)	(51.2%)	(52.3%)	(54.7%)	(52.1%)
Effort data	226	234	211	252	470	1,393
	(36.9%)	(39.7%)	(36.8%)	(45.0%)	(37.9%)	(39.0%)
Attendance data	397	381	343	370	804	2,295
	(64.9%)	(64.6%)	(59.8%)	(66.1%)	(64.8%)	(64.1%)

Table 6.9: Full RCT — attrition of WWCB sample between randomisation and outcome data collection

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	All arms
Randomised	598	548	543	525	1,115	3,329
Session 1 data	433	376	381	367	832	2,389
	(72.4%)	(68.6%)	(70.2%)	(69.9%)	(74.6%)	(71.8%)
Session 2 data	328	290	291	245	610	1,764
	(54.8%)	(52.9%)	(54.6%)	(46.7%)	(54.7%)	(53.0%)
Effort data	187	204	182	223	393	1,189
	(31.3%)	(37.2%)	(33.5%)	(42.5%)	(35.2%)	(35.7%)
Attendance data	393	357	332	338	741	2,161
	(65.7%)	(65.1%)	(61.1%)	(64.4%)	(66.4%)	(64.9%)

Table 6.10: Full RCT — attrition of WWCG sample between randomisation and outcome data collection

	WWCB				WWCG			
	Session 1 data	*Session 2 data*	*Effort data*	*Attendance data*	*Session 1 data*	*Session 2 data*	*Effort data*	*Attendance data*
Arm 2	0.012	0.046	0.005	0.003	−0.041	0.002	0.007	0.005
	(0.039)	(0.046)	(0.005)	(0.007)	(0.037)	(0.047)	(0.006)	(0.009)
Arm 3	0.037	0.045	0.001	0.004	−0.007	0.011	0.006	0.006
	(0.036)	(0.043)	(0.005)	(0.007)	(0.031)	(0.046)	(0.007)	(0.009)
Arm 4	−0.008	0.051	0.004	0.006	−0.026	−0.066	−0.003	0.003
	(0.040)	(0.048)	(0.005)	(0.007)	(0.038)	(0.051)	(0.009)	(0.010)
Arm 5	0.044	0.055	−0.001	0.001	0.027	−0.0004	0.006	0.006
	(0.032)	(0.037)	(0.005)	(0.006)	(0.027)	(0.039)	(0.006)	(0.008)
FSM	−0.051**	−0.059**	−0.007*	−0.012**	0.009	−0.070**	−0.0005	0.001
	(0.012)	(0.016)	(0.003)	(0.004)	(0.012)	(0.016)	(0.003)	(0.005)
SEN	−0.040**	−0.128**	−0.008+	−0.005	−0.020	−0.060*	−0.001	−0.010
	(0.015)	(0.020)	(0.004)	(0.005)	(0.019)	(0.026)	(0.005)	(0.007)
Year	−0.020*	−0.070**	0.001	0.0001	−0.030**	−0.064**	0.001	0.003
	(0.008)	(0.010)	(0.001)	(0.002)	(0.010)	(0.012)	(0.001)	(0.002)
Constant	0.961**	1.165**	0.973**	0.990**	1.110**	1.231**	0.982**	0.971**
	(0.130)	(0.136)	(0.017)	(0.021)	(0.131)	(0.148)	(0.011)	(0.017)
Observations	3,075	3,075	3,075	3,075	2,902	2,902	2,902	2,902

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. Whether the pupil is present in each data set is coded as one (yes) or zero (no). Presence is modelled as a function of binary indicators for treatment and a number of other variables (shown) using binary logistic regression. All models control for a school dummy variable.

Table 6.11: Full RCT — pupil presence in data collected

6.5 Description of pupils in collected data

Before describing the pupils in the collected data, it is useful to outline the demographic variables used throughout the remainder of this chapter. As specified elsewhere, "FSM-eligibility" is a binary indicator of whether a child had been eligible for free-school meals in the last six years, "SEN" is a binary indicator of whether a child had any special educational needs and "ACORN 4/5" is a binary indicator of whether a child lived in an ACORN 4 or 5 postcode. I also collected and controlled for "month of birth" which is a discrete measure of age within each year group.

Pupils in Years 8 to 13 took part in this trial to maximise the sample and year group is used as a covariate throughout my analysis. As noted in Chapter 3, we may expect some differential effect of the intervention by age because older pupils may have higher cognitive abilities and be less present-oriented, and therefore be more likely to pay attention to the intervention. Because anti-academic attitudes appear to develop over a number of years, we might also expect a differential effect of peer pressure by year but also a different baseline in terms of the attitudes which my intervention will seek to influence, with younger pupils more positive about education on average. Because it is not trivial to predict the effect on different year groups, I've remained agnostic on this issue and have not included a formal hypothesis but include exploratory analysis on this question.

However, we must note that those Year 12 and 13 pupils have chosen to progress to post-16 academic study and are therefore likely to buck the trend and have more positive attitudes to education than the population of younger participants. To address this issue I explore whether my results change when dropping Year 12 and 13 pupils. Because there are so few (they comprise less than three percent of all pupils in my data and less than one percent of the WWCBs) dropping these observations does not cause any substantive difference to my results and I do not report a full set of robustness checks on this issue.

Unfortunately, the Key Stage 2 maths data is not available in a uniform format across all year groups due to changes in the way this data was collected by the government. For Year 8 and 9 pupils I have access to a continuous point score which I will refer to as the “maths score”. For Year 10 and above I have access to a “level” for each pupil (ranging from one to six) which I will refer to as the “maths level”. I also create a “Maths unified” marker by combining these two measures. I take the full set maths levels in my data and calculate the proportion of pupils assigned to each which I use as a level “weighting”. Handling Year 8 and Year 9 data separately, I then rank the pupils according to their maths score and assign pupils to the maths levels according to the weighting. This combined marker is referred to as “maths unified” in the remainder of this document.

The pupil survey asked whether individuals would be the first in their family to go to university if they attended. Of the 12,409 pupils for whom survey data were collected, 1,513 (12 per cent) did not answer this question. Of the pupils who answered the question, 32 per cent said that they would be first in their family to go to university but the figure was higher for WWCBs (35 per cent) and WWCGs (42 per cent). The discrepancy between these two numbers, and the number of pupils who missed the question, suggests that this measure is not particularly robust — in fact a number of pupils wrote on their survey sheets that they did not know the answer. Therefore, I only use this measure for descriptive purposes rather than including it as a covariate in analysis as I had originally planned.

Table 6.12 summarises the characteristics of the overall sample of WWCBs and WWCGs for whom Session 1 data was collected. The third column also shows the characteristics of the broader population in schools for whom data were collected. Due to my targeting criteria, WWCBs (44 per cent) and WWCGs (47 per cent) are more likely to be FSM-eligible than the wider sample of pupils in their schools (26 per cent). Interestingly, whilst WWCGs are no more likely than the general school population (15 per cent) to have a special educational need, there is a higher incidence for WWCBs (26 per cent). The average Key Stage 2 attainment was not substantially lower than the all-schools average for either the boys or the girls and this may be indicative of the general level of deprivation across the school sample.

6.6 Balance

The high level of attrition between randomisation and data collection means it is particularly important to assess balance between trial arms in the data collected. Tables 9.191 to 6.20 present balance checks for WWCBs and WWCGs in the Session 1, effort and attendance data. These checks show pupil characteristics were balanced across the five trial arms in the outcome data. Although there is some imbalance when looking at the proportion of pupils in the particular project areas, when I jointly test the distribution of pupils across project areas, there is no significant difference by arm.

	WWCB	WWCG	All pupils
White British	1.0	1.0	0.74
Female	0.0	1.0	0.47
FSM	0.44	0.47	0.26
SEN	0.26	0.15	0.15
ACORN 4/5	0.89	0.90	0.51
Year 8	0.25	0.26	0.27
Year 9	0.27	0.27	0.26
Year 10	0.25	0.23	0.24
Year 11	0.22	0.22	0.21
Year 12	0.00	0.01	0.01
Year 13	0.00	0.00	0.01
Maths score	101.8	101.8	103.0
	(7.4)	(6.7)	(7.1)
Maths level	4.3	4.2	4.3
	(0.8)	(0.7)	(0.8)
Maths unified	4.2	4.2	4.3
	(0.8)	(0.7)	(0.8)
First in family	0.35	0.42	0.32
Observations	2,478	2,389	12,143

Notes: Proportions given for binary measures, mean and standard deviation given for continuous measures. “All pupils” relates to all pupils in participating schools.

Table 6.12: Full RCT — characteristics of all pupils in session 1 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
FSM	0.44	0.44	0.45	0.44	0.45	0.75
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	
SEN	0.27	0.29	0.26	0.24	0.25	0.81
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
ACORN4/5	0.90	0.90	0.89	0.91	0.88	0.72
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	
Year group	9.45	9.48	9.62	9.38	9.40	0.08
	(0.05)	(0.06)	(0.06)	(0.06)	(0.04)	
Maths score	-0.00	-0.17	-0.04	-0.14	-0.16	0.75
	(0.08)	(0.08)	(0.08)	(0.07)	(0.05)	
Maths level	0.32	0.25	0.27	0.20	0.27	0.56
	(0.06)	(0.06)	(0.06)	(0.07)	(0.04)	
Maths unified	0.29	0.21	0.29	0.20	0.22	0.98
	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	
Area (overall)	—	—	—	—	—	0.31
— EE	0.22	0.27	0.30	0.25	0.25	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— EM	0.23	0.23	0.21	0.29	0.21	0.48
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— S	0.30	0.26	0.29	0.24	0.26	0.75
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— WM	0.25	0.24	0.20	0.23	0.28	0.10
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Observations	418	395	388	382	895	2,478

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.13: Full RCT — Balance checks for WWCBs in session 1 data

6.7 Outcome measures

Before presenting my analysis, it is pertinent to examine the outcome measures in more detail. The outcomes collected directly from pupils are the “Identification with School” (ISQ) questionnaire score (scaled between one and five), interest in university (between one and five), interest in an apprenticeship (between one and five), score on a low stake maths test (maximum score of ten) and entry into a

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
FSM	0.46	0.43	0.46	0.46	0.45	0.97
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
SEN	0.22	0.26	0.21	0.19	0.25	0.70
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	
ACORN4/5	0.91	0.90	0.90	0.90	0.87	0.67
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year group	9.28	9.42	9.46	9.37	9.29	0.04
	(0.06)	(0.07)	(0.06)	(0.07)	(0.04)	
Maths score	0.04	-0.06	0.02	-0.17	-0.14	0.84
	(0.08)	(0.10)	(0.08)	(0.08)	(0.06)	
Maths level	0.33	0.30	0.34	0.20	0.29	0.95
	(0.08)	(0.08)	(0.08)	(0.07)	(0.05)	
Maths unified	0.31	0.27	0.35	0.20	0.23	0.57
	(0.05)	(0.06)	(0.05)	(0.05)	(0.03)	
Area (overall)	—	—	—	—	—	0.01
— EE	0.24	0.25	0.28	0.23	0.25	0.29
	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	
— EM	0.26	0.25	0.21	0.26	0.18	0.18
	(0.03)	(0.02)	(0.02)	(0.03)	(0.01)	
— S	0.33	0.25	0.30	0.28	0.31	0.44
	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)	
— WM	0.17	0.25	0.21	0.23	0.26	0.24
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Observations	295	304	294	293	678	1,864

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a"disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.14: Full RCT — Balance checks for WWCBs in session 2 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
FSM	0.50	0.45	0.43	0.45	0.44	0.18
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
SEN	0.25	0.29	0.24	0.21	0.22	0.71
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
ACORN4/5	0.89	0.90	0.89	0.91	0.86	0.93
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Year	9.47	9.50	9.68	9.39	9.40	0.05
	(0.08)	(0.08)	(0.07)	(0.07)	(0.05)	
Maths score	0.18	-0.02	0.12	-0.24	-0.09	0.68
	(0.11)	(0.11)	(0.10)	(0.09)	(0.08)	
Maths level	0.37	0.22	0.29	0.29	0.25	0.54
	(0.08)	(0.08)	(0.08)	(0.08)	(0.06)	
Maths unified	0.35	0.26	0.37	0.23	0.24	0.82
	(0.06)	(0.06)	(0.06)	(0.05)	(0.04)	
Area (overall)	—	—	—	—	—	0.34
— EE	0.31	0.35	0.38	0.30	0.30	0.10
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— EM	0.04	0.12	0.04	0.12	0.03	0.88
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	
— S	0.27	0.26	0.33	0.27	0.30	0.13
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— WM	0.38	0.27	0.24	0.31	0.37	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Observations	226	234	211	252	470	1,393

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.15: Full RCT — Balance checks for WWCBs in effort data

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
FSM	0.45	0.43	0.46	0.43	0.45	0.85
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	
SEN	0.25	0.29	0.24	0.21	0.24	0.76
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
ACORN4/5	0.90	0.91	0.89	0.91	0.89	0.67
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	
Year	9.44	9.51	9.59	9.47	9.42	0.09
	(0.05)	(0.06)	(0.06)	(0.06)	(0.04)	
Maths score	0.02	-0.13	-0.02	-0.12	-0.10	0.75
	(0.08)	(0.08)	(0.08)	(0.07)	(0.06)	
Maths level	0.27	0.20	0.28	0.25	0.29	0.97
	(0.07)	(0.07)	(0.07)	(0.06)	(0.05)	
Maths unified	0.28	0.20	0.30	0.23	0.25	0.69
	(0.05)	(0.05)	(0.05)	(0.04)	(0.03)	
Area (overall)	—	—	—	—	—	0.26
— EE	0.18	0.22	0.24	0.20	0.18	0.05
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— EM	0.29	0.28	0.27	0.32	0.26	0.63
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
— S	0.23	0.20	0.24	0.18	0.21	0.74
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— WM	0.30	0.30	0.25	0.31	0.34	0.10
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Observations	397	381	343	370	804	2,295

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.16: Full RCT — Balance checks for WWCBs in attendance data

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
FSM	0.45	0.47	0.50	0.46	0.47	0.17
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	
SEN	0.15	0.14	0.16	0.17	0.15	0.69
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
ACORN4/5	0.90	0.91	0.91	0.89	0.89	0.65
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	
Year	9.39	9.57	9.56	9.38	9.40	0.05
	(0.05)	(0.06)	(0.06)	(0.06)	(0.04)	
Maths score	-0.20	-0.13	-0.04	-0.05	-0.14	0.10
	(0.07)	(0.08)	(0.07)	(0.07)	(0.05)	
Maths level	0.15	0.20	0.23	0.12	0.15	0.42
	(0.07)	(0.06)	(0.06)	(0.06)	(0.05)	
Maths unified	0.17	0.21	0.25	0.20	0.18	0.15
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	
Area (overall)	—	—	—	—	—	0.75
— EE	0.31	0.35	0.38	0.30	0.30	0.83
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— EM	0.04	0.12	0.04	0.12	0.03	0.83
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	
— S	0.27	0.26	0.33	0.27	0.30	0.83
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— WM	0.38	0.27	0.24	0.31	0.37	0.83
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Observations	433	376	381	367	832	2,389

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.17: Full RCT — Balance checks for WWCGs in session 1 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
FSM	0.45	0.44	0.50	0.43	0.44	0.16
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
SEN	0.14	0.12	0.14	0.16	0.14	0.93
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
ACORN4/5	0.91	0.91	0.91	0.89	0.90	0.71
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year	9.22	9.59	9.44	9.38	9.27	0.01
	(0.06)	(0.07)	(0.07)	(0.07)	(0.04)	
Maths score	-0.19	-0.06	-0.07	-0.07	-0.09	0.25
	(0.07)	(0.09)	(0.07)	(0.08)	(0.05)	
Maths level	0.15	0.25	0.26	0.13	0.17	0.36
	(0.09)	(0.07)	(0.08)	(0.07)	(0.06)	
Maths unified	0.16	0.26	0.25	0.19	0.21	0.16
	(0.05)	(0.05)	(0.04)	(0.05)	(0.03)	
Area (overall)	—	—	—	—	—	0.89
— EE	0.22	0.24	0.29	0.20	0.25	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— EM	0.25	0.18	0.22	0.22	0.22	0.33
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	
— S	0.31	0.33	0.31	0.31	0.31	0.83
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— WM	0.22	0.24	0.19	0.28	0.22	0.40
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Observations	328	290	291	245	610	1,764

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.18: Full RCT — Balance checks for WWCGs in session 2 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
FSM	0.49	0.53	0.47	0.47	0.47	0.79
	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	
SEN	0.14	0.13	0.15	0.17	0.15	0.69
	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)	
ACORN4/5	0.91	0.89	0.90	0.87	0.89	0.66
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Year	9.50	9.56	9.62	9.37	9.40	0.30
	(0.09)	(0.08)	(0.07)	(0.08)	(0.05)	
Maths score	-0.14	-0.25	-0.18	-0.03	-0.20	0.83
	(0.11)	(0.11)	(0.10)	(0.08)	(0.07)	
Maths level	0.35	0.18	0.24	0.12	0.25	0.34
	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)	
Maths unified	0.27	0.15	0.23	0.22	0.20	0.59
	(0.06)	(0.06)	(0.06)	(0.05)	(0.04)	
Area (overall)	—	—	—	—	—	0.11
— EE	0.36	0.34	0.41	0.26	0.32	0.40
	(0.04)	(0.03)	(0.04)	(0.03)	(0.02)	
— EM	0.05	0.09	0.05	0.09	0.04	0.95
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— S	0.32	0.33	0.31	0.37	0.31	0.79
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
— WM	0.27	0.24	0.24	0.27	0.33	0.49
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Observations	187	204	182	223	393	1,189

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.19: Full RCT — Balance checks for WWCGs in effort data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
FSM	0.43	0.46	0.49	0.43	0.47	0.12
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	
SEN	0.13	0.13	0.15	0.14	0.13	0.36
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
ACORN4/5	0.90	0.91	0.90	0.88	0.90	0.90
	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	
Year	9.37	9.65	9.53	9.52	9.42	0.07
	(0.05)	(0.07)	(0.06)	(0.07)	(0.04)	
Maths score	-0.19	-0.13	-0.03	0.01	-0.06	0.11
	(0.07)	(0.09)	(0.07)	(0.07)	(0.05)	
Maths level	0.20	0.18	0.26	0.13	0.16	0.55
	(0.07)	(0.07)	(0.07)	(0.06)	(0.05)	
Maths unified	0.19	0.22	0.28	0.22	0.22	0.15
	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	
Area (overall)	—	—	—	—	—	0.35
— EE	0.17	0.20	0.22	0.17	0.17	0.09
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
— EM	0.31	0.26	0.31	0.25	0.27	0.87
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	
— S	0.24	0.24	0.22	0.24	0.26	0.50
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
— WM	0.28	0.30	0.25	0.33	0.30	0.40
	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	
Observations	393	357	332	338	741	2,161

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 6.20: Full RCT — Balance checks for WWCGs in attendance data

lottery for a chance to win online tutoring (binary). For all measures, a higher score indicates a more positive attitude or behaviour relating to education.

Table 6.21 provides an overview of the outcomes combined across trial arms by pupil group (for WWCBs, WWCGs and all pupils). WWCBs have lower ISQ scores, lower levels of interest in university, lower maths test scores and lower rates of entry into the lottery than the all-pupil average. They also have worse effort ratings and lower attendance than the average across the sample. By contrast, WWCGs actually have comparable ISQ scores, university interest and slightly better effort ratings when compared to the overall sample and their lottery entry rate appears marginally higher.

In Appendix 9.22 the difference in ISQ scores by pupil characteristics is explored in more detail using data from the control arm of the trial. This analysis shows that being a WWCB is associated with having significantly lower ISQ scores, even when I control for prior attainment. Exploring the role of individual characteristics, I find that all three characteristics (being white British, working-class and male) are independently and significantly associated with lower ISQ scores rather than this being an issue associated white-British working-class males in particular. However, it is important to note that our sample of a few thousand pupils in the control arm is not really large enough to support any concrete analysis of this sort as I lack power to examine the higher order interactions. It is also important to note that this analysis was not pre-registered.

As the ISQ is a score calculated using a seven item survey, it is important to assess the validity of this marker before I start analysis. I calculate Cronbach's alpha for the full sample of pupils (N=12,143) and find $\alpha = 0.76$ and when I restrict the sample to WWCBs or WWCGs this does not change. Therefore, I can state that the scale has an acceptable level of internal consistency. In Appendix 9.23 I also examine the test-retest reliability of this survey measure (using data from pupils in the control group) and examine how the ISQ correlates with other outcomes of interest (for example attendance) to establish criterion validity. My analysis suggest that this survey does indeed appear to be a reliable and valid measure.

It is also relevant to use the outcome data to calculate an estimate of the ICC which I can use to retrospectively assess the accuracy of my power calculations. Full results are given in Appendix 9.24. Using the class as the cluster, and replicating the analysis with both the full sample of pupils and the WWCB subset, the ICC is approximately 0.1 for the ISQ total and between 0.02-0.06 for the other outcomes. This number is in line with the assumptions used to design the trial. Repeating these calculations with the school as the cluster leads to lower ICC values, implying it was correct to cluster standard errors at the level of the class.

Some administrative outcomes are also collected directly from schools, namely effort and attendance. To minimise the burden on schools, they were asked to provide whatever effort rating they routinely collected for pupils; this was typically an average score for effort aggregated across marks from multiple teachers. Only nine of the schools collected a measure of effort in a continuous numerical format, the rest used discrete numbered or verbal ratings (for example "Good", "Requires Improvement" etc.) Using the continuous measurements only, the effort ratings were converted into within school z-scores. The discrete coding of the effort data from other schools meant it was not possible to include them in the effort outcome data so the final analysis of the effort data contains only seven schools with effort coding centred around zero with a standard deviation of one. For context, this effort data was collected at the end of term in which the sessions were implemented but applies to the whole term. Session 1 was scheduled four weeks before the end of term and so I made the assumption there would be sufficient period between the intervention and collection of effort data for the scores to be influenced.

The attendance data was much more straight forward to process. Unfortunately, one school could only provide wide percentage ranges (for example 0 per cent to 75 per cent) so this school is excluded. All of the other 17 schools which provided data did so in percentage form and these data relate to the half term in which the sessions were run in schools.

	WWCB	WWCG	All pupils
Primary outcome — session 1			
ISQ total	3.46	3.58	3.57
	(0.66)	(0.60)	(0.62)
Observations	2,478	2,389	12,143
Secondary outcomes — session 1			
University interest	3.13	3.62	3.64
	(1.36)	(1.33)	(1.32)
Apprenticeship interest	3.64	3.42	3.50
	(1.17)	(1.18)	(1.19)
Maths test	5.05	4.91	5.38
	(2.43)	(2.35)	(2.45)
Lottery entry	0.40	0.46	0.44
Observations	2,478	2,389	12,143
Secondary outcomes — session 2			
ISQ total	3.40	3.49	3.50
	(0.69)	(0.61)	(0.65)
University interest	3.15	3.60	3.65
	(1.36)	(1.34)	(1.32)
Apprenticeship interest	3.63	3.35	3.43
j	(1.17)	(1.17)	(1.19)
Lottery entry	0.39	0.42	0.42
Observations	1,864	1,764	9,192
Effort	-0.28	0.13	0.00
	(1.06)	(0.93)	(1.00)
Observations	1,393	1,189	6,552
Attendance	93.2	92.7	94.4
	(10.0)	(10.8)	(9.3)
Observations	2,295	2,161	11,076

Notes: Mean outcome given with standard deviation in parentheses where appropriate. “All pupils” relates to all pupils in participating schools. “ISQ total”, “university interest” and “apprenticeship interest” are all scored out of five and “maths score” is out of ten. “Lottery entry” is binary. Effort is given as a within-school z-score and attendance is a percentage. The total sample for the survey data relates to pupils who responded to any one of the survey items but the actual sample size for the individual items (“university interest” etc.) is lower due to incomplete surveys.

Table 6.21: Full RCT — outcomes by pupil group

6.8 Results

The primary analysis for this trial focuses on the impact of treatment on total ISQ score among WWCBs. My secondary analysis replicates the primary analysis using secondary outcome measures: interest in university, interest in apprenticeships, entry into a lottery to win free online tutoring, attainment in a low-stakes maths test and a measure of effort and attendance (provided by schools). I then examine the effect of the intervention on WWCGs, followed by robustness checks of the main results and some exploratory analysis of data on how pupils perceived the role models. All data analysis was conducted using code written in R statistical software (R Core Team, 2019) and formatted using the "stargazer" package (Hlavac, 2018).[8]

6.8.1 Primary analysis

The hypotheses for my primary analysis were: that a male role model would improve attitudes to education among WWCBs (hypothesis 1); that asking pupils to reflect on their similarity with the role model would boost the impact of the intervention (hypothesis 2); and that a vocational role model would be more effective than an academic role model (hypothesis 3). Therefore, my analysis involves comparing the average ISQ score in combined trial arms against the average in other trial arms. To test hypothesis 1, I compare all role model treatment arms (trial arms one to four) with the control group (arm five) and control for whether pupils were also exposed to the "similarity prime" intervention. To test hypotheses two and three, I restrict my sample to only the treatment arms and include dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. As recommended by Muralidharan et al. (2019), I include an interaction between these dummies to ensure an unbiased estimate of treatment effects. I also directly compare pupils exposed to the university role model versus control and run the same analysis for the apprentice-

[8]Relevant sections of the actual code can be accessed at: https://github.com/ElizaKozman/someonelikeme.git

ship role model versus control. For each element of my analysis I present a naive regression, a model which includes a set of demographic covariates (listed under each table) and two models which control for Key Stage 2 maths attainment. As discussed previously, because the trial involves multiple year groups, these attainment data are not available in a uniform format across all year groups. However, I create a "Maths unified" marker by combining these two measures so that pupils are ranked from one to five (see Section 6.5 for more detail). For the purpose of a robustness check, based on this ranking I label those in the top two quintiles as "Maths high". Throughout my analysis I control for prior maths attainment using both maths markers (as indicated in each table).

Finally, I also analyse the interaction between treatment and the proportion of pupils in a class meeting the WWCB criteria. The latter is a proportion which I convert into a standardised variable but for ease of interpretation, I also split classes into two categories: "High WWCB" and "Low WWCB" based on whether they lie above or below the mean for this marker. I include models which show the interaction of the treatment with both the continuous and binary marker of the proportion of target pupils in a class. Ordinary least squares (OLS) regression is used throughout my primary analysis.

The results in Table 6.22 test the effect of any role model versus control, controlling for the similarity prime activity. This table shows that being exposed to a role model does have a small but significant effect on ISQ scores for WWCBs and this finding is robust to a number of different model specifications. The similarity prime activity appears to have no significant impact on pupils' scores. Models 5 and 6 show that there is some marginal evidence of an interaction between role model treatment and the proportion of pupils in a class meeting the WWCB criteria but this does not reach significance.

Table 6.23 shows analysis which is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed and the similarity prime intervention. Therefore, the reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. Model 2 provides some suggestive evidence that the university role model may be more effective than the apprenticeship role model but this result does not hold when controlling for Key Stage 2 maths attainment. However, when I split out the sample and compare the university role model to control (see Table 6.24) and the apprenticeship role model to control (see Table 6.25), it is clear that the university role model has a small but significant effect on ISQ scores for WWCBs which is not present for apprenticeship role model. The ISQ score for pupils who were exposed to the university role model is approximately 0.1 points higher out of a possible score of five. Based on model 1, this represents approximately a three per cent increase relative to the control group.

Tables 6.24 and Table 6.25 also show the interaction of the university role model and the apprenticeship role model with the proportion of the class meeting the WWCB criteria. This interaction is not significant for the university role model but it is for the apprenticeship role model. This finding suggests a differential response to the apprenticeship role model based on the proportion of the class meeting the WWCB criteria. In other words, as the proportion of target pupils in a class increases, the efficacy of the intervention decreases. In fact, for the apprenticeship role model, my analysis suggests the intervention would actually have a negative impact on pupils if everyone in the class was a WWCB.

To assess whether the observed effects persist over time, I replicate the analysis discussed above using the outcome data for the second session which took place three weeks after the intervention. This analysis is presented in Appendix 9.25. At this follow-up point, neither of the role model interventions, nor the similarity prime intervention, had an impact on pupil ISQ scores and there is not convincing evidence of a significant interaction between treatment and the proportion of the pupils in the class meeting the target criteria.

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
Any role model	0.067^{+}	0.070^{*}	0.072^{*}	0.072^{*}	0.098^{**}	0.148^{**}
	(0.037)	(0.033)	(0.036)	(0.036)	(0.036)	(0.054)
Similarity prime	−0.013	0.009	0.020	0.022	0.009	0.010
	(0.039)	(0.035)	(0.038)	(0.038)	(0.035)	(0.035)
Proportion WWCB		−0.011	−0.009	−0.009	0.025	
		(0.020)	(0.022)	(0.022)	(0.025)	
High WWCB						0.059
						(0.050)
Any role model x Proportion WWCB					-0.060^{+}	
					(0.031)	
Any role model x High WWCB						-0.112^{+}
						(0.061)
Constant	3.422^{**}	3.636^{**}	3.562^{**}	3.571^{**}	3.623^{**}	3.590^{**}
	(0.059)	(0.060)	(0.082)	(0.085)	(0.060)	(0.070)
Observations	2,195	2,181	1,785	1,785	2,181	2,181
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5-9 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 6.22: Full RCT — primary analysis — ISQ score (session 1) — WWCBs — any role model versus control

	ISQ score			
	(1)	(2)	(3)	(4)
University role model	0.079	0.097^{*}	0.064	0.065
	(0.053)	(0.049)	(0.053)	(0.053)
Similarity prime	0.008	0.035	0.038	0.041
	(0.054)	(0.047)	(0.050)	(0.050)
University role model x Similarity prime	−0.037	−0.056	−0.041	−0.042
	(0.077)	(0.069)	(0.076)	(0.076)
Constant	3.425^{**}	3.623^{**}	3.498^{**}	3.473^{**}
	(0.087)	(0.089)	(0.124)	(0.127)
Observations	1,407	1,402	1,146	1,146
Maths control	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 6.23: Full RCT — primary analysis — ISQ score (session 1) — WWCBs — comparison of treatment arms

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
University role model	0.110*	0.121**	0.109*	0.111*	0.132**	0.167**
	(0.044)	(0.043)	(0.048)	(0.048)	(0.045)	(0.064)
Similarity prime	−0.039	−0.028	−0.014	−0.013	−0.027	−0.027
	(0.055)	(0.050)	(0.057)	(0.057)	(0.050)	(0.050)
Proportion WWCB		0.008	0.018	0.019	0.021	
		(0.021)	(0.024)	(0.024)	(0.026)	
High WWCB						0.040
						(0.052)
University role model x Proportion WWCB					−0.026	
					(0.034)	
University role model x High WWCB						−0.068
						(0.071)
Constant	3.410**	3.642**	3.565**	3.602**	3.640**	3.622**
	(0.060)	(0.070)	(0.093)	(0.097)	(0.070)	(0.079)
Observations	1,515	1,503	1,216	1,216	1,503	1,503
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5 and 6 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 6.24: Full RCT — primary analysis — ISQ score (session 1) — WWCBs — university role model versus control

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
Apprenticeship role model	0.027	0.024	0.044	0.044	0.077^{+}	0.146*
	(0.046)	(0.039)	(0.042)	(0.042)	(0.044)	(0.064)
Similarity prime	0.002	0.035	0.040	0.040	0.026	0.040
	(0.054)	(0.046)	(0.050)	(0.050)	(0.046)	(0.046)
Proportion WWCB		−0.018	−0.012	−0.012	0.025	
		(0.023)	(0.025)	(0.025)	(0.026)	
High WWCB						0.071
						(0.051)
Apprenticeship role model x Proportion WWCB					−0.116**	
					(0.037)	
Apprenticeship role model x High WWCB						−0.177*
						(0.070)
Constant	3.448**	3.661**	3.633**	3.642**	3.638**	3.599**
	(0.076)	(0.066)	(0.086)	(0.092)	(0.068)	(0.078)
Observations	1,468	1,457	1,208	1,208	1,457	1,457
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). Models 5 and 6 include interactions with the proportion of the class meeting the WWCB criteria ("Proportion WWCB", continuous) and a marker for whether a class contains a higher than average number of WWCBs ("High WWCB", binary). All models control for a school dummy variable.

Table 6.25: Full RCT — primary analysis — ISQ score (session 1) — WWCBs — apprenticeship role model versus control

6.8.2 Secondary analysis

My secondary analysis replicates the primary analysis using secondary outcome measures: interest in university, interest in apprenticeships, entry into a lottery to win free online tutoring, attainment in a low-stakes maths test and a measure of effort and attendance (provided by schools). I then examine the effect of the intervention on WWCGs. As stated in Chapter 4, I use ordinary least squares regression for continuous outcomes and binary logistic regression for the lottery entry outcome which is binary. However, for simplicity I also present some analysis of the lottery outcome using ordinary least squares regression and this is clearly signposted. The full results of my secondary analysis for WWCBs are presented in Appendix 9.26 and parallel analysis for WWCGs is presented in Appendix 9.27. The most relevant results are highlighted in the following section.

Secondary analysis for WWCBs

I find that there is no effect of any role model intervention or the similarity prime activity on my secondary outcome measures for WWCBs except for lottery entry. Exposure to any role model leads to a significant increase in entry and this seems to be driven by the university role model. For ease of interpretation, I present regression tables below which model lottery entry using OLS regression. Table 6.26 suggests that role model exposure increases entry directly after the intervention by almost six percentage points (relative to approximately 34 per cent in the control group) and suggests that the effect is actually even bigger when controlling for prior attainment (although we do not have these data for all pupils). This effect is present and of a similar magnitude three weeks later.

The same pattern is present in Table 6.27 (university role model versus control) but does not reach significance for session two. A similar pattern is present in Table 6.28 (apprenticeship versus control) but again the treatment term does not reach significance. Taken in the round, however, my findings suggest the effect on lottery entry was driven by the university role model even in the session 2 data.

	Lottery entry							
	Session 1				Session 2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.057*	0.057*	0.086**	0.087**	0.055+	0.055+	0.075*	0.074*
	(0.027)	(0.027)	(0.030)	(0.030)	(0.032)	(0.032)	(0.036)	(0.036)
Similarity prime	−0.017	−0.020	−0.054+	−0.053+	−0.007	−0.011	−0.029	−0.025
	(0.028)	(0.028)	(0.030)	(0.030)	(0.034)	(0.034)	(0.038)	(0.038)
Constant	0.344**	0.341**	0.387**	0.429**	0.350**	0.331**	0.353**	0.377**
	(0.048)	(0.058)	(0.061)	(0.066)	(0.065)	(0.074)	(0.082)	(0.086)
Observations	2,146	2,133	1,743	1,743	1,471	1,461	1,204	1,204
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery is coded as binary but analysed using OLS for ease of interpretation.

Table 6.26: Full RCT — secondary analysis — lottery entry — WWCBs — any role model versus control

	Lottery entry							
	Session 1				Session 2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.059^{+}	0.056^{+}	0.088*	0.089*	0.072^{+}	0.068^{+}	0.078^{+}	0.080^{+}
	(0.032)	(0.032)	(0.034)	(0.035)	(0.039)	(0.039)	(0.045)	(0.045)
Similarity prime	−0.006	−0.008	−0.051	−0.051	0.009	0.009	0.005	0.004
	(0.038)	(0.038)	(0.039)	(0.040)	(0.051)	(0.051)	(0.057)	(0.057)
Constant	0.376**	0.414**	0.480**	0.508**	0.414**	0.401**	0.384**	0.441**
	(0.052)	(0.066)	(0.060)	(0.066)	(0.064)	(0.077)	(0.086)	(0.091)
Observations	1,478	1,466	1,185	1,185	1,001	994	812	812
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery is coded as binary but analysed using OLS for ease of interpretation.

Table 6.27: Full RCT — secondary analysis — lottery entry — WWCBs — university role model versus control

	Lottery entry							
	Session 1				Session 2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	0.046	0.048	0.066^{+}	0.069^{+}	0.026	0.029	0.056	0.054
	(0.035)	(0.035)	(0.039)	(0.039)	(0.039)	(0.038)	(0.043)	(0.043)
Similarity prime	−0.021	−0.025	−0.040	−0.041	−0.012	−0.019	−0.045	−0.041
	(0.039)	(0.040)	(0.044)	(0.044)	(0.044)	(0.044)	(0.048)	(0.048)
Constant	0.312^{**}	0.302^{**}	0.366^{**}	0.423^{**}	0.297^{**}	0.263^{**}	0.287^{**}	0.299^{**}
	(0.064)	(0.073)	(0.076)	(0.082)	(0.075)	(0.083)	(0.095)	(0.099)
Observations	1,449	1,439	1,190	1,190	989	980	821	821
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery is coded as binary but analysed using OLS for ease of interpretation.

Table 6.28: Full RCT — secondary analysis — lottery entry — WWCBs — apprenticeship role model versus control

Secondary analysis for WWCGs

I find that there is no consistent effect of any role model interventions or the similarity prime activity on my secondary outcome measures for WWCGs.

In the session 1 data, I do find evidence that the university role model is associated with significantly lower scores in the maths test than the apprenticeship role model. However, neither the university role model or apprenticeship role model has a significant impact on test scores relative to control. Therefore, I treat this finding with caution and only present it for completeness.

In the session two data, I find that the university role model appears to depress interest in university relative to control and this result is robust to multiple model specifications (see Table 6.29). However, because this pattern is not present in the outcome data for session one (collected immediately after the intervention was delivered), this is a somewhat puzzling finding which I again handle with caution.

In my analysis of school outcome data (effort and attainment) I find that the apprenticeship role model has a significant positive impact on effort for WWCGs. This result is surprising and, in the absence of an impact on any of the related outcome measures, is likely to be an artefact of the way in which the data was coded and combined across schools. Therefore, I present these findings for completeness rather than to suggest that there has been a causal impact on this outcome.

Throughout my secondary analysis for WWCGs, I also examine the interaction of treatment and the proportion of the pupils in the class who are WWCBs. I find some evidence of a significant positive interaction across a number of outcomes which suggests that the efficacy of the intervention for WWCGs increases as the proportion of WWCBs in a class increases. This finding is discussed in the following section.

Finally, because in my analysis I observe that the role model intervention appears to have an impact on ISQ scores and rates of lottery entry for WWCBs but not

	University interest					
	(1)	(2)	(3)	(4)	(5)	(6)
University role model	-0.248^{**}	-0.205^{*}	-0.233^{*}	-0.203^{*}	-0.251^{**}	-0.355^{**}
	(0.096)	(0.082)	(0.093)	(0.095)	(0.081)	(0.113)
Similarity prime	0.179^{+}	0.122	0.155	0.132	0.117	0.124
	(0.099)	(0.086)	(0.102)	(0.102)	(0.086)	(0.087)
Proportion WWCB		0.042	0.030	0.019	−0.050	
		(0.057)	(0.065)	(0.066)	(0.078)	
High WWCB						−0.123
						(0.124)
University role model x Proportion WWCB					0.160^{*}	
					(0.077)	
University role model x High WWCB						0.234^{+}
						(0.141)
Constant	3.648^{**}	4.105^{**}	3.574^{**}	3.346^{**}	4.122^{**}	4.192^{**}
	(0.275)	(0.206)	(0.169)	(0.183)	(0.204)	(0.224)
Observations	1,210	1,204	971	971	1,204	1,204
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5-9 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 6.29: Full RCT — secondary analysis — university interest (session 2) — WWCGs — university role model versus control

WWCGs, in Appendix 9.28 I present analysis to checks whether there is a significant difference in how these groups respond. I do not find a significant difference by sex when examining the impact on ISQ scores but I do find a interaction between sex and treatment when examining rates of lottery entry. This finding suggests that there truly is a differential effect of the role model by sex, at least on this outcome.

6.9 Robustness checks

6.9.1 Addressing missing data

I conduct checks to test the robustness of my main findings. For the ISQ scores there are outcomes missing where pupils have not completed all of the individual survey items (as shown in Table 6.30).

Number of ISQ items missing	**Session 1**	**Session 2**
0	2,181	1,805
1	40	43
2	5	6
3	1	0
4	3	2
5	1	1
6	1	2
7	0	5
1-6 items missing	**51**	**54**
WWCBs who returned survey	2,232	1,852
WWCBs missing ISQ total	2.3%	2.9%

Table 6.30: Full RCT — frequency of missing ISQ items

I take two approaches to handling this missing data. First, I use mean imputation to replace the missing ISQ item responses with the mean of the other available answers from a pupil. This approach adds 52 ISQ scores to the data for WWCBs in the session 1 data and 54 scores in the session 2 data.

I also conduct multiple imputation to generate survey data for the full sample of pupils who completed at least one of the survey questions. To do this, I restrict my data set to pupils for whom I have demographic data (excluding the marker for special educational needs and maths attainment data in order to retain as large a sample as possible). I also drop a small number of rows for pupils who are missing month of birth. I then use the "miceadds" package in R to impute the missing data and generate five imputed datasets based on demographic information and existing survey responses for each pupil (Robitzsch et al., 2019).[9] The extent of the missing data which is imputed is shown in Table 6.31.

Outcome missing	Session 1	Session 2
ISQ scores	51	59
	(2.3%)	(3.2%)
University interest	22	29
	(1.0%)	(2.0%)
Apprenticeship interest	33	34
	(1.5%)	(2.0%)
Lottery	99	391
	(4.5%)	(21.1%)
Pupils who returned survey	2,232	1,852

Notes: The number of pupils for whom outcome data among the sample of pupils who returned a non-blank survey. The proportion of the total is given in parentheses.

Table 6.31: Full RCT — frequency of missing outcome data

I then replicate the analysis of the survey outcomes from my primary and secondary analysis. The results are presented in Appendix 9.29 and are consistent with the findings of the main analysis.

I also test the assumption that when a pupil has answered the other survey questions but left the lottery entry question blank, that this should be counted as a rejection of the chance to enter. Under this assumption, 263 pupils are recategorised as having not entered the lottery in session 1 and 1,726 pupils are recategorised as having not entered the lottery in session 2. Tables 6.32 and 6.33 show that, even under this pessimistic assumption, the role model treatment has a significant positive impact on entry to the lottery in both sessions which seems to be driven by the university role model.

[9] The mice function generates multivariate imputations by chained equations. I used the predictive mean matching (pmm) method to impute missing survey outcomes.

	Lottery entry							
	Session 1				Session 2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.235^{*}	0.234^{*}	0.360^{**}	0.362^{**}	0.274^{*}	0.279^{*}	0.351^{*}	0.344^{*}
	(0.114)	(0.114)	(0.126)	(0.126)	(0.131)	(0.130)	(0.149)	(0.148)
Similarity prime	−0.076	−0.090	-0.228^{+}	-0.222^{+}	−0.034	−0.053	−0.094	−0.071
	(0.113)	(0.113)	(0.122)	(0.123)	(0.136)	(0.136)	(0.151)	(0.152)
Constant	-0.700^{**}	-0.697^{**}	-0.469^{+}	−0.291	-0.916^{**}	-0.982^{**}	-1.124^{**}	-0.992^{**}
	(0.204)	(0.245)	(0.254)	(0.273)	(0.278)	(0.316)	(0.337)	(0.352)
Observations	2,189	2,176	1,781	1,781	1,823	1,811	1,493	1,493
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.Lottery entry is binary and analysed using binary logistic regression.

Table 6.32: Full RCT — robustness check of secondary analysis — lottery entry — WWCBs — any role model versus control

	Lottery entry							
	Session 1				Session 2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.239^{+}	0.228^{+}	0.366^{*}	0.371^{*}	0.364^{*}	0.358^{*}	0.413^{*}	0.427^{*}
	(0.132)	(0.132)	(0.143)	(0.144)	(0.152)	(0.150)	(0.175)	(0.174)
Similarity prime	−0.033	−0.040	−0.205	−0.206	0.040	0.036	0.043	0.036
	(0.153)	(0.154)	(0.160)	(0.161)	(0.188)	(0.189)	(0.215)	(0.215)
Constant	-0.591^{**}	−0.413	−0.087	0.047	-0.726^{**}	-0.750^{*}	-0.986^{**}	-0.758^{*}
	(0.219)	(0.275)	(0.248)	(0.274)	(0.281)	(0.327)	(0.363)	(0.380)
Observations	1,507	1,495	1,209	1,209	1,245	1,236	1,008	1,008
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 6.33: Full RCT — robustness check of secondary analysis — lottery entry — WWCBs — university role model versus control

6.9.2 Other robustness checks

As a broader robustness check, I re-run my primary analysis and secondary analysis of survey outcomes for WWCBs with errors clustered at the level of schools rather than classes. This analysis is presented in Appendix 9.30 and simply acts to strengthen the significance of the observed effects (see also how the ICC is lower for schools versus classes in Appendix 9.24).

As reported previously, I found that the effect on ISQ scores for WWCBs was not present three weeks after the intervention but the impact on lottery entry appears to persist. To probe this pattern more thoroughly and understand whether it may be a function of the pupils who were present in each dataset, I conducted robustness checks by restricting the data to only pupils who were present in both the first session and the follow-up session. The results of this analysis are presented in Appendix 9.31. I find that the results are consistent with those presented in my main analysis; there is some evidence of a persistent effect on lottery entry for WWCBs exposed to the university role model but no lasting effect on ISQ scores.

6.10 Exploratory analysis

6.10.1 Effect by year group and prior attainment

As outlined in Chapter 3, we might expect a differential effect of the intervention depending on pupils' prior attainment and year group. To test for this, I run exploratory analysis of session 1 outcomes which interacts the treatment term with year group and my unified maths attainment measure. The results are given in Appendix 9.32.It is important to note that these comparisons were not pre-registered and I include them as exploratory analysis only.

I find that there is a positive interaction between treatment and year group (coded as a continuous variable) for WWCBs which seems to relate to the university role model. To explore this more fully, I code year as a factor and interact it with the university role model term; the results are in Table 6.34 and confirm that the intervention appears to have been more effective for older pupils. The analysis presented in Appendix 9.32 also suggests that there was a significant interaction between prior maths attainment and the university role model treatment such that the intervention was more effective at increasing lottery entry for pupils with higher prior attainment.

There were no significant interactions between treatment and year group or attainment for WWCGs. When looking at the sample of all pupils, the interactions did not reach significance except for the interaction of apprenticeship role model with maths attainment which seems to suggest that that the apprenticeship role model was less effective at increasing university interest among higher ability pupils, but in the absence of a main effect on this outcome it is not clear how we should interpret this finding and I include it for completeness only.

	ISQ score	
	(1)	(2)
University role model	−0.012	0.007
	(0.068)	(0.078)
Similarity prime	−0.030	−0.008
	(0.049)	(0.056)
Year 9	−0.174**	−0.184**
	(0.058)	(0.062)
Year 10	−0.354**	−0.311**
	(0.063)	(0.072)
Year 11	−0.579**	−0.550**
	(0.071)	(0.082)
University role model x Year9	0.144	0.108
	(0.093)	(0.101)
University role model x Year 10	0.167+	0.067
	(0.093)	(0.109)
University role model x Year 11	0.246**	0.238*
	(0.095)	(0.107)
Constant	3.689**	3.606**
	(0.076)	(0.098)
Observations	1,492	1,210
Maths control	N	Maths unified
Other controls	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and the proportion of the class who are WWCBs. All models control for a school dummy variable.

Table 6.34: Full RCT — exploratory analysis — ISQ score — WWCBs — university role model versus control — interaction with year group

6.10.2 Perception of role models

For pupils in the treatment arms, I also collected data on their perceptions of the role models. These data were collected after the second round of survey data was collected in the second session. Pupils were shown a reminder video of the role model they had viewed a few weeks previously and then asked to rate the extent to which they agreed with to statements, one relating to perceived similarity with the role model ("How similar are you to them?") and one relating to admiration ("How much do they set an example which you would like to live up to?"). Both items were scored on a scale from one ("not at all") to seven ("very much").

Because I was collecting long-term follow-up data from the school, I did not expose pupils to the other role model which they hadn't yet seen. Therefore, I do not have a comparative measure of how each pupil rated themselves in relation to the two role models. However, as the pupils were randomly allocated it is valid to compare these scores across trial arms.

Table 6.35 provides a breakdown of how pupils answered these questions by role model type and for WWCB, WWCB and all pupils. There are no noticeable differences in these scores between the two role model types for any group but interestingly, WWCBs give some of the lowest ratings.

In Tables 6.36- 6.38, I formally test whether perceived similarity or the extent to which a role model is seen as setting an admirable example varies by role model type or by the similarity prime condition. I find that no intervention makes any difference to these scores for WWCBs. However, the priming is associated with a significant increase in scores for WWCGs and for all pupils.

	WWCB University	WWCB Apprenticeship	WWCG University	WWCG Apprenticeship	All pupils University	All pupils Apprenticeship
Similar	3.0	3.1	3.1	3.0	3.2	3.2
	(1.5)	(1.5)	(1.4)	(1.4)	(1.5)	(1.4)
Observations	424	430	440	404	2,262	2,300
Example	3.6	3.6	3.9	3.8	3.8	3.8
	(1.7)	(1.6)	(1.6)	(1.5)	(1.7)	(1.5)
Observations	419	533	435	468	2.246	2.697

Notes: Mean outcome given with standard deviations in parentheses and sample size below. “All pupils” relates to all pupils in participating schools. “Similar” is the response to a question asking pupils to rate their similarity to the role model on a scale which is converted to a score from one to seven. “Example” is the response to the question “. How much do they set an example which you would like to live up to?” also rated from one to seven. A higher rating on both measures implies a more positive response to the role model.

Table 6.35: Full RCT — perception of role model by pupil group

	Similar				Example			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	−0.167	−0.167	−0.220	−0.200	−0.137	−0.164	−0.129	−0.122
	(0.129)	(0.127)	(0.157)	(0.157)	(0.185)	(0.174)	(0.180)	(0.179)
Similarity prime	−0.097	−0.088	−0.089	−0.062	−0.161	−0.162	−0.109	−0.101
	(0.140)	(0.143)	(0.154)	(0.154)	(0.187)	(0.184)	(0.171)	(0.171)
University role model x Similarity prime	0.147	0.123	0.104	0.082	0.156	0.127	0.092	0.084
	(0.193)	(0.192)	(0.218)	(0.217)	(0.272)	(0.251)	(0.247)	(0.247)
Constant	3.318**	3.433**	2.375**	2.290**	4.082**	4.251**	3.339**	3.334**
	(0.187)	(0.219)	(0.287)	(0.312)	(0.381)	(0.389)	(0.329)	(0.354)
Observations	854	850	716	716	841	837	704	704
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. “Similar” is a response to the question “How similar are you to [the role model]?” and “Example” is a response to the question “How much do they set an example which you would like to live up to?”. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3-4 and 7-8 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). All models control for a school dummy variable.

Table 6.36: Full RCT — perception of role models — WWCBs

	Similar				Example			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.017	0.048	0.125	0.145	0.016	0.089	0.181	0.180
	(0.119)	(0.114)	(0.156)	(0.156)	(0.131)	(0.121)	(0.160)	(0.160)
Similarity prime	0.242^{+}	0.291^{*}	0.463^{**}	0.467^{**}	0.221	0.290^{*}	0.460^{**}	0.458^{**}
	(0.128)	(0.125)	(0.157)	(0.156)	(0.149)	(0.141)	(0.155)	(0.155)
University role model x Similarity prime	−0.043	−0.110	−0.325	−0.331	−0.005	−0.113	−0.329	−0.326
	(0.177)	(0.175)	(0.215)	(0.215)	(0.203)	(0.187)	(0.223)	(0.223)
Constant	3.054^{**}	3.075^{**}	2.841^{**}	2.648^{**}	4.082^{**}	4.252^{**}	3.704^{**}	3.696^{**}
	(0.197)	(0.206)	(0.296)	(0.314)	(0.329)	(0.269)	(0.276)	(0.306)
Observations	844	835	689	689	836	827	685	685
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Similar" is a response to the question "How similar are you to [the role model]?" and "Example" is a response to the question "How much do they set an example which you would like to live up to?". "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3-4 and 7-8 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 6.37: Full RCT — perception of role models — WWCGs

	Similar				Example			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.052	0.060	0.019	0.023	0.088	0.110	0.059	0.061
	(0.077)	(0.071)	(0.079)	(0.080)	(0.097)	(0.076)	(0.083)	(0.083)
Similarity prime	0.169*	0.179*	0.197*	0.206**	0.148	0.161*	0.176*	0.180*
	(0.075)	(0.073)	(0.078)	(0.079)	(0.097)	(0.081)	(0.085)	(0.085)
University role model x similarity prime	−0.091	−0.102	−0.138	−0.141	−0.098	−0.118	−0.120	−0.123
	(0.109)	(0.103)	(0.113)	(0.113)	(0.140)	(0.115)	(0.120)	(0.120)
Constant	2.952**	3.146**	2.918**	2.881**	3.818**	4.132**	3.694**	3.729**
	(0.179)	(0.142)	(0.186)	(0.188)	(0.281)	(0.172)	(0.172)	(0.178)
Observations	4,562	4,515	3,750	3,750	4,528	4,481	3,723	3,723
Maths control	N	N	Maths unified	Maths high	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. “Similar” is a response to the question “How similar are you to [the role model]?” and “Example” is a response to the question “How much do they set an example which you would like to live up to?”. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3-4 and 7-8 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). All models control for a school dummy variable.

Table 6.38: Full RCT — perception of role models — all pupils

6.10.3 Differences by project area

Given that I used different role models in the different project areas, it is also relevant to examine any difference in response to treatment across these areas. This analysis is presented in Appendices 9.33-9.35. I analyse the effect of any role model, the university role model and the apprenticeship role model for WWCBs, WWCGs and all pupils, broken down by the four project areas. I also provide an interaction of treatment by project area for each sample. However, cutting the sample like this is likely to introduce imbalance for some of the comparisons and the trial was not powered or designed for this analysis, so the findings discussed here are exploratory only.

For the WWCBs, the most striking finding is that treatment effects are strongest in the West Midlands.[10] In this area, the university role model has a positive effect on ISQ scores (although this is not significant) but even when we restrict the sample size considerably, there is a positive and significant effect on university interest and lottery entry. In this project area I also find that there is a significant positive effect of the apprenticeship role model on apprenticeship interest. So, even though we see no effect of these role models in the aggregated results, it may be the the role models in this project area actually had a positive effect on university and apprenticeship aspirations for WWCBs. For the WWCGs, there is not consistent evidence of a differential effect by area. Looking at the full sample of pupils, the university role model in the West Midlands did have a significant positive impact on lottery entry and this echoes the more positive effect for WWCBs in this region which I report above.

To supplement this analysis, in Appendix 9.36 I explore the perception of role models by area. When we look at WWCBs, I find that the university role model in the West Midlands does score significantly higher on perceived similarity and the

[10] Some other significant relationships between treatment and outcomes are present in other areas but these are not consistent in the data and I do not report them here for risk of over-stating their importance.

extent to which they set an example pupils would like to live up to, and this is true for the full sample of pupils too. In this appendix I then go on to consider whether the average distance between schools and role models within each area may be playing a part in driving the different effects by area. However, any examination of different effects by area is fundamentally limited by the design of the trial. Because the role model a pupil was exposed to was a determined by their school, and there was no variation within schools, it's not possible to untangle the effect of being in a certain school with the effect of different role models. I provide a brief discussion of this point in Appendix 9.36 and conclude that more research would be needed to explore this issue.

6.10.4 Considering the wider population of pupils

Although the focus of this thesis is on white working-class pupils, it is also relevant to contextualise my findings by looking at the effect of the intervention on all pupils, and non-WWC pupils. In Appendices 9.37-9.39 I reproduce analysis of session 1, session 2 and school outcome measures for these groups.

Looking at the sample of all pupils, I find that the university role model treatment has a significant positive effect on ISQ scores in session 1 which is slightly smaller than the effect on the same outcome for WWCBs. There is no effect on any other outcomes. Balance checks presented in Appendix 9.40 suggest that this sample is broadly balanced although there is significant imbalance on the proportion of white British pupils by arm. This imbalance is more pronounced in the session 2 data and so I do not discuss results relating to these data here as they are not likely to be valid. There is no effect on effort or attendance, although again imbalance between arms renders this comparison unreliable.

Looking at the parallel analysis for non-WWC boys, there is no imbalance in the session 1 data and we see a significant increase in lottery entry which is present for both the university and apprenticeship role models (whereas there was no significant effect of the apprenticeship role model on lottery entry for WWCBs).

The effect of the university role model on this outcome is slightly larger than for WWCBs. Again, tables presented in Appendix 9.40 suggest significant imbalance for the session 2, effort and attendance data and while analysis of these data is presented in 9.38 for completeness, I do not comment on these as true findings here.

Moving to the analysis for WWCGs, there is no imbalance in the session 1 data and we see a significant increase in ISQ scores which is present for both role model types but bigger for the university role model (and again is slightly smaller than the effect for WWCBs). Analysis of the session 2 data is undermined by imbalance between trial arms and there is no consistent effect found in relation to the effort and attendance data.

As an extension to the analysis of the full sample, I also conduct analysis to examine the interaction of treatment with a range of characteristics, including my "white British" marker, FSM eligibility, gender and my WWCB marker. The results are presented in Appendices 9.43-9.46. I find no significant interaction between treatment and the white British or FSM marker, suggesting that ethnicity (at least in these broad terms) and FSM did not influence the impact of the intervention. I do find some evidence that the impact of the intervention was less for female pupils when we look at the lottery outcome (as mirrored in previous analysis of lottery entry for WWCGs versus WWCBs) and this seems to have been driven by the apprenticeship role model. Finally, I do not find that my intervention was more (or less) effective for my target group than for all other pupils.

In sum, we see broadly positive effects on the full sample of pupils and on non-WWC pupils, and these effects sometimes exceed those we see for our target group. Gender seems to be the only factor which determines the efficacy of the intervention, particularly in relation to lottery entry where we see a null for female pupils in general. This finding would bear some further investigation through qualitative methods to understand if and how the motivation for entering the lottery (or not) differs by gender.

This broader set of findings are reassuring as they means that we can have some confidence that the intervention is not inadvertently harming other groups of pupils. The positive effect of the apprenticeship role model on lottery entry for non-WWCBs is an interesting point of deviation from my main results and indicates that the theory of change for influencing non-WWC pupils may be different to the one which underlies my hypotheses.

6.11 Discussion

The analysis presented in this chapter suggests that being exposed to a role model had a small but significant positive impact on self-reported attitudes to education among my sample of WWCBs and this was driven by the university role model. The effect is equivalent to Cohen's δ of 0.1 which is typical for education interventions when assessed on attainment outcomes (see discussion in Chapter 4). However, this effect did not persist when measured three weeks later and there was no effect due to the apprenticeship role model or priming activity either immediately after the intervention or at the three-week follow-up.

In my secondary analysis, I found there was no impact of any treatment on interest in university or apprenticeships, scores in a low-stakes maths test, attendance or effort. However, I did find that exposure to a role model led to significant increase in pupils entering a lottery to win £200 of online tutoring which was again driven by the university role model. This effect persisted three weeks later. My analysis suggests that role model exposure increases entry directly after the intervention by almost six percentage points (relative to 34 per cent in the control group) and this equates to an effect size (Cohen's h) of approximately 0.10 (see Appendix 9.5 for effect size formulae used in this thesis).

I found that the effect on ISQ scores for WWCBs was not present three weeks after the intervention but the impact on lottery entry appears to persist. This inconsistency in my findings presents some interesting questions: if the effect on self-reported attitudes washes out after three weeks, and we have hypothesised that propensity to enter the lottery is a measure of those attitudes, why do we see this sustained impact on behaviour? I propose that the answer lies in individuals' preference for consistency. There is a body of literature which argues we all desire to act in a way which is consistent with our prior behaviour (Guadagno and Cialdini, 2010). This desire for consistency means that when we have taken some action, there is a natural tendency to behave in ways which are in line with that behaviour. In the case of this trial, it may be that a desire to be consistent with prior behaviour led pupils who had entered the lottery once to enter it again. The same desire for consistency may not be reflected in the survey scores because arguably the exact rating which pupils gave to each of the survey items will have been less memorable and also less of an overt action on their part. Further research would be needed to confirm these suggestions. If this is the case, then we find ourselves in an interesting situation where we may not have had a lasting impact on pupil attitudes, but the impact on behaviour lasts regardless.

Taken as a whole, the results discussed above provide good evidence to support hypothesis 1 (that exposure to male role models will improve attitudes to education among white working-class male pupils). However, I find no evidence for hypothesis 2 (exposure to a vocational male role model will improve attitudes to education among white working-class male pupils to a greater extent than exposure to a male role model who is a university student) as in fact the raw effect for the vocational role model is effectively zero.

Although in my exploratory analysis I find that the similarity priming activity is effective at increasing perceived similarity for the role models among all pupils and among WWCGs, this activity is actually ineffective for my core target group; therefore, it is unsurprising that we do not see any impact of this activity across any outcomes and there is no support for hypothesis 3 (exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils when pupils are encouraged to reflect on how they are similar to the role model).

I find no effect of any intervention on white working-class girls although there is some suggestive evidence that the university role model reduced interest in university (but this effect was only present in the data collected three weeks after the intervention so I interpret it with caution). Whether this result is robust or not, my findings do support hypothesis 4 (exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils).

Throughout my analysis I examine the interaction of the role model treatment with the proportion of the class meeting the WWCB criteria. Although the pattern is not consistently present across all outcomes, there is some evidence of a differential effect to the role models based on the proportion of the class meeting the WWCB criteria. In other words, as the proportion of target pupils in a class increases, the efficacy of the intervention decreases — particularly for the apprenticeship role model for which this interaction is significant. This pattern is consistent with my hypothesis that as the proportion of WWCBs in a class increases the efficacy of the intervention will decrease. However, an alternative explanation for this pattern could be that classes with a higher proportion of target pupils have poorer behaviour and so the intervention is delivered with less fidelity. To address this issue, I turn to the secondary analysis for WWCGs which shows that this pattern is visible for some outcomes but the sign of the interaction is reversed: so as the proportion of WWCBs increase, so does the efficacy of the intervention. If we assume that girls mainly associate with female classmates, this pattern may reflect the fact that pupils are more likely to respond to the intervention when they are not bolstered by their social crowd (which is simply the inverse of the reasoning behind my original hypothesis). Therefore, there is some evidence to support hypothesis 5 (exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils in classes where white working-class male students constitute the minority of male pupils).

Finally, in my exploratory analysis I find some evidence to suggest that the impact of the university intervention was greater for higher prior attainment but this only applied to lottery entry and not any other outcomes (hypothesis 6).[11].

Turning to the limitations to this study, as noted in section 6.2, the schools were located in four areas: the East Midlands, South, West Midlands, and East of England and the majority were in urban settings. All schools were non-selective,

[11] This hypothesis was added post-trial and so it was was not pre-registered and is included as exploratory analysis only

non-religious and mixed-sex apart from one which was an all-boys school.) A discussion of the profile of these schools, and a comparison to regional and local averages, is given in Section 6.2 and a further examination of how school drop-out changed this sample is given in Section 6.4. I show that, in the original sample, participating schools contained a higher proportion of white British pupils and a higher proportion of FSM-eligible pupils than the average across all state-funded English secondary schools and that schools rated as "Good" and "Requires Improvement" were overrepresented while those at the extreme ends of the rating scale were underrepresented. Looking at these data aggregated by region, although some deviation from the region specific averages exists, there are no obvious patterns to suggest the systematic selection of certain types of schools into the sample across the regions.

The loss of three schools due to school-level attrition did not make large notable differences to the profile of the sample for analysis (in terms of school-level characteristics), although the remaining schools are arguably slightly higher-performing in terms of Ofsted rating (but note that analysis of this dropout is necessarily noisy due to the small number of schools). Compared to all state-funded secondary schools in England, the final sample is still slightly smaller than the average and contains a higher proportion of white British pupils (77 per cent versus 68 per cent) and higher proportion of FSM-eligible pupils (16 per cent versus 12 per cent). As well as considering selection bias and dropout at the level of schools, we can also examine the effect of the removal and attrition of classes and pupils from the original sample. Within participating schools, I excluded a small number of classes which sat outside the normal tutorial system (i.e. for pupils with particular educational or behavioural needs). These classes were removed from the trial because teachers felt that the pupils would not engage well with the materials but it does have implications for external validity. It is possible that these pupils are among the least engaged in their education and would have been least receptive to the interventions so removing them from the trial could mean that I risk overstating the efficacy of the intervention. On the other hand, if these pupils were removed from this project, it is likely they would also be subject to exclusion from other similar projects; therefore, the risk to external validity is minor in this regard.

Aside from the removal of classes, this trial suffered high rates of attrition between randomisation and data collection. However, much of this disparity was due to whole schools dropping out of the trial (three in total) and when I exclude these schools, session 1 data was actually collected for approximately 87 per cent of the randomised sample. My analysis shows that attrition was not linked to trial arm but it was related to a number of demographic characteristics; FSM-eligibility and specific educational needs are both associated with lower rates of survey data collection and older pupils are also less likely to be present in the data than younger pupils. It is not possible to examine whether the lack of survey outcomes for some pupils was due to absence from the sessions in which these data were collected, unsuccessful implementation of the sessions themselves, or low rates of survey completion. However, it seems plausible that FSM eligibility and special educational needs status may both be correlated with pupil absence and this may be partly to blame. Therefore we must be cognisant of the fact that, in trials such as mine, the data collected probably relates to pupils who are present and participate in class activities.

6.12 Conclusion

In this chapter I have set out the implementation and results from an RCT to compare the efficacy of a university or apprenticeship role model in improving attitudes to education among WWCBs. It simultaneously tested whether a short "similarity priming" exercise could boost role model impact and also measured the effect of the various treatment arms on WWWGs. Specifically, I examined the impact of exposure to a light-touch role model video on self-reported attitudes to education, interest in university and apprenticeships, performance in a low-stakes maths test and entry into a lottery to win £200 of online tutoring, as well as school measures of attendance and effort. I found that exposure to a role model led to a positive impact on self-reported attitudes to education and lottery entry for WWCBs and this was driven by the university role model.

The main contribution of this chapter is to provide evidence for or against each of my project hypotheses (see Chapter 3). The trial provides robust and convincing empirical support for the use of role model interventions with my target group and provides some useful insights about what type of role model is most effective and for whom. To fully understand these results, I turn to qualitative inquiry. In the following chapter I present the findings from my qualitative interviews which were designed to elucidate the quantitative results. An overarching discussion of my quantitative and qualitative results is then given in Chapter 8.

Chapter 7

Exploring pupil perceptions of role models

7.1 Introduction

In the preceding chapters I have made the case that role model interventions may be one effective approach in helping tackle the persistent underachievement of white working-class boys in English schools (Chapters 1-2). By developing a simple model of how a role model intervention might influence pupils' attitudes to education, I generated several testable hypotheses about the efficacy of role modelling approaches for this group (Chapter 3) and presented an associated research design (Chapter 4) comprising two RCTs (Chapters 5-6) and a qualitative study.

In this Chapter, I present the qualitative portion of my project. As described in Chapter 4, RCTs are sometimes criticised for taking a "black box" approach and focusing solely on inputs and outcomes without due attention to the intervening processes. Indeed, my quantitative work seeks to establish causal impact (and maps well onto the simple model presented in in Chapter 3) but my qualitative work takes a more nuanced approach to understanding the causal process. To this end, in Section 7.2, I base my qualitative research questions on a framework developed by

Morgenroth (2015) which seeks to formalise the mechanisms of role model influence. The overall aim of these interviews was to understand how pupils responded to the role model interventions used in my quantitative studies and particularly if there was any differential effect by role model type ("academic" or "vocational").

In Section 7.3, I present details of the qualitative sample before providing my results (Section 7.4). I find that existing career aspirations are an important factor which determines perceived similarity with a role model and to the extent to which a role model is seen as embodying a desirable career destination. Both role model types were seen as successful but apprenticeships were generally seen as a more attainable option. In Section 7.5, I discuss my results in light of the framework presented by Morgenroth (2015) before concluding in Section 7.6.

7.2 Revisiting a theoretical framework for role model influence

As discussed in Chapter 2, Morgenroth (2015) bring together a diverse literature on role models to propose a unified "theoretical framework" for role model influence. The simple model presented in Chapter 3 deals only with aggregated concepts of cost and benefit (see simple schematic of the model in Figure 7.1). The more detailed framework used in this model delves inside the "Role model relevance" box to map out the different pathways by which an impact on behaviour might occur. Specifically, it draws on expectancy-value theories of motivation to suggest that three distinct role model functions can influence motivation and goals.

Expectancy-value theories of motivation are studied across a range of domains and are well supported in the education literature (Wigfield and Eccles, 2002). These theories state that the extent to which an individual is motivated to perform a certain task is dictated by their expectations about that task and the value they place on it: "Expectancy refers to an individual's perceived subjective likelihood of success in a certain task or area, for example, the perceived likelihood of passing a

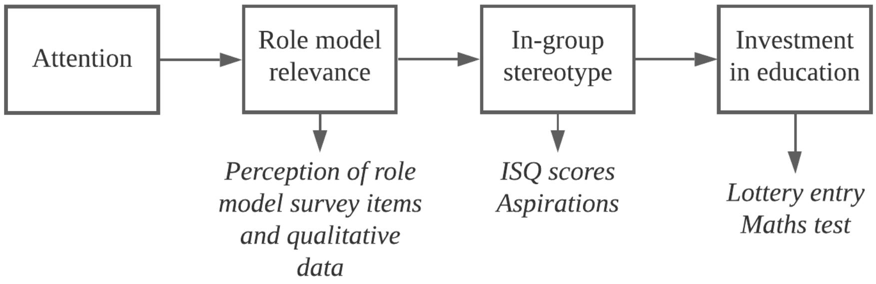


Figure 7.1: Basic schematic of model presented in Chapter 3 mapped to data collected

difficult math test...Value, on the other hand, refers to an individual's perceived desirability of said success such as the resulting enjoyment, pride, or financial reward" (Morgenroth, 2015, pp. 469).

Morgenroth (2015) breaks down expectancy into two components: expectancy based on the perception of internal factors and expectancy based on the perception of external factors. The former is linked to personal self-efficacy but also individual beliefs about ability to succeed based on social identities and associated stereotypes. External factors are those which do not relate directly to the self, such as the perceived difficulty of the task. Value is similarly broken down into value based on the internal attributes of the goal (for example, interest and enjoyment) and value based on the consequences of achieving that goal.

An illustration of the "Motivational Theory of Role Modeling" reproduced from Morgenroth (2015) is given in Figure 7.2. This diagram shows that there are three main paths through which a role model can influence attitudes and behaviour among "role aspirants" (those who are subject to the role model exposure). First, they can act as "behavioural models" for individuals who already hold a goal which the role model embodies. For example, if a trainee doctor wants to know how to perform a particular procedure, they may observe and learn how to perform this task from a respected peer. This function is about transmitting information on how to do something and is similar to the theory of social learning discussed in Chapter 2. In Figure 7.2, this process relates to the top pathway: role models embody a relevant goal from which role aspirants vicariously learn and this leads to improved expectancy of success resulting in skill acquisition and motivation. The second possible function of a role model is to act as a “representation of the possible”. In this scenario, role models not only hold a relevant goal but they also encourage the role aspirant to perceive that goal as attainable. Morgenroth (2015) suggest that this happens via two processes: role models can change perceived stereotypes about a particular domain and they can change the perception of barriers to success in that domain. The message from the role model is that it is possible for an individual like them to succeed at the goal in question and, via this process, it is expected that a role model can increase an individual’s identification with the relevant domain, thus improving self-efficacy. This process is represented by the middle pathway in Figure 7.2 which shows how this role model function acts to improve expectancy of success resulting in skill acquisition and motivation. The third possible function of a role model is to act as an “inspiration”. In this scenario, the role model encourages role aspirants to adopt a goal which they did not previously hold. This inspiration is thought to occur by a process of admiration and identification between the role aspirant and the role model which means that the role aspirant seeks to adopt behaviour and attitudes which are being role modelled. This process is represented by the bottom pathway in Figure 7.2 which shows how this role model function acts to increase the perceived value of a goal of success resulting in skill acquisition and motivation.

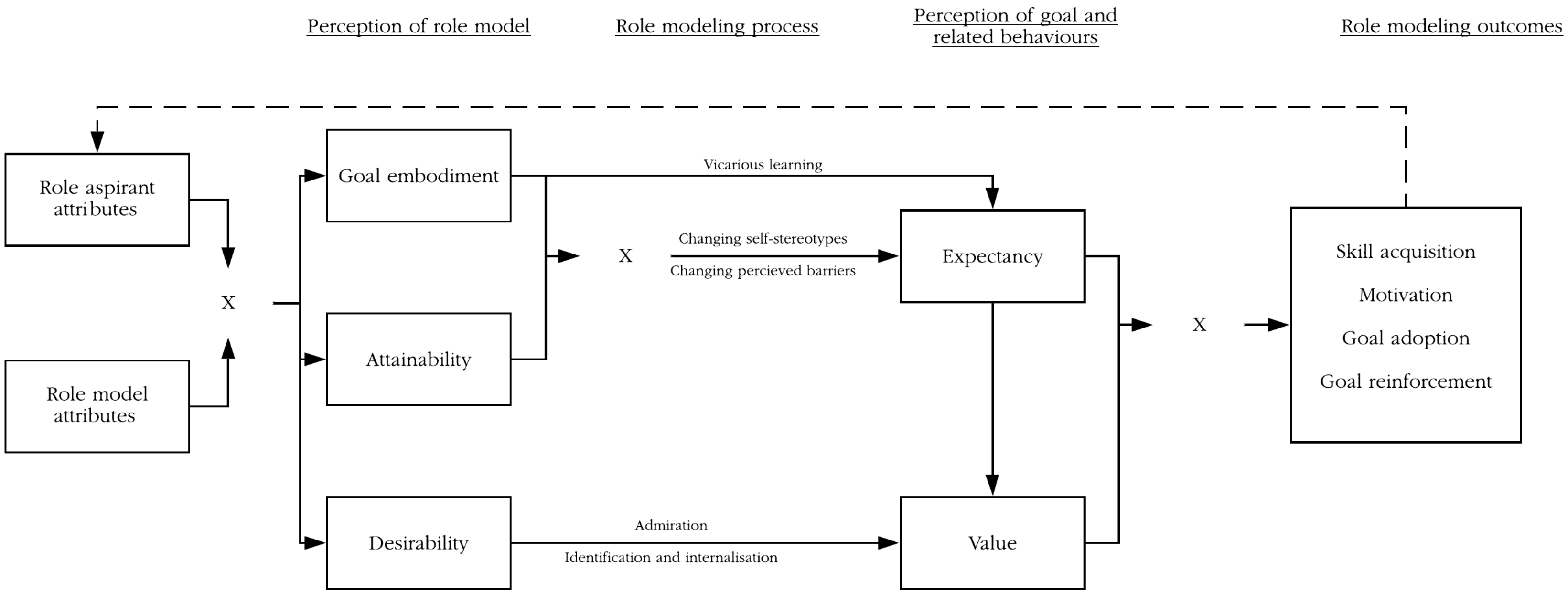


Figure 7.2: An illustration of the Motivational Theory of Role Modeling

All the pathways described above start with the intersection of role aspirant and role model attributes. It is trivial to state that there is not one role model who can fulfil these functions for all individuals; instead, as per the tenet of this thesis, there are a range of factors which will determine whether these functions operate effectively and the relative weighting of the various pathways for a particular interaction. One such factor is likely to be the level of similarity between role models and role aspirants; indeed, for both of the latter functions, role models as "representations of the possible" and as "inspirations", Morgenroth et al. argue that shared in-group membership is a necessary prerequisite to role model influence. However, it is clear that there also also other factors which will dictate the efficacy of a role modelling process. For example, the degree of match between a role aspirant's goals and the goal which the role model embodies will dictate the extent to which the upper two pathways in Figure 7.2 are present. We might also expect the role aspirants existing beliefs about the attainability of the goal to impact on the role modelling process via the middle pathway and the role model's level of success is likely to dictate whether they can be an effective messengers for changing these beliefs across all pathways.

As discussed in Chapter 4, based on this framework and the discussion above, I developed a number of research sub-questions focused on delving into the causal process in more detail. These questions are given in Table 7.1 and form the basis for my qualitative study which is presented in the following sections.

Question
1. How do pupil's perceptions of perceived similarity with the role model vary by role model type?
2. To what extent do pupils perceive different role models as embodying desirable career destinations?
3. How do pupils' perceptions of the role model's career success depend on role model type?
4. To what extent do pupils perceive different role models as embodying attainable career destinations?

Notes: Where role model "type" refers to academic versus vocational role models.

Table 7.1: Qualitative research sub-questions

7.3 Qualitative sample

Schools were invited to take part in my qualitative study in the Spring and Summer term 2019. During recruitment for my second RCT, each school had been asked about their level of interest in participating in this part of the project and so five schools which had expressed a desire to be involved were approached. To take into account the burden on staff time, schools were asked if they would be willing to host four pupil interviews after they had finished implementing the intervention (both sessions one and two). Three schools were selected covering three of the four project areas and providing range in terms of rural versus more urban environments. Table 7.2 shows that these schools were smaller than the average for the second RCT sample but that the proportion of White British pupils, and proportion of FSM-eligible pupils, ranged either side of the quantitative sample average. Two of the schools had an Ofsted rating of “Good” and one had a rating of “Requires Improvement” so the schools were fairly typical of the second RCT sample in this regard (see full details in Section 6.2).

To sample participants, schools were sent a list of pupils who met the criteria used for targeting white working-class boys in the RCT (see Section 4.2). Within this list the key member of staff was asked to choose four pupils for interview. No further criteria were provided except that certain schools were asked to focus on particular year groups so that pupils were sampled from across the age distribution.

Pupils were initially approached about the interview by the key staff member in their school. They were given further information upon attending the interview and asked if they would like to take part. All pupils who were selected agreed to take part and gave verbal and written consent to this effect. All of the pupils who were approached consented to take part and gave a full interview.

Table 7.3 shows that pupils were sampled across a range of year groups and trial arms. Although pupils in the qualitative sample were slightly less likely to have a special educational need than those in the RCT as a whole, the proportion

School	Area	Setting	Total pupils in school	White British	FSM-eligible	Ofsted rating
S10	WM	Rural	550	92%	15%	Good
S13	EE	Urban	600	64%	27%	Requires Improvement
S19	S	Urban	700	67%	20%	Good
Full RCT sample average			**900**	**77%**	**16%**	-
All-England average			**950**	**68%**	**12%**	—

Notes: The schools were located in three areas: the South ("S"), West Midlands ("WM") and East of England ("EE") and spread across urban and rural settings. The RCT sample averages are weighted means (based on school sizes).The all-England average is for state-funded secondary schools. School size is rounded to the nearest 50. The schools in the qualitative study were generally smaller than the average for the RCT (and the national average). The proportion of White British pupils, and proportion of FSM-eligible pupils, ranged either side of the full RCT sample average. Data was obtained from national administrative datasets.

Table 7.2: Profile of schools in qualitative study

of pupils who had been FSM-eligible in the last six years was comparable to that in the full trial sample (50.0 per cent versus 47.3 per cent). Similarly, the proportion living in ACORN 4 or 5 areas was close to that in the full trial sample (91.7 per cent versus 89.2 per cent).

As discussed in Chapter 4, using the research sub-questions presented earlier in this chapter, I developed a research guide for semi-structured interviews with individual pupils (see Appendix 9.47). The interviews were designed to be 20 minutes long. Pupils were shown a one-minute reminder clip, either of the university or apprenticeship role model and then asked questions about the role model they had seen. Then they were shown the clip of the other role model and the process was repeated. The order in which the clips were shown (university first or apprentice first) alternated between interviews to avoid systematic ordering effects.

For each interview, the qualitative data was recorded, transcribed, then coded in the Nvivo software package (QSR International Pty Ltd., 2015). The codes were determined according to emerging themes which distilled the cumulative responses of pupils into insights about how the pupils responded to the role models in the

School	Project area	Year group	Trial arm	SEN	FSM	ACORN 4 or 5
S10	WM	10	5	0	0	1
S10	WM	10	2	0	1	0
S10	WM	11	1	0	0	1
S10	WM	11	5	1	0	1
S13	EE	9	3	0	1	1
S13	EE	9	1	0	1	1
S13	EE	10	3	0	0	1
S13	EE	10	2	0	1	1
S19	S	8	5	1	0	1
S19	S	8	5	0	1	1
S19	S	10	5	0	0	1
S19	S	10	5	0	1	1
			Qualitative sample average	**16.7%**	**50.0%**	**91.7%**
			FUll RCT sample average	**25.2%**	**47.3%**	**89.2%**

Notes: Four pupils were interviewed in each school. This sample comprised two Year 8 pupils, two Year 9 pupils, six Year 10 pupils and two Year 11 pupils. Participants were from a range of trial arms. Two of the participants had some form of special education needs (SEN), six had been FSM-eligible in the last six years (FSM) and all but one lived in ACORN 4 or 5 postcodes. Pupils in the qualitative sample were slightly less likely to have some form of SEN requirement but seem otherwise representative of the RCT sample.

Table 7.3: Profile of pupils in qualitative study

intervention. The resuts of my analysis are given in the following section.

7.4 Qualitative findings

Career aspirations and similarity

The clearest finding from this qualitative research is that pupils' existing career aspirations are strongly linked to reported similarity with a role model. Across all but one of the interviews, pupils identified an interest in pursuing either university progression or apprenticeships as the main point of similarity or difference with the role models.

This was particularly the case for pupils who appeared to have internalised a narrative about the binary nature of the routes; nearly all of the participants seemed to conceptualise academic and vocational aspirations as mutually exclusive and reported either a high level of interest in university or a high level of interest in apprenticeship, in contrast to one another. All of these pupils referred to their chosen route as a characteristic which they shared (or did not share) with the role models. This was true across the full age range of participants.

It is important to note that, for some pupils, simple matching on a high-level destination, such as university or an apprenticeship, was not sufficient. Two pupils who were very interested in doing an apprenticeship, identified a lack of similarity with the role model because they were not focused on exactly the same type of occupation. Specifically, these pupils were interested in woodwork and construction which they saw as quite different from engineering. Likewise, one pupil who was interested in university drew a clear distinction between his subject interest and that of the role model. These pupils were in lower year groups (Years 8, 9 and 10) so this fine-grain distinction between possible careers could be due to a lack of exposure to careers IAG which tends to kick in a little later and might help pupils understand the higher-level similarities between options within the different routes.

Career aspirations, family background and social networks

For the majority of pupils, perceived similarity or difference was framed purely in terms of interest in a particular career pathway but several also linked the career choice of the role model back to their family background. Three of the participants referred to their lack of family experience in HE as a point of similarity with the university role model and a family link to apprenticeships was similarly cited when discussing the apprenticeship role model. For example, one pupil noted that the apprentice role model had a background of engineering in his family "kind of like a tradesman yeah and I've got that kind of background, like trade, in my family" *Pupil [Year 10, S19].*

To gauge the perceived similarity of role models, pupils were asked if they thought the role model would fit in with their group of friends. For some pupils the apprenticeship role models were seen as having a better chance of fitting in due to their "hands-on" attitude and "physical job". Two pupils thought that the university role model would not fit in with their current peer group because their friends had very low levels of interest in HE; so again, the expected level of fit with pupils' social groups seemed to be determined by the role model's post-school destination. One pupil went as far as to make assumptions about the role model's values based on their career choices. Specifically, he thought that the apprentice role model was probably closer to his family because he seemed like he had less money and that the university role model had a different "ideology" due to his perceived affluence:

> ***Pupil [Year 10, S19]:*** *"To be honest I wouldn't say [the university role model] is coming up from the exact same background. He seems pretty nonchalant about the fact that he's got a lot debt now...this is going to sound really bad but something about how he speaks and how he acts — he doesn't give off to me a person who's worried about too much so don't think money was a really big issue for him."*

Positive personality traits

Career aspirations were the most dominant point of similarity identified, but pupils who had a less concrete view of what they would like to do in the future seemed to find it easier to identify points of similarity which were not based on the role model's chosen route. One pupil in Year 9 made no reference to career choices, instead reflecting on how he shared the apprenticeship role model's propensity for multitasking and also relating to the university role model's drive to pursue his own dreams and not be swayed by family or friends. Another pupil who reported high levels of interest in both university and apprenticeships and was torn between the two noted that he was dissimilar to the university apprentice because he was much less sure of which option to take.

Although not always identified as a similarity, most participants identified both role models as having high levels of motivation and independence. Pupils reflected positively on how the role models had a clear idea of what they wanted to do in life and seemed to take away two key messages from the videos: first that education was important for the future and second that they should make choices which are right for themselves. Several pupils identified the fact that the role model had taken time to appear in the video and give advice as a positive trait. Participants generally thought the role models seemed like "nice lads" as they were "helping people out".

The source of career aspirations

As career aspirations were such a dominant determinant of perceived similarity of role models, it is important to understand their source. Pupils did mention careers IAG support in relation to their plans. However, while some older pupils reported a positive experience of intensive support from school staff, for example in choosing between particular GCSE options, the overall response to in-school advice was fairly tepid. Pupils generally said that they remembered some kind of assembly or meeting about their career options taking place but they were vague about the details.

By contrast, pupils spoke about the influence of their social and family networks with enthusiasm. Many of the pupils who aspired to undertake an apprenticeship linked this back to a family connection — for example a brother, father or uncle, already in the trade. These pupils generally had practical experience of helping their family member with that job in an informal capacity and could speak confidently about the aptitude for, and enjoyment of, the work. Personal enjoyment of particular subjects was a theme which is also present in the career aspirations of pupils who aspired to go to university but seemed especially important for pupils who aspired to more vocational routes. For these pupils, there was a clear divide between their self-efficacy inside and outside the classroom. Participants highlighted how they did not enjoy the school-based mode of learning (which they equated with academic post-school options) and contrasted this unfavourably with the practical nature of apprenticeships.

Interestingly, the role of families in giving career advice appears to differ by route. When considering academic options such as university, or even GCSE choices, participants reported that their families were supportive but generally "didn't mind" what pupils chose to do as long as they were happy. In contrast, families played a more active role in providing advice on apprenticeship options, sometimes giving specific information about how the qualification would work in practice.

It is also relevant to understand how pupils conceptualise the role of school in leading to career success and across the interviews pupils reported that they believed GCSEs to be an important tool in the labour market. However, their attitudes to school tended to be more ambivalent and several pupils stated that they did not enjoy the learning experience and struggled with activities like sitting still and writing. Overall, participants seemed to take an instrumental approach to their education, recognising the need to get a "baseline" of qualifications which would allow them access to a good job. In this sense, academic success was seen as subordinate to broader themes of success in the outside world.

Desirable and achievable destinations

If we think that being perceived as successful is a factor in role model efficacy, then it is pertinent to first establish what we mean by success. To this end, pupils were asked about what success meant to them and what they would like to achieve in their life. In line with existing research into careers aspirations for working-class boys many of the pupils aspired to have a stable source of income which could provide for them on a practical level. However it is important to note that several pupils also spoke about wanting to "help people" and the desire for a sense of "accomplishment" or personal development in their careers. These higher level ambitions are not in-line with the more instrumental approach to employment we might expect to uncover based on the discussion in Section 2.2.

Of the four who were asked, all pupils stated that they believed both the university and apprenticeship role model to be successful. The apprenticeship's success was framed in terms of his employment, current earnings and the potential to start his own business. By contrast, the university role model was seen as academically successful and determined. However, one pupil drew a distinction between his current studies and future employment, saying he wasn't very successful right now but could be in future. The pupil contrasted this with the apprenticeship role model's situation:

> ***Pupil [Year 10, S19]:*** *" I would say [the apprenticeship role model] is obviously going to be earning more money than the other guy, but if he harnesses his potential the [university role model] is obviously going to surpass [him]...The other guy is says he's working in apprentice so he's probably gonna get more money than that guy and he could potentially get a job after — and if he gets a job he could learn a trade and start a business if he wanted to. So I think they both have equal opportunity it just depends how hard they work."*

This quote sums-up that, although pupils recognised the balance between short-term and long-term pay-offs, both role models were recognised as generally successful in life.

Among pupils who reported some interest in going to university, all of them spoke about the financial barrier to studying as a factor which would make them less likely or able to do so. Pupils also spoke about the challenges of having to travel, move away from home and or leave family members as reasons why they would be inclined not to attend. None of these factors applied to their discussion of apprenticeships. Therefore, although both routes are seen as leading to successful careers, apprenticeships are certainly perceived as a more achievable destination.

7.5 Discussion

My qualitative results can be used to effectively answer the four research sub-questions set out in Section 7.2. First, my headline finding is that pupils' existing career aspirations are strongly linked to reported similarity with a role model; so pupils who aspire to complete an apprenticeship reported higher levels of similarity with the apprenticeship role model and vice-versa. Relatedly, the extent to which a role model was seen as embodying a desirable career destination depended on their existing aspirations. Both role model types were seen as successful but apprenticeships were generally seen as a more attainable option.

The significance of these findings can be assessed using the theoretical framework presented in Section 7.2. In this framework, goal embodiment refers to the extent to which a role model has reached a role aspirant's goal and meeting this criteria is key to a role model influencing role aspirant expectancy. If we consider the goal in question to be related to the role model's post-school destination (i.e. university or an apprenticeship) then the consequence for this study would be that the level of match between existing aspirations and the role model type would effective turn the top two pathways in Figure 7.2 "on" or "off". For example, if a pupil has no interest in university, the university role model does not embody a relevant goal in this regard and so the framework would not predict an impact on expectancy relating to this post-school destination. Instead, any impact on this pupil would likely operate by role models acting as “inspirations” and making the route desirable, thus increasing the value of the goal. If a pupil is interested in university, the university role model embodies a relevant goal and so we might expect the role model to help the role aspirant see the route as more attainable, thus boosting the expectancy of success relating to this goal.

However, it should be noted that Morgenroth et al. (2015) note that role aspirants will have multiple goals and the effect of a role model may differ by goal type. Therefore, it is interesting to note that both types of role model were broadly perceived in a positive light and seen as successful by pupils. This finding suggests that I was successful in selecting role models who were seen as broadly similar to each other apart from their post-school destination.

However, my qualitative research is subject to several limitations which bear discussion. First, although I sampled from across three distinct government regions, the schools at which the interviews took place were selected via convenience sampling as I needed school staff to volunteer to host my visit. As noted in Section 7.3, the schools were smaller than the average across my quantitative sample but the proportion of White British pupils, and proportion of FSM-eligible pupils, ranged either side of the sample average for my second RCT. However, the institutions were unavoidably self-selecting and this could reflect a host of differences with the broader population of schools which participated in my project. Within schools, teachers were asked to select interview participants from a list of pupils and, although they were requested not just to choose the most amenable children, it is possible that they made slightly biased choices about who should take part. As a result, I may have only interviewed pupils who had among the more positive attitudes to education and better relationships with teachers than the broader population of target pupils.

Another potential source of bias in my findings is my own role in collecting and interpreting data. Within the interviews, it was clear that pupils perceived me as something close to an authority figure — similar to a teacher or another member of school staff — and this is likely to have coloured their answers to my questions. Specifically, it is possible that pupils will have attempted to sound more positive about education than they really were; therefore, I must take this into account when interpreting the results. To mitigate any bias in how I recorded data, all interviews were taped and the audio files transcribed. I have used quotes from these transcripts to illustrate my findings and strengthen the interpretive validity of my work.

Another limitation of my research is that I did not interview any non-target pupils. Specifically, there is a clear niche to interview white working-class girls and understand how they respond to these role models. Unfortunately, this was not viable within the resourcing envelope for this project but could form the basis of future research. Similarly, I was not able to explore the effect of varying in-group membership of the role models, for example by testing the effect of shared ethnicity or location. Moreover, although in these interviews I focused solely on university and apprenticeship role models, there is a clear case to examine how pupils respond to role models who represent a range of other post-school routes or more granular options within these routes.

7.6 Conclusion

In this chapter I have set out the results of a qualitative study to understand how white working-class boys respond to the video case studies of role models which feature in the quantitative elements of this project. Using a theoretical framework proposed by Morgenroth (2015) I developed a set of four research sub-questions specifically designed to explore the causal process behind role model influence. Specifically, I sought to understand: how perceived similarity with the role model might vary by role model type; the extent to which the role models would be seen as embodying a desirable career destination; whether the role models were seen as successful and; the whether the different role models were seen as embodying attainable career destinations.

I find that pupils' existing career aspirations are strongly linked to reported similarity with a role model and to the extent to which a role model was seen as embodying a desirable career destination. Both role model types were seen as successful but apprenticeships were generally seen as a more attainable option. The main contribution of this chapter is to provide important context to the results of my RCTs. In the following chapter, I precis my quantitative and qualitative results and provide a unified discussion of my findings as I seek to answer my overarching research: can exposure to male role models improve attitudes to education among white working-class male pupils in English schools?

Chapter 8

Summary and conclusions

8.1 Introduction

At the start of this thesis I painted a picture of persistent underachievement among white working-class boys in English schools (Chapter 1). In recent years, this issue has attracted considerable policy and media attention (Coughlan, 2019; Education Committee, 2014; Gov.uk, 2017; Line, 2016; Ofsted, 2013; Silverman, 2019; Walker, 2018) and these pupils are now a key audience for HE outreach work (Baars et al., 2016; Hillman and Robinson, 2016; Hunter et al., 2018; Office for Fair Access, 2017). Accordingly, there is growing interest in providing tailored support for this demographic group but relatively little evidence on the most effective approaches (Baars et al., 2016; Hunter et al., 2018).

One common component of HE outreach activity is the use of current undergraduates or postgraduates as "student ambassadors" to act as role models for young people (Gartland, 2014; Raven, 2012). The use of student ambassadors is supported by a body of policy literature (Hatt et al., 2009; HEFCE, 2011; Rodger and Burgess, 2010) and some qualitative research (Gartland, 2012, 2014, 2015) but there is relatively little evidence on the causal effect of exposure to such role models (Sanders et al., 2018a, 2018b). Therefore, by focusing on role model interventions for white working-class boys, I identified an opportunity to improve the evidence base for this approach while simultaneously developing much-needed new insights on how to improve educational outcomes for the group in question.

In Chapter 2, I summarised a mature body of sociological literature which describes how white working-class boys perceive academic education, including HE, as incompatible with notions of working-class identity and masculinity (Archer et al., 2001; Connell, 1989; Ingram, 2009; Willis, 1977). Because this rejection of academic education is rooted in group identities, I then turned to the social psychological literature on how these identities form and how they bring a set of social prescriptions about acceptable and desirable behaviour (Reicher et al., 2010). Based on literature discussed above, I argued that the rejection of academic education among white working-class boys was an inherently social issue requiring a social solution and decided to explore the potential for role model interventions for this group. Therefore, my thesis has centred on a single research question: can exposure to male role models improve attitudes to education among white working-class male pupils in English schools?

There is a small but growing body of lab- and field-based literature on how role model interventions can improve outcomes in a range of domains, including education (see for example Breda et al., 2018; Lockwood and Kunda, 1997; Sanders et al., 2018b; Stout et al., 2011). In much of this empirical literature it is implied that perceived similarity is a factor in role model efficacy but this assumption is rarely tested; therefore, I identified this as an interesting avenue for investigation. However, rather than focus on simple demographic similarities, this thesis has sought to solve a more nuanced puzzle presented by the literature. Student ambassadors may appear to be the most suitable individuals to encourage young people to fulfil their academic potential but if white working-class boys do not perceive these role models as sufficiently similar to themselves or as representing achievable goals, then we might expect the approach to be ineffective. By contrast, the existing literature suggests that individuals embodying a more vocational destination, such as apprentices, might be seen as more relatable and more effectively influence attitudes about the value of education. This puzzle formed the heart of my research design.

In Chapter 3, I reviewed the relevant economic literature on how social image concerns can influence human behaviour. By drawing on the literature discussed in Chapter 2, I created a simple theoretical model of how a role model might influence the social cost of investing in education and developed six testable hypotheses. First, I hypothesised that male role models can help improve attitudes to education among white working-class male pupils (hypothesis 1). Second, I hypothesised that exposure to a male role model who is an apprentice will improve attitudes to education among white working-class male pupils to a greater extent than exposure to a male role model who is a university student (hypothesis 2). Drawing on assumptions about the role of perceived similarity, I further hypothesised that exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils when pupils are encouraged to reflect on how they are similar to the role model (hypothesis 3) and exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils (hypothesis 4). Finally, I hypothesised that exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils in classes where white working-class male students constitute the minority of male pupils (hypothesis 5) and that exposure to a male model will lead to a greater improvement in attitudes to education among higher-ability pupils (hypothesis 6).

Based on these hypotheses I presented my methodological approach and research design in Chapter 4. In three subsequent chapters I then set out findings from two RCTs and a qualitative study all focused on my central research question. In this chapter, Chapter 8, I pull together my findings from across the piece and provide a summary of my results (Section 8.2). I then discuss my contribution to the literature (Section 8.3), the limitations of my work (Section 8.4), future research possibilities (Section 8.5) and implications for policy (Section 8.6).

8.2 Summary of results

8.2.1 Quantitative results

In Chapter 5, I described the implementation and results from a field experiment designed to test hypothesis 1 ("Exposure to male role models will improve attitudes to education among white working-class male pupils") and hypothesis 4 ("Exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils"). This trial took place in two schools in the North East of England where classes of year 9 pupils were randomly allocated to one of two trial arms. Classes in the treatment arm viewed a short video case study of a local university student talking about the value of school-leaving qualifications (i.e. GCSEs) for post-school opportunities, including university. Outcome data was collected immediately after implementation and included a survey measuring pupils' attitudes to education (the "Identification with School" or "ISQ" survey) as my primary measure. Secondary outcomes were interest in academic post-school options (specifically A-levels and university) and performance in a low-stakes maths test. Pupils were also invited to enter a lottery for the chance to win a bundle of revision resources and this binary marker was used as a novel outcome measure based on the assumption that pupils with more positive attitudes to education would be more likely to enter. This trial was a pilot for my larger subsequent trial but I conducted quantitative analysis nonetheless to provide some preliminary estimates of the impact of the intervention. Analysis showed that the intervention had a positive and statistically significant impact on ISQ scores for white working-class boys but no effect on this outcome for their female counterparts. Moreover, the intervention had a significant negative effect on three of the four secondary outcomes related to post-16 academic aspirations for white working-class girls. There was no effect on the maths test or lottery outcomes for either group. However, as this trial used very small samples we should not place too much confidence in these findings.

In Chapter 6, I described the implementation and results from a field experiment designed to test the full set of hypotheses for this project. In a large trial with 21 schools spread across England, approximately 3,500 white working-class boys and 3,300 white working-class girls in years 9 to 13 were randomised at the level of classes into five trial arms using a partial factorial design. The trial tested whether an "academic" role model (i.e. a university student) or a "vocational" role model (i.e. an apprentice) would have the biggest impact on pupil outcome and simultaneously tested a "similarity priming" exercise in which pupils were asked to spend one minute thinking about the role model and writing down two points of similarity. Outcome data were collected both immediately after the intervention and three weeks later. The outcome measures were largely the same as the first trial (described above) but additional data was collected from schools on pupils' effort and attendance over the half term in which the trial took place. The lottery prize was also upgraded to £200 of online tutoring.

The quantitative results for white working-class boys are summarised in Table 8.1. The results show that exposure to a role model intervention did have a small but positive and statistically significant impact on ISQ scores for white working-class boys. This increase was driven by pupils who were exposed to the university role model. For my target pupils, the university role model also had a significant positive impact on the rate of entry into a lottery to win online tutoring (an increase of approximately six percentage points relative to 34 per cent entry in the control group). Both the university role model and apprenticeship role model had no effect on other secondary outcomes and the similarity prime activity had no impact on any outcomes.

Table 8.1 also shows that the observed effect on ISQ scores ranges considerably across the two trials, from Cohen's d=0.16 to 0.60. The effect size for lottery entry in the full trial is Cohen's h=0.10 but there was no effect on this outcome in the developmental trial. Considering all explanations for the discrepancy in these results, it is possible that the role model in the developmental trial was particularly effective. The mean school to role model distance in this trial was only 8 miles (versus a mean of closer to 50 in the full trial) so it may have been that this version of the intervention was better tailored to the target pupils in terms of locality and this was reflected in the observed impact. In terms of the lottery outcome, we must remember that the lottery prize on offer in the developmental trial was a bundle of revision resources (e.g. notebooks, pens) whereas the prize in the full trial was £200 worth of online tutoring. Therefore, these outcomes are not directly comparable and it is possible that the former was not really seen as an "investment in education" in the same way that the latter was — hence the inconsistency in the impact on lottery results. However, the fundamental issue to consider when reviewing these results is that the developmental trial was conceived as a pilot and the results relate to very small sample sizes compared to the full trial (fewer than 100 WWCBs versus several thousand). Therefore, as cautioned by Lancaster et al. (2004), the results of formal significance testing from pilots such as my own should be handled with caution. Ultimately, I report these results to contextualise the findings of my main trial, which should be used as the more reliable estimate of the intervention impact.

In my full trial I collected outcome data both directly after the intervention and three weeks later. I found that the effect on ISQ scores for WWCBs was not present in the second session but the impact on lottery entry appears to persist. This finding highlights and interesting contrast in the impact on my outcome measures. I suggest that this discrepancy is due to a differential effect on individuals' desire for consistency depending on whether we use a survey-based attitudinal outcome measure or a behavioural outcome measure (Guadagno and Cialdini, 2010). We all desire to act in a way which is consistent with our prior behaviour and this means there is a natural tendency to behave in a way which is in line with prior behaviour. In the case of lottery entry, this is a clear, unambiguous binary action to enter (or not) and it is possible that a preference for consistency led those pupils who had entered the lottery once to enter it again. As an attitudinal survey, the ISQ score is not the same kind of outcome, and answers to these questions are not likely to have been internalised (or remembered) by pupils in the same way. Therefore, it is possible that a desire to be consistent is not reflected in our measure of this attitudinal outcome. Further research would be needed to confirm these suggestions.

I also ran a pre-specified test for a differential effect of the university role model by the proportion of the class meeting the white working-class boy criteria. I found that there is a significant interaction with the apprenticeship role model treatment which would suggest that as as the proportion of target pupils in a class increases, the efficacy of the intervention decreases for white working-class boys. However, this pattern is not consistently observed for all outcomes. Interestingly, the inverse pattern appears for white working-class girls; this finding could reflect the fact that, as the proportion of boys in a class increases, the proportion of girls decreases. If we assume that girls mainly associate with female classmates, this pattern may reflect the fact that pupils are more likely to respond to the intervention when they are not bolstered by their social crowd.

In addition to the main analysis described above, I conducted a suite of exploratory analysis to delve further into the data and inform further studies on this topic. Through this analysis I found that the university role model intervention appears to have been more effective at increasing ISQ scores for older WWCBs and was more effective at increasing lottery entry for pupils with higher prior attainment. In analysing data from the broader pool of pupils, we see positive effects which sometimes exceed those we see for our target group. Gender seems to be the only factor which determines the efficacy of the intervention, particularly in relation to lottery entry where we see a null for female pupils in general.

Comparison	Outcome measure	Result	Effect size	Interaction with proportion WWCB
Developmental RCT Primary				
ISQ score	University vs Control	+0.4 points	Cohen's δ=0.60	—
(scored 1-5)				
Developmental RCT Secondary				
University interest	University vs Control	—	—	—
Full RCT Primary				
ISQ score	University vs Control	+0.1 points	Cohen's δ=0.16	—
(scored 1-5)	Apprenticeship vs Control	—	—	Significant — negative
	Priming vs No prime	—	—	—
Full RCT Secondary				
Lottery entry	University vs Control	+6pp entry	Cohen's h=0.10	—
(binary)	Apprenticeship vs Control	—	—	-
	Priming vs No prime	—	—	-
Other outcomes	University vs Control	—	—	—
	Apprenticeship vs Control	—	—	—
	Priming vs No prime	—	—	-

Table 8.1: Summary of quantitative results for WWCBs

8.2.2 Qualitative results

My qualitative study comprised twelve in-depth interviews with white working-class male pupils in three schools. In these interviews I explored how pupils responded to the video case studies used in my quantitative trials. Specifically, I sought to understand whether pupils' perceptions of similarity with the role models varied by type (academic or vocational), to what extent they saw different role models as embodying desirable and attainable career destinations and how pupils' perceptions of the role model's career success depended on role model type.

Although both types of role model were seen as successful, I found that pupils' existing career aspirations were strongly linked to reported similarity. That is, nearly all the individuals I spoke to had already self-categorised as either likely to go to university or not and this dictated perceived similarity with the university role model. Many pupils who were focused on vocational post-school destinations, like apprenticeships, spoke about role models in their immediate family or social network who embodied a trade which they aspired to enter. Often these boys actually had direct experience of working with family or friends in these trades and they tended to contrast their "real life" exposure to work with unenjoyable school work. The direct exposure to more powerful role models in pupils' social networks may mean it is difficult for light-touch interventions to have a meaningful impact on the majority of the target population.

8.2.3 Answer to my research question

My hypotheses for this project are given in Table 8.2. In light of the quantitative and qualitative findings outlined above, the answer to this question is: yes, exposure to male role models can improve attitudes to education among white working-class male pupils in English schools. In both of my trials I found that a video role model intervention improved attitudes to education among white working-class male pupils and in my second trial this was accompanied by higher rates of entry into a lottery to win education resources. Therefore, there is support for **hypoth-**

esis 1. In my two trials I found that an academic role model (i.e. a university student) was actually effective at improving attitudes to education and in my second trial, I specifically demonstrated that a vocational role model was ineffective in this regard. Therefore, there is not support for **hypothesis 2**. My qualitative study provides important context to this finding: rather than pupils in my target group universally identifying apprentices as more socially relatable than the university students, pupils actually seemed to have internalised the binary narrative about these routes and categorised themselves accordingly. Pupils who identified with vocational routes identified more strongly with the apprentice and those who saw themselves as someone who could go to university identified more strongly with the student. This finding directly contradicts the reasoning set out in Chapters 2 and 3 and could be because pupils exposed to the apprenticeship role model were inadvertently primed to think of figures in their own lives who embody similar routes. My qualitative work found that these real life role models do not tend to emphasise the importance of school performance for career success; therefore, this may be why the intervention did not have the desired effect.

My quantitative analysis does not provide evidence that the intervention is more effective when pupils are encouraged to consider how they are similar to the role model (**hypothesis 3**). However, in both of my RCTs I found that there is a null or negative effect of the intervention on white working-class girls (**hypothesis 4**). I do not find consistent evidence to support the hypothesis that there was a differential effect of the intervention depending on the proportion of the class meeting the target criteria (**hypothesis 5**). Finally, in my exploratory analysis I find some evidence to suggest that the impact of the university intervention was greater for higher prior attainment but this only applied to lottery entry and not any other outcomes (**hypothesis 6**).[1].

Given the mixed support for my hypotheses, it is important to revisit the model

[1] This hypothesis was added post-trial and so it was was not pre-registered and is included as exploratory analysis only

Hypothesis	Support?
H1. Exposure to male role models will improve attitudes to education among white working-class male pupils.	Yes
H2. Exposure to a vocational male role model will improve attitudes to education among white working-class male pupils to a greater extent than exposure to a male role model who is a university student.	No
H3. Exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils when pupils are encouraged to reflect on how they are similar to the role model.	No
H4. Exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils.	Yes
H5. Exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils in classes where white working-class male students constitute the minority of male pupils.	No
H6. Exposure to a male role model will lead to a greater improvement in attitudes to education among pupils with higher attainment.	Some

Table 8.2: Hypotheses — supported or not?

I set out in Chapter 3 to consider whether this is still valid. One of the basic tenets behind my use of this model was that for white working-class boys, university role models would be seen as less relevant distant than apprenticeship role models. So does the lack of support for some of my hypotheses undermine the model? And why did my role models have no impact on pupils' post-school aspirations?

At this point is it relevant to return to the model presented in Chapter 3 and the framework proposed by Morgenroth (2015) which is discussed in Chapter 7. My simple model of pupil behaviour stated that the impact of a role model intervention would depend on the level of attention paid by a pupil to the intervention and the relevance of the role model in question. Contingent on these factors, I argued that a role model intervention could influence the in-group stereotype and consequently the cost of investing in education and related behaviour. In Chapter 4.2, I went on to develop a research design based on this model and introduced a number of outcome measures and other survey measures relating to the various components of this model. See Figure 8.1 below for a simple schematic showing the principle components of the model and how they map onto the data I collected (presented previously in Chapter 7. My primary outcome measure and aspiration measures were collected to assess whether my intervention had been successful at influencing the in-group stereotype while my lottery and maths test measures were designed to assess the impact on actual behaviour. To delve into the concept of role model "relevance" I collected survey data on pupil perceptions of the role models and conducted qualitative research.

In Chapter 7, I presented a framework developed by Morgenroth (2015) which maps out the "Motivational Theory of Role Modelling". This framework provides a detailed breakdown of the "Role model relevance" box in Figure 8.1, and seeks to explain why certain role models may be more or less effective and how they influence attitudes and behaviour. I previously used the unadapted framework to inform my qualitative research design and to analyse the qualitative data I collected. At this stage, however, I combine it with Figure 8.1 to provide an expanded schematic which more closely matches the results of my research, as shown in Figure 8.2.

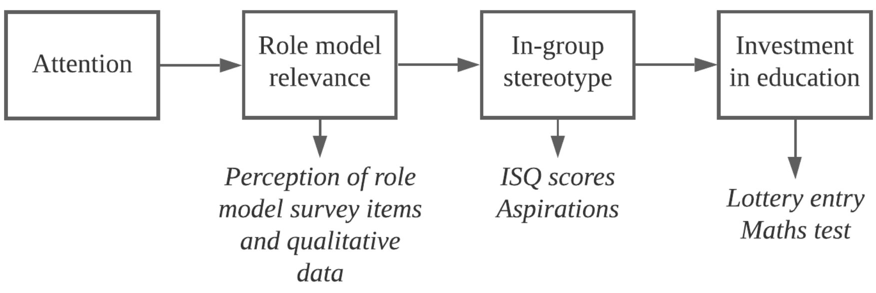


Figure 8.1: Basic schematic of model presented in Chapter 3 mapped to data collected.

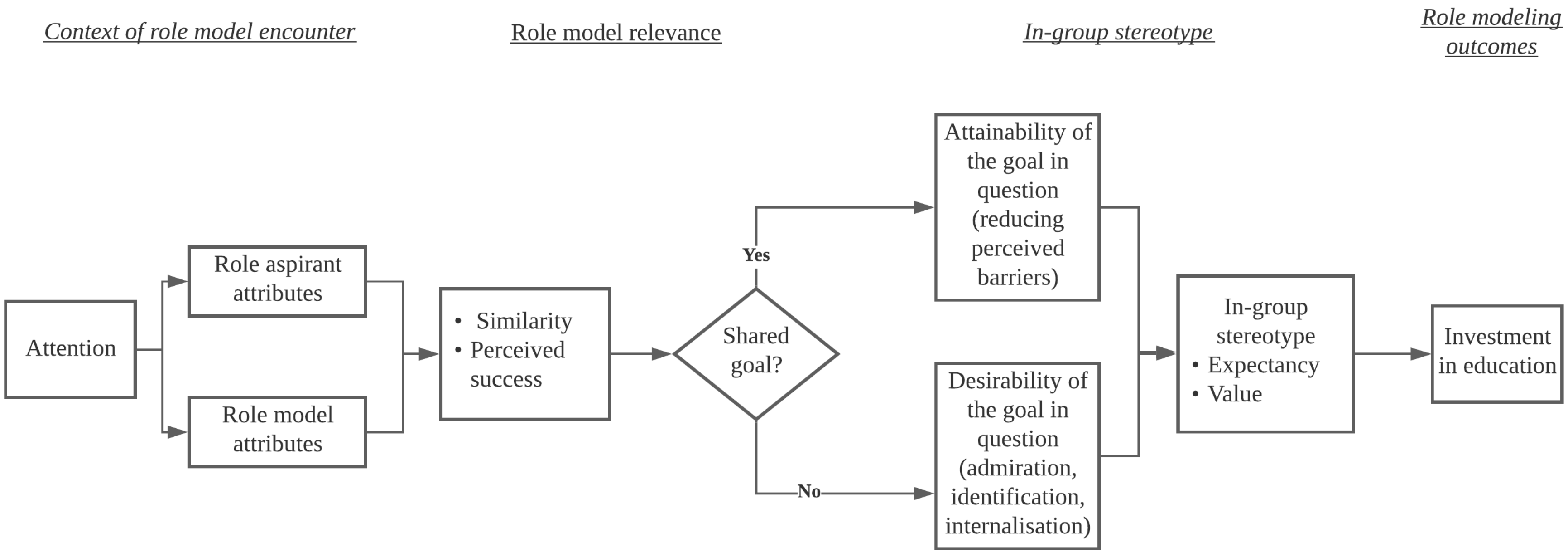


Figure 8.2: Expanded schematic of model presented in Chapter 3 incorporating elements of the Motivational Theory of Role Modelling

As a result, the role model relevance box is expanded to include similarity and perceived success as factors which dictate this relationship. In a modification to the original framework, whether or not the role aspirant shares the goal which the role model is seeking to promote is split out in the separate box to represent the fact that pupils' existing career aspirations are strongly linked to reported similarity with a role model and to the extent to which a role model was seen as embodying a desirable career destination. My qualitative data suggests that the effect on the perception of a role model is almost binary,"switching" the relevance of a role model on or off, hence the increased prominence of this factor in my schematic. I also expand the "in group stereotype" portion of my simple schematic, expanding it to incorporate elements of the more detailed framework. Specifically, I include the two key processes which appeared relevant to my target population and within the context of considering how role models can reduce social costs of engaging in education: increasing the extent to which pupils see engaging in education as something which is attainable and desirable as someone with their particular social identity. Influencing these factors is key to updating the in-group stereotype, which is associated with the "expectancy" of success at achieving that goal and the value they place on it. The impact on the cost of investing in education and consequential behaviours follows as per the simple schematic. I drop the arm of the original framework which relates to vicarious learning as this arm of role model influence does not operate through influencing the in-group stereotype and is less relevant for this project.

Central to this new schematic then, is the goal which the role model represents. If a pupil already holds the goal, even somewhat, the role model can influence them to increase the perceived desirability and attainability of the goal in question (for example, going to university). If a pupil does not share the goal in question then the role model must inspire them to adopt it by increasing the desirability of a goal. This task is arguably more difficult than nurturing a pre-existing interest. In others words, pupils' attitudes and behaviours are less likely to be influenced by a role model who embodies a goal in which they have no prior interest.

The role models in my project can be imagined to embody two goals simultaneously: first, they represent the post-school destination which they have pursued but second they were purposefully selected to embody positive engagement with education. Given that my qualitative work found that pupils responded positively to both of the role models but distinguished between them on the basis of their post-school career, it is helpful to consider how a pupil might respond to the role model in the frame of each of these goals in turn.

First let's consider that the salient goal is progression to either university or an apprenticeship. If a pupil already holds this goal, based on the schematic presented in Figure 7.2 in Chapter 7 the main function of the role model is to reduce the perceived barriers to achieving that goal. If a pupil doesn't hold this goal, the main function of the role model is to inspire the pupil to adopt it. The fact that we see a null result on aspiration means that the role model is not performing these functions or that the effect is too small to change pupil aspirations.

In the case of the university role models, based on my qualitative work it is possible that, for pupils who want to attend university the role model did not do enough to discuss the perceived practical barriers to university progression (for example, issues around student finance). For pupils who do not want to attend university, it is entirely plausible that the role model did not do enough to make the route desirable (as this was not really the aim of the intervention). In the case of the apprenticeship role models, for pupils who want to pursue an apprenticeship, it is possible that they already perceived few barriers to progressing to an apprenticeship. For pupils who do not want to pursue an apprenticeship, again the apprentices may not have done enough to "sell" the route.

Now let's shift to thinking about the role models embodying positive school engagement — so the goal is good school performance. Because nearly all pupils do see at least some value in attaining school-leaving qualifications, we can assume that the role models acted as "representations of the possible" in this scenario. Morgenroth (2015) theorises that, when operating via this function, role models evoke shared group membership to reduce self-stereotyping and increase identification with the goal domain — so in this example, they act to update the pupils' understanding of how white working-class boys should behave in school. Therefore, we need to question why the university role model appears to have been more effective in this regard. One interpretation is that the university role models were seen as more academic and so were more effective at shifting the dial on self-stereotyping. Indeed, pupils may have assumed that the apprenticeship role models were not particularly academic or studious because of their own biases about the kind of people in vocational occupations. Because a white working-class male occupying such a position is less of a rare occurrence, this could have just triggered pupils to think of other similar individuals in their own social networks.

Of course, this is only post-hoc speculation but it goes some way to explaining why the role model was effective in some regards and not in others, and why the university role model was actually more effective than the apprenticeship role model. Therefore, my assumptions about the determinants of role model influence are not necessarily undermined by my results. The differential effects on boys versus girls (particularly in the case of lottery entry), however do not fit so well into this model and suggests there may be some other factors which underlie their propensity to engage in pro-education behaviour which I have not captured in this project and deserve more detailed examination.

In sum, although there is not universal support for my hypotheses, there is sufficient evidence to support the use of role model interventions for my target group. A broader discussion of my contribution to the literature is discussed in the following section.

8.3 Contribution to the literature

This research was motivated by ongoing concern about the underachievement of white working-class boys. A mature literature characterises this group as holding what I have termed "anti-academic attitudes", rooted in notions of working-class masculinity, which directly inhibit their ability to engage in school and their interest in academic post-school destinations such as university (Archer et al., 2001; Connell, 1989; Willis, 1977). Indeed, my survey data, collected from nearly 9,000 pupils, does suggest that this group is significantly less likely to identify with school, less interested in university and more interested in vocational post-school destinations than other pupils (see Appendix 9.22). Moreover, from a quantitative perspective it seems that the effects of being white, working-class and male may be simply be additive. That is, the survey data do not indicate that the combination of these characteristics is associated with a distinct set of attitudes over and above those which can be explained by the characteristics in isolation.

However, my qualitative analysis paints a nuanced picture of aspirations among the target group. Even young pupils appear to self-categorise according to their post-school plans, but while many do intend to pursue careers which can be characterised as traditionally white, working-class and male, it is not uncommon for individuals to aspire to university or other career pathways. On the whole, these boys either see themselves as on-course for academic study (or not) from an early age, but a small number are prepared to consider the possibility of attending university alongside other non-academic options such as apprenticeships or employment. This view is in contrast to the somewhat older literature which seems to suggest a stronger rejection of academic education than was observed in my research. Therefore, this project is aligned with other more recent work with young white working-class males which suggests that the reference point for acceptable male behaviour might have shifted and this group actually hold positive attitudes to learning but are not always as engaged in their education as they know they should be (Highham and Gagnon, 2017; Roberts, 2013). An optimistic interpretation is that the increased rates of university attendance, educational outreach, or a combination of the two, are gradually eroding the previously entrenched attitudes to academic study. An alternative explanation is that much of the existing literature is focused on how these pupils interact with others in their day-to-day education; therefore, the discrepancy could be due to the distinction between how pupils report their attitudes in a one-on-one setting, versus how they choose to behave in the classroom. The limitations of this research are discussed in Section 8.4.

A more substantial contribution from this thesis is an improved understanding of how best to support academic engagement among the target group. My research provides robust evidence to support the use of university ambassadors in outreach and, counter to my hypotheses, finds that an apprenticeship role model does not appear to be superior at influencing pupils' attitudes to education and related behaviours. Given the lack of existing evidence on the most effective approaches to working with this group, such findings are particularly important (Baars et al., 2016; Education Committee, 2014; Hunter et al., 2018).

However, it is important to note that none of the role models had any impact on pupils' stated interest in university or apprenticeships, casting new light on the value of initiatives to "raise aspirations". My qualitative research found that the main point of similarity or dissimilarity which pupils identified with role models was their existing aspirations and in the case of white working-class boys, it may be that such activities are not particularly effective at stimulating interest in university or other destinations because pupils have already self-categorised as heading down a particular path. For example, those pupils who do not plan to go to university see information from a university student as less relevant to themselves and this advice seems to fall on deaf ears. However, it is possible that within my quantitative results it is not possible to observe the effect on the small proportion of pupils who are less decided about their future and, on the basis of my qualitative research, are likely to be more receptive to this advice. Even if there is no effect on aspirations, given that attainment is such an important prerequisite for nearly all post-school destinations, my findings still support the use of university role models to promote a more positive approach to education overall (Gartland, 2014; Raven, 2012).

A more general set of contributions relate to the use of role models. My research forms part of a small but growing literature on how these interventions can improve a range of outcomes in the education domain, from subject choice, to attainment and higher education decision-making (Breda et al., 2018; Riley, 2017; Sanders et al., 2018b). This work is also novel as I focus on one of the worst performing groups in education. By contrast, much of the existing work on role models focuses with individuals who are already qualified and probably somewhat interested in doing the target activity. For example, Breda et al. (2018) examine how to encourage suitable female candidates to pursue science courses and Sanders et al. (2018a) are concerned with university application behaviour of high-achieving young people. It is easy to see that the challenge in my research is substantively different; many of the target group do not have the level of attainment needed to progress to any of the careers which are represented in the intervention and perhaps this another reason why we see no effect on the aspiration outcomes. So there is a clear contribution in terms of testing role model interventions with a low-achieving group in the school domain.

In terms of a more general contribution to the behavioural education literature, my research provides a useful comparison of attitudinal and behavioural outcome measures. Although we see no impact of my intervention on post-school aspirations, and only a small impact on identification with school, we see a substantial increase in the rate of pupils signing-up to enter a lottery to win online tutoring, both immediately after the intervention and three weeks' later (a measure designed to uncover the extent to which pupils were willing to engage in formal education). The use of such an outcome measure builds on previous research by Bursztyn et al. (2017) and is a novel way of testing whether it is possible to influence effort in school. Given that we see no impact on longer term measure of effort, namely attendance and teacher-ratings of effort, the lottery entry outcome measure was particularly important in this instance and demonstrates that sometimes it is possible to influence behaviour over the short and medium-term with light-touch interventions, but other interventions may be needed to impact upon longer-term outcomes.

Finally, a project of this scale constitutes a considerable and robust contribution to the literature on field experiments in schools. With the rise of the Education Endowment Foundation in England, whose remit is to develop and test promising education interventions, it is not uncommon for schools to participate in research, but these projects are normally focused on more fully-fledged pupil activities or teaching methods which a lay person might reasonably expect to be beneficial for schools (Lortie-Forgues and Inglis, 2019). However, I have demonstrated that it is possible to run field experiments to test interventions which seek to test a discrete aspect of theory where the intervention itself is likely have a positive, but small, effect on pupils. The fact that teachers were willing to participate in this work is testament to the lack of existing research on how to best engage white working-class boys and their desire to help develop an new evidence in this area. Because the target group constitute a subset of the overall school population, my research is also a good example of how such trials can be clustered at the level of the classroom and delivered by school staff in order to enable implementation at scale and with adequate statistical power.

8.4 Limitations

Although I have asserted that my project provides sufficient evidence to support a number of my hypotheses, there are a number of important limitations which bear discussion. First and foremost, I must acknowledge that the intervention tested in my trials was not the typical role model intervention which is used in education contexts. Often role model exposure happens via in-person encounters, for example during school activities or university open days, whereas my intervention was a short video clip. Moreover, I had to design an intervention which could be implemented by schools in tutorial sessions alongside data collection activities and, due to resourcing constraints, I had to film, edit and produce the videos myself. These factors mean that the intervention is not an entirely typical example of something which would be used in schools but I would argue that it sufficiently distils the key features of a role model intervention into a standardised and testable format. Therefore, although I cannot claim that I have found evidence for the efficacy of in-person role model encounters, I think it is valid to use my results as proof of concept for the overall approach of using role models.

Another limitation of my trials is that, because I was focused on a particular subgroup of pupils, to gain statistical power it was necessary to work with a number of schools and these were spread across a large geographical area. This design meant it would have been impossible for me to implement the trial myself and instead I relied on schools, and specifically tutors within schools, to deliver the intervention materials and collect the outcome data. Although I received assurances from each school about the fidelity of implementation, I cannot be sure that the intervention was always delivered as intended. This limitation is simply one of the trade-offs associated with delivering research at scale with a limited budget.

Both of my trials suffered from attrition between randomisation and data collection. Some of this attrition was at school-level (as three whole schools dropped out of my second trial) and some was at the level of pupils or classes (due to imperfect implementation and data collection). Attrition is a potential problem for both internal validity (if it introduces systematic differences between trial arms) and external validity (if attrition introduces systematic differences between those in the data collected versus the recruited sample). In both cases, attrition was not related to trial arm allocation and so it does not undermine the internal validity of the research. However, in both trials attrition was significantly related to certain characteristics which limit the external validity of the research. Specifically, in both trials, FSM-eligible pupils and those with a special educational need were more likely to be missing in the outcome data. It is not possible to analyse whether, and to what extent, this issue is due to pupil absence, unsuccessful session implementation, or low rates of survey completion at the level of individual pupils. However, it is possible that FSM eligibility and special educational needs status may both be correlated with pupil absence and partly the cause of this issue. Therefore we must be cognisant of the fact that my findings may only generalise to the population of pupils who actually attend and engage in similar classroom activities. In my second trial, there is also some evidence to suggest that school-level attrition may be linked to the Ofsted rating of the school, with worse performing schools more likely to drop out; however, the small number of schools in my sample makes it hard to comment on the patterns of school-level attrition with much certainty. Regardless, just as selection bias leads certain types of schools to participate in research projects such as mine, it is reasonable to assume that school-level drop out is also linked to certain school characteristics. Therefore, I must caveat my findings to say that they apply to pupils in schools with sufficiently high levels of motivation and staff resources to implement projects such as mine.

Attrition also had implications for statistical power. My first trial was powered for an effect size of approximately 0.60 standard deviations whereas, after attrition, my second trial was powered for an effect size of just over 0.17 standard deviations. Overall, the limited power in the first trial does not undermine my results because the main findings from this RCT replicates in my second trial (albeit with a smaller effect size, as discussed in Section 8.2). Regardless, the nature of RCTs means that there is always a risk of false positives (see Chapter 4.5.2 for more detail). Therefore, further replication studies testing this approach would be appropriate.

One way to improve statistical power is to use baseline data to control for pupils' prior attitudes and beliefs. I did not collect baseline data in either of my trials as the trial already required schools to print, administer and return a large quantity of surveys. This arrangement was necessary as schools do not typically have computer facilities for all of their pupils to use in tutorial sessions. The lack of baseline data means it is not possible to explore whether the intervention had a differential effect on pupils with different prior attitudes and beliefs. For example, based on my qualitative study it seems plausible that pupils' existing career aspirations might be a factor in how they respond to different role models. Unfortunately, I cannot examine this quantitatively but this may be an avenue for future research (see Section 8.5).

A further limitation of my quantitative findings is that they only relate to survey-based or short-term measures of attitudes to education. Although I did collect more substantial education outcomes in my second trial (effort and attendance), I did not see any effect on these for the target group. However, it is important to note two things: first, my intervention was only a light-touch and it would be remarkable if it had impacted on such important measures of pupil engagement. Second, RCTs in education have recently come under fire for too often focusing on high-stakes attainment as an outcome at the detriment of statistical power. Therefore, there is a good case for taking my approach and choosing outcomes which have a "theoretically well-established causal link" with longer term outcomes (Lortie-Forgues and Inglis, 2019).

Experimental techniques are often criticised for testing artificial interventions in an artificial setting (Deaton and Cartwright, 2018). I addressed this threat to external validity by testing my intervention in real classroom settings. However, to facilitate this real-world testing I had to find schools to take part in my project. This recruitment process introduces an inescapable source of bias into my findings: my results are based on a sample of pupils from a particular set of self-selecting schools. To try and broaden the sample, in my second RCT I worked with schools spread across four project areas and for both trials I outlined the demographic profile of participating schools (see appropriate chapters) and found that participating schools had a higher proportion of white British pupils and a higher proportion of FSM-eligible pupils than the average across state-funded English secondary schools. It also appears that these schools are more likely to come from the middle of the distribution in terms of performance as rated by Ofsted, with the best and worst performing schools less likely to be present in my data. However, it is more important to consider how, just by taking part, these schools have demonstrated a high level of motivation to engage with the research question, potentially signalling a higher level of existing support for pupils in these institutions and particularly motivated senior leadership. Unfortunately, this bias means that my sample are not likely to be representative of the wider population of schools in England, conditional on demographic profile.

A threat which applies to both my quantitative and qualitative work is that these findings may be biased because pupils are reacting to the intervention as part of a research project (as discussed in Section 4.5.6). When completing surveys or participating in interviews, there is always a chance that pupils are responding in such a way as to confirm or disconfirm the research hypothesis. The strength of the ethnographic literature discussed in Chapter 2 is that it is focused on how pupils interact with one another and the school environment in their day-to-day education. By contrast, the very act of explicitly collecting data from pupils may change how they behave. To mitigate this risk for the RCTs, tutors were asked to run the sessions as part of normal tutorial classes and the research character of the trials was not emphasised to pupils at the time of delivery. Therefore, I can be relatively confident that pupils are responding as they would to similar materials typically used in careers IAG sessions but I cannot eliminate this risk to external validity.

Some of the more profound criticisms of RCTs characterise trials as "black boxes" which tell us little about the causal chain, therefore, offering poor external validity. My project address this issue in two ways. First, my trials are rooted in theory and are carefully designed to test discrete intervention components with the aim of contributing to theory rather than providing an evidence base for the intervention itself. Second, my mixed methods approach was designed to help me add context to my quantitative findings by exploring pupils' responses to the intervention in more detail.

8.5 Future research

My project provides an excellent basis for further research on the topic of role model interventions in education. One option would be to re-rerun the existing trial designs with some of the improvements mentioned above. For example, including the collection of baseline data would allow an examination of whether pupils react differently to role models depending on the level of match between the career which the role model represents and their own aspirations. Within this trial design there is also scope to test a wide variety of role model "types" to understand who are the most inspirational figures for my target group. For example, if we accept that my findings show that a university role model is most effective, it make sense to then test variants of this intervention — for example, older versus younger, or more local versus less local students. This kind of trial would help us build an even more nuanced understanding of role model impact. Given that the existing literature suggests that paid work is central to working-class male identity (see Section 2.2) it would also be pertinent to compare a university role model to a role model representing the "world of work". Any further work of this kind should follow-up on avenues of interest which I have identified via my exploratory analysis, namely the differential effect of role models by age and prior attainment and the role of distance in mediating perceived role model relevance.

There is also an obvious gap in my research; that is, I have focused on white working-class boys but paid less attention to their female counterparts. As discussed in Chapter 1, white working-class girls and pupils from other ethnic groups are also faced with barriers to maximising their potential in the English education system. My rationale for focusing on one specific group was that the literature supported a tailored approach to improving engagement among these pupils versus other pupils. Indeed, my thesis provides some evidence to support this view. Moreover, just as I tailored an intervention to my target group, the general theory which I've tested may apply to white working-class girls and other groups among who we might observe a particular set of social and cultural factors inhibiting engagement with education. Testing the same theory with another such group (replicating my field experiments with white working-class female role models, for example) would be a good way of testing whether the theory upon which I've based my research applies more generally.

Although my similarity priming activity was not successful at improving the impact of my role model interventions, I did find promising evidence that it encouraged white working-class girls and all pupils to to see the role models as more similar to themselves and as an example they would like to live up to. This finding is particularly interesting as it is detected three weeks after initial exposure to the role model and the similarity priming activity. On this basis, there is some case for further development and testing of this activity. Morgenroth (2015) suggest that self-efficacy is an important part of the picture in helping pupils believe they can be like a role model in the future; therefore, it would also be interesting to test a combination of the similarity prime activity with another positive affirmation exercise which could simultaneously boost pupil's self-efficacy in the academic domain (see Damgaard and Nielsen, 2018 for a review).

As noted in Section 8.3, in this project, my role model intervention had an impact on a short-term behaviour (namely entry into a lottery) but no impact on longer term measures of effort in school. The lottery outcome was employed as a short-term measure which could be used with pupils in a range of age groups but it would be valid to explore whether the effect could apply to other positive short-term behaviours which might apply to more specific age groups, for example, participating in GCSE revision sessions or making university applications.

The other natural and most substantial avenue for future research would be evaluation of a scheme using in-person role models in a RCT. As discussed in 2, studies of this sort do exist but they rarely focus on particular subgroups of the pupil population beyond boys and girls. They also rarely test role model "types" with as much control as I have done in this project. Given the resourcing implications associated with running a such a role modelling intervention in schools, this research would almost certainly need to piggy-back on an existing funded programme; therefore, there may be less opportunity to test theory. Nonetheless, the results from such a trial would complement my research to provide a more complete view of whether role model interventions are truly effective for my target group.

8.6 Policy implications

Widening participation in higher education has been part of the policy agenda for nearly half a century and higher education institutions now spend millions of pounds annually on activity to boost participation among disadvantaged and underrepresented groups (Younger et al., 2018). However, there is limited research evidence on which approaches are most effective overall or for particular groups (Harrison and Waller, 2017; Younger et al., 2018). Therefore, the call for higher education institutions to do more to improve the attainment and HE participation of white "working-class" boys has been met with a degree of uncertainty about the best way to proceed (Baars et al., 2016; Hunter et al., 2018; Office for Fair Access, 2017). Simultaneously, schools are facing their own decisions about the best ways to boost engagement and outcomes for this group (Education Committee, 2014; Lewis and Demie, 2015).

My research has clear policy implications which are of use for stakeholders in higher education institutions and schools alike. My findings suggest that, counter to my hypotheses, university students can act as effective role models for white working-class boys and improve their attitudes to education and investment in pro-education activities (at least in the short-term). By contrast, I found no effect of a vocational role model on pupils' attitudes or behaviours. Therefore, I conclude that the practice of using relatable university role models in higher education outreach and engagement, or in careers lessons, is likely to have a positive impact on pupils. However, it must be noted that I took pains in my project to track down university students who were happy to identify as possible role models for white working-class boys — and as discussed previously, it seems I was successful in choosing relatable individuals for my target group. Given the low rates of higher education attendance among white working-class males, the young men who participated in my project were the exception rather than the rule. Institutions who employ students as ambassadors in their work must be careful to pay close attention to the demographic characteristics of the role models they present to young people and ensure they are truly representative of the groups they are trying to engage.

However, we must note that the intervention did not have an effect on pupil aspirations. This null effect could be because my role models focused their narrative on the value of school-leaving qualifications for a range of post-school destinations rather than trying to "sell" university or apprenticeships. There was also insufficient time within my intervention to deliver detailed information about the benefits of particular routes. My qualitative research found that pupils were concerned about the practical barriers of attending higher education and so it is possible that any "emotive" intervention, such as my own, which seeks to inspire pupils may usefully be coupled with an information-based intervention in order to impact on post-school aspirations. Indeed, there is an existing body of empirical evidence on how information can influence knowledge and attitudes about education options (see McGuigan et al., 2016 for a relevant example of how this approach has been tested in relation to HE funding in England) but that such interventions appear to be most likely to influence behaviour when they are combined with some degree of personalised support or an inspirational component (see Damgaard and Nielsen, 2018 and McNally, 2016 for recent reviews).

My qualitative research found that pupils self-categorise themselves as either heading for university or a vocational route at an early age and this has an impact on how receptive they are to role models who represent the different pathways. To tackle this issue, it may be most fruitful to expose pupils to individuals who break down this binary divide — for example, young men pursuing degree apprenticeships. By blurring the line between academic and vocational options, this approach could help pupils perceive the possibility of a future career which they previously disregarded.

Another finding from my qualitative work was that pupils were sensitive to quite granular differences between role models, for example in terms of the subject they represented. Of course, my project introduced an artificial restraint on the number of role models a pupil was exposed to but in the real world, it is likely to be optimal to expose pupils to a wide range of role models representing different routes and subjects so that they can find a good match for their own aspirations. In fact, based on Social Identity Theory (discussed in Chapter 2) exposing pupils to a number multiple role models, some of whom aren't relevant to their chosen destination may help them identify more strongly to the ones who are.

Across both of my RCTs I found that my role model had either a null or negative effect on white working-class female pupils. On the basis of this result, there is a case for ensuring that whenever pupils are engaged as part of mixed groups (for example, in schools) an attempt is made to provide relatable role models for all of the pupils in that group. Although it is not possible to provide an infinitely tailored experience for pupils, as white working-class female pupils do not respond to male role models in the same way as their male counterparts, it is important to consider how best to support both groups rather than assuming they are a homogeneous cohort.

With all this in mind, we must consider whether schools should implement role model interventions of the sort I've tested in this project. As outlined elsewhere in this thesis, the aim of this research was to test the approach of using role models in schools, rather than to test a specific intervention which I would propose should be rolled-out more broadly. But based on my findings, what action should schools take? I find that the impact of the role model interventions are small and there is little evidence of a lasting effect. However, the intervention was also very light-touch — just a five minute video integrated into tutorial sessions. Given that we see small positive effects for WWCBs and for all pupils, and that the negative effects for WWCGs are not robustly evidenced in my analysis, I believe that the continued use of light-touch role model interventions by schools is warranted, particularly given the very low cost (both financial and time) to schools in terms of implementation. However, I think my results suggest that any more substantial scale-up of role model interventions, and any intervention which requires a more significant investment from schools in terms of time and resources, should be subject to further research.

Finally, from my qualitative research it is clear that many boys base their vocational aspirations on their exposure to real life role models in their family or social network — for example, fathers or brothers who already occupy a trade. Moreover, many of these pupils have direct experience of helping their family in these trades and contrast their positive experience in this arena with their less positive experience of school. These emotional links make it incredibly difficult for a light-touch intervention, or even an "in-person" role model intervention, to change pupils' existing aspirations. Therefore, my closing recommendation is that role model interventions can be part of a toolbox of approaches used to improve outcomes for white working-class boys, but to support meaningful change in terms of higher education aspirations they must form part of a sustained approach through which pupils are given the opportunity to build self-esteem and self-efficacy in the academic domain.

8.7 Summary

This research project was primarily inspired by the ongoing policy discourse about white working-class boys' underachievement in schools and how to tackle this issue. From this entry point, I have built on a wealth of sociological evidence on how these pupils tend to form negative attitudes to academic education and how this directly impedes positive engagement in school. Drawing on a growing literature on role model interventions in education, this project set out to answer whether exposure to a male role model could improve attitudes to education among white working-class male pupils in English schools. Moreover, I developed a novel research design to test whether academic role models (university students) or vocational role models (apprentices) would be more effective and the impact of an activity which encouraged pupils to reflect on their similarities with the role model.

This thesis forms an original contribution to the several bodies of literature, as discussed previously. However, most significantly, it develops the evidence base for role model interventions in education in two key regards. First, I have used rigorous experimental techniques to provide new insights on role model efficacy and specifically on how role models who embody different post-school destinations impact on pupils' attitudes to education and aspirations. Second, I have focused on one of the worst performing groups in English schools whereas most of the existing literature targets high-achieving pupils. As a result, I have produced novel insights on how to tackle a persistent issue in English education. In the words of Mitch, my university role model in the West Midlands:

> *"The best thing I can do to give you the most chance in life, you know, those dreams of owning a mansion or owning a nice car or having a good family...the best thing you can do is keep your education in high regard coz it's the most important tool to get where you want to be".*
>
> *- Mitch, University of Birmingham*

I hope that my research and the work which follows will help many young people realise that, like Mitch, they have the potential to follow a range of pathways and that education is the key to doing so. Although role models are only a small part of the solution, a better understanding of this approach is a good step on the road to more and better support for white working-class boys in English schools.

Chapter 9

Appendices

9.1 Potential Outcomes Framework

The Potential Outcomes Framework states (Rubin, 1974):

$$Potential\,outcome \begin{cases} Y_{1i}\,if\,D_i = 1 \\ Y_{0i}\,if\,D_i = 0 \end{cases} \tag{9.1}$$

Where Y_i is the outcome of interest for person i and D_i is a binary treatment variable. So we can define the observed outcome for person Y_i and the effect of the treatment β as:

$$Y_i = Y_{0i} + (Y_{1i} - Y_{0i})D_i\beta = Y_{1i} - Y_{0i} \tag{9.2}$$

In my project, I am interested in measuring the average treatment effect on the treated (ATT) which is (Heckman and Smith, 1995):

$$E(Y_1 - Y_0|D = 1) = E(Y_1|D = 1) - E(Y_0|D = 1) \tag{9.3}$$

However, because an individual cannot be both treated and untreated, we are never able to simultaneously observe both Y_{1i} and Y_{0i}. This issue is the "fundamental problem of casual inference" (Holland, 1986). Using the observed outcomes of non-participants to generate a naïve estimator of the counterfactual (the second term on the right hand side of the equation above), we could write:

$$E(Y_1|D=1) - E(Y_0|D=0) = E(Y_1 - Y_0|D=1) + E(Y_0|D=1) - E(Y_0|D=0) \tag{9.4}$$

But this introduces a term which represents the error due to selection bias and the resultant non-comparability of the treated and non-treated groups (Angrist and Pischke, 2008). Random allocation of individuals to $D_i = 0$ and $D_i = 1$ makes D_i independent of potential outcomes, so that we can write:

$$E(Y_1 - Y_0|D=1) = E(Y_1 - Y_0) \tag{9.5}$$

9.2 Role model video content

Each video started with an animated introduction and voice-over and ended with an animated wrap-up section and voice-over; the voice-over content is given in the preceding sections. The overall template for the video content follows.

9.2.1 University introduction voice-over

> *University - you've probably heard loads about it already but what is it and why would you want to go? Going to university means undertaking a course of academic study. The qualification which you get at the end of your study is called a degree and the degree can give you access to graduate jobs such as being a doctor a teacher or a wide range of other careers. Degrees are normally about three years long and they can include options like industrial placements. To help you find out more about going to university we've been talking to university students near you. Today you're going to hear from [role model name].*

9.2.2 Apprenticeship introduction voice-over

> *Apprenticeships - you've probably heard of them but what are they and why would you want to do one? Apprenticeships are recognised qualifications and you can do them in a wide range of careers from traditional trades like plumbing to marketing or recruitment. Apprenticeships offer you the chance to earn while you learn and you can do them at a range of different levels depending on the qualifications that you hold. It normally take between one and four years. To help you find out more about doing an apprenticeship we've been talking to apprentices near you. Today you're going to hear from [role mode name].*

9.2.3 Wrap-up voice-over

Thanks for watching. We hope this video has helped you understand a little bit more about [university/apprenticeships] and giving you some ideas for what you could do in your future.

9.2.4 Video template

Section	Arms	Length	Description
Preamble	All	1m	A short animated introduction with a voice-over as given below, tailored to university/apprenticeship arms.
Introduction	All	0.5m	Role model states their name, age, where they are from and whether they are at university or doing an apprenticeship.
Journey	All	0.5m	Role model explains how they got into their chosen route and highlights a challenge they faced along the way.
Life	All	0.5m	Role model talks about what it is like to be at university or be doing an apprenticeship.
Benefits	All	0.5m	Role model talks about the main benefits of going to university or doing an apprenticeship. All university students to highlight improved career prospects and all apprentices to highlight the benefit of being able to "earn while you learn".
Future plans	All	0.5m	Role model talks about their future plans.
Advice	All	0.5m	Role model provides an message to viewers that, whatever they want to do, they'll need good grades to do it and encourages them to do their best at school.
Prime	Prime	1m	Similarity prime activity. Via voice-over pupils are asked to reflect on how they are similar to the role model and "write down two things they have in common".
Wrap-up	All	0.5m	Role model provides a message to viewers that, whatever they want to do, they'll need good grades to do it.

Table 9.1: Role model video template

9.3 ACORN categorisation

ACORN ("A Classification of Residential Neighboourhoods") segments households, postcodes and neighbourhoods into six categories, as shown in Table 9.2.

Category 1	Affluent Achievers
Category 2	Rising Prosperity
Category 3	Comfortable Communities
Category 4	Financially stretched
Category 5	Urban Adversity
Category 6	Not Private Households

Table 9.2: ACORN classification categories

By matching postcodes and mapping the ACORN data onto local authority and regional data (sourced from ordinance survey files), it is possible to construct a localised demographic profile, as shown in Table 9.3. Of approximately 1,690,000 postcodes linked to local authorities, approximately 1,420,000 (84 per cent) could be matched to ACORN data. This imperfect matching is possibly due to the relative ages of the data sets and recoding of postcodes over time.

Region	ACORN category 1	2	3	4	5	6	ACORN 4 or 5
North East	13,206	1,678	16,079	18,221	14,116	8,880	32,337
	18%	2%	22%	25%	20%	12%	45%
North West	45,913	5,480	42,409	35,791	35,859	25,188	71,650
	24%	3%	22%	19%	19%	13%	38%
Yorkshire and the Humber	32,116	4,473	39,816	30,350	21,873	17,174	52,223
	22%	3%	27%	21%	15%	12%	36%
West Midlands	34,843	3,824	36,049	26,503	19,441	18,560	45,944
	25%	3%	26%	19%	14%	13%	33%
East Midlands	27,855	3,432	34,885	20,381	12,888	12,551	33,269
	25%	3%	31%	18%	12%	11%	30%
Inner London	3,698	31,336	1,064	3,743	18,319	21,489	22,062
	5%	39%	1%	5%	23%	27%	28%
Outer London	20,342	19,079	19,732	9,077	16,027	12,975	25,104
	21%	20%	20%	9%	16%	13%	26%
East of England	45,519	10,752	48,033	24,143	13,267	19,020	37,410
	28%	7%	30%	15%	8%	12%	23%
South West	50,974	7,332	54,729	26,023	14,314	18,439	40,337
	30%	4%	32%	15%	8%	11%	23%
South East	89,645	23,179	51,629	30,914	20,674	30,865	51,588
	36%	9%	21%	13%	8%	13%	21%
England	364,113	110,566	344,427	225,147	186,779	185,142	411,927
	26%	8%	24%	16%	13%	13%	29%

Notes: The number of postcodes falling into each of the ACORN categories by region. Percentage of the regional total given in brackets. Regions ordered by the proportion of ACORN 4 and 5 postcodes.

Table 9.3: ACORN categories by region

9.4 Identification with School survey

The Identification with School (ISQ) survey items are given below in Table 9.4. The seven items are rated on scale of one (strongly agree) to five (strongly disagree), where positively worded questions are reverse-scored so that a higher score relates to greater identification with a school. Total scores are simply summed across all items.

1	I can get a good job even if my grades are bad.
2	School is one of the most important things in my life.
3	Many of the things we lean in class are useless.
4	Most of what I learn in school will be useful when I will get a job.
5	School is often a waste of time.
6	Dropping out of school would be a huge mistake for me.
7	School is more important than most people think.

Table 9.4: ISQ items

9.5 Effect size formulae

9.5.1 Cohen's d

Cohen's δ (δ) is defined as the standardised difference between two means such that (Cohen, 1988; Hedges and Rhoads, 2010):

$$\delta = \frac{\mu_1 - \mu_2}{\sigma} \tag{9.6}$$

where μ_1 and μ_2 are the population means in the treatment and control groups, and σ is the within-sample population standard deviation of the outcome.

9.5.2 Cohen's *h*

Cohen's h (h) is used to define the difference between two proportions (Cohen, 1988). For any proportion, (P), its arcsin transformation is defined as:

$$\phi = 2\arcsin(\sqrt{}(P)) \tag{9.7}$$

Then for two proportions, P_1 and P_2, h is defined as:

$$h = \phi_1 - \phi_2 \tag{9.8}$$

9.6 Sample size in clustered experiments

To understand the implications of clustering, it is useful to turn to the estimating equation for the outcome variable (McConnell and Vera-Hernandez, 2015):

$$Y_{i_j} = \alpha + \beta T_j + \nu_j + \varepsilon_{i_j} \tag{9.9}$$

where i relates to the pupil and j the class. T_j is the treatment indicator, ν_j is the error term at the class-level and ε_j is the error term at the pupil-level. The variance of the error terms and the total variance are defined as:

$$var(\nu_j) = \sigma_c^2 \tag{9.10}$$

$$var(\varepsilon_j) = \sigma_p^2 \tag{9.11}$$

$$var(\nu_T^2) = \sigma_c^2 + \sigma_p^2 \tag{9.12}$$

The intraclass correlation coefficient provides a measure of how much of the total variance is accounted for by between-cluster variance and is defined as (McConnell and Vera-Hernandez, 2015):

$$\rho = \frac{\sigma_c^2}{\sigma_c^2 + \sigma_p^2} = \frac{\sigma_c^2}{\sigma_T^2} \tag{9.13}$$

A high value of ρ implies that outcomes within a cluster are similar and limited information can be gained by adding additional people to the cluster. Including the intraclass correlation in sample size calculations results in the following formulation:

$$n^* = m^*k^* = 2(t_{\frac{\alpha}{2}} + t_\beta)^2 \frac{\sigma^2}{\delta^2}(1 + (m-1)\rho) \tag{9.14}$$

Where n^* is the total number of pupils per treatment arm, there are k^* classes per treatment arm and m^* pupils per class, α is the significance level of the test, $\beta$is the power of the test and δ is the expected effect size. This equation shows how the ICC acts to reduce the effective sample size.

This formula should be further modified to take into account the effect of covariates in reducing the residual variance of the outcome variable as (McConnell and Vera-Hernandez, 2015):

$$n^* = m^*k^* = 2(t_{\frac{\alpha}{2}} + t_\beta)^2 \frac{\sigma^2}{\delta^2}[(1 + (m-1)\rho) - ({R_p}^2 + (m{R_c}^2 - {R_p}^2)\rho] \tag{9.15}$$

Here ${R_c}^2$ is the proportion of the class-level variance explained by covariates and ${R_p}^2$ is the proportion of the pupil-level variance explained by covariates. The structure of this equation shows how the inclusion of covariates can act to reduce the required sample size.

Alternatively, it is possible to adapt the sample size formula to take into account variable cluster size. In which case:

$$n^* = m^*k^* = 2(t_{\frac{\alpha}{2}} + t_\beta)^2 \frac{\sigma^2}{\delta^2}[(1 + ((CV^2 + 1)m - 1)\rho] \tag{9.16}$$

Where CV is the coefficient of variation of the cluster size (defined as the ratio of the standard deviation of cluster size to mean cluster size).

9.7 Developmental RCT power calculations

```
# MDES calculation for clustered data
# Adapted from Stata code shared by Jake Anders

#For two tailed test
power_clustered <- function(n, j, prop, reg, blocks, ICC,
r2_i, r2_c)
{
# n = number per cluster
# j=number of clusters
# prop = proportion in treatment group
# reg= number of regressors, including the constant so
minimum 1
# blocks= number of blocks in randomisation strategy (for
dof calculation)
# ICC=ICC
# r2_i= proportion of individual-level variance in outcomes
explained b
y your regressors/blocks
# r2_c= proportion of cluster-level variance in outcomes
explained by y
our regressors/blocks

dof<-j-reg-blocks
nullcrit<-qt(0.05/2, df=dof)
altcrit<-qt((1-0.8), df=dof)
M<-sqrt((nullcrit+altcrit)^2)
MDES <- M*sqrt((ICC*(1-r2_c)
/(prop*(1-prop)*r[i])) + ((1-ICC)*(1-r2_i)
```

```
/(prop*(1-prop)*n*r[i])))1-prop)*n*j)))
return(MDES)
}

# A priori power
# Assume work with 2 schools and 1 year group - 2*6 (12)
clusters
# Regressors are: school, proportion WWCB, FSM, SEN, KS2
maths
# Assume that covariates account for a high proportion
of variance
power_clustered(6, 12 , 0.5, 6, 1, 0.2, 0.7, 0.7)
# The MDES is 0.6
```

9.8 Pre-registration for developmental RCT

ASPREDICTED

(http://credlab.wharton.upenn.edu) Wharton University of Pennsylvania CREDIBILITY LAB

You are logged in as:

HOME (index.php) See List (see_list.php)
Change my AsPredicted email (update_email1.php) Log out (logout.php)

As Predicted: "*SOMEONE LIKE ME - role model project, London, July 2017*" **(#4745)**

Created: 07/05/2017 09:07 AM (PT)

Author(s)
Eliza Selley (University College London) -

1) Have any data been collected for this study already?
No, no data have been collected for this study yet

2) What's the main question being asked or hypothesis being tested in this study?
'White working-class boys' have been identified as the worst performing group in British secondary education. This trial will provide new evidence on on how to address this issue by testing whether exposure to video case studies of inspirational role models can improve attitudes to academic education in schools with a high proportion of students from low-income homes. This is a pilot for a larger trial to take place in the 2017-18 academic year.

3) Describe the key dependent variable(s) specifying how they will be measured.
'Attitudes to education' will be measured using a scale based on the 'Identification with School Questionnaire' (ISQ) which focuses on the value students place on education. Participants will also be asked to rate their interest in pursuing academic post-16 options on a 5 point scale. In addition, students will take a 10 question multiple-choice maths test. They will also be offered the chance to enter a lottery to win revision resources (on the basis that an student's attitude to education will impact their propensity to enter).

4) How many and which conditions will participants be assigned to?
This will be a two-arm cluster randomised controlled trial, clustered at the classroom level. In the treatment arm, classes will be shown a video of an inspirational role model. In the control arm, they will not be shown the video.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
Ordinary least square (OLS) regression will be used to determine the impact of the treatment on the survey

9.9 Full RCT power calculations

```
# Power curve
# Clustered at class-level taking into account the role
of covariates
# Adapted from Stata code shared by Jake Anders

# Assume 6 classses per year group in each school
# So 24 clusters per school
# Assume 20 students in each class
# Assume 6 are WWCBs and 6 are WWCGs
# So we effectively have 6 students per cluster

# Define terms
# n = number per cluster
# j = number of clusters
# prop = proportion in treatment group
# reg = number of regressors, including the constant so
minimum 1
# blocks = number of blocks in randomisation strategy
(for dof calculation)
# ICC = ICC
# r2_i = proportion of individual-level variance in outcomes
explained by your regressors/blocks
# r2_c = proportion of cluster-level variance in outcomes
explained by your regressors/blocks

# Set min and max number of clusters for power curve
# Note: trial will effectively have three arms
# Therefore use 2*N/3 as the number of clusters where N
```

```
is the total number of clusters across the trial
# Do power curve for between 15 and 30 schools in total
across trial

j <- c(240,480)
# Set number of steps on x-axis
granularx <- 24

# Then set all parameters
# The regressors are: region, school, year group, Prop_WWCB,
KS2_maths, KS2_reading, FSM, SEN, month of birth (9 -
but add constant, so 10)
# Blocks are region, school and prop_WWCB

n<-6
ICC <- 0.2
prop<-0.5
reg <-10
blocks <- 3
r2_i <-0.1
r2_c <- 0.1

# Note: alpha is set to 0.05 and power to 0.8

#### Set-up plot ####

# Range for x axis
r <- seq(j[1],j[2],(j[2]-j[1])/granularx)
nr <- length(r)
```

```
# Create 2 columns of data - number of clusters (for x
values) and MDES for (for y values

plot <- array(0, dim=c(nr,2))
  for (i in 1:nr)
    {
    dof<-r[i]-reg-blocks
    nullcrit<-qt(0.05/2, df=dof)
    altcrit<-qt((1-0.8), df=dof)
    M<-sqrt((nullcrit+altcrit)^2)
     MDES <- M*sqrt((ICC*(1-r2_c)
    /(prop*(1-prop)*r[i])) + ((1-ICC)*(1-r2_i)
    /(prop*(1-prop)*n*r[i]))))1-prop)*n*j)))
    plot[i,1] <- 3*r[i]/(2*24)
    plot[i,2] <- MDES
  }

# Set up graph
# Note: plot total number of schools in overall trial
on x axis
par(family="serif", font=1)
tikz(file = "power_curve.tex", width = 5, height = 3)
xrange <- 3*range(r)/(2*24)
yrange <- range(plot[,2])
plot(xrange, yrange, type="n",
     xlab="Number of schools (total)",
     ylab="MDES (Cohen's d)" )

# Add power curve
lines(plot[,1], plot[,2], type="l", lwd=0.5, col="mediumorchid3")
```

9.10 Pre-registration for full RCT

Trial Protocol: SOMEONE LIKE ME - Investigating the use of role models to inspire investment in education

Lead Researcher: *Eliza Kozman (full time PhD student in the Department of Political Science, University College London)*

Principal Supervisor: *Dr Jake Anders*

Subsidiary Supervisors: *Prof. Peter John and Dr Michael Sanders*

Contents

Executive summary

Background

Disadvantaged white British male pupils have been identified as the worst performing group in English schools. As a result, many universities are developing or expanding new programmes of outreach to engage ‘white working-class boys’. A common approach is to employ ‘student ambassadors’ to deliver these activities; however, there is limited evidence on the efficacy of university role models to engage disadvantaged white British male pupils.

Trial aims

This trial will test whether video case studies of role models can help inspire disadvantaged white British male pupils to invest in their education. It will compare the effect of an ‘academic role model’ (i.e. a university student) versus a ‘vocational role model’ (an apprentice). In addition, it will test whether prompting pupils to reflect on how they are similar to the role model can boost the impact of the intervention.

Trial design

The trial will be run as a fractional factorial cluster-randomised controlled trial (with 2x2 treatment arms and a control arm). Tutor groups will be the unit of randomisation.

Interventions

In each treatment arm, the intervention will be a five-minute video featuring a role model. The videos will focus on the role model’s experience of school, their current work/studies and their plans for the future. The role model will either be ‘academic’ or ‘vocational’. In the ‘similarity prime’ arms of the trial, students will also be prompted to reflect on how they are similar to the role model.

Outcome measures

The primary measure is identification with school, measured via the Identification with School (ISQ) survey.[1] Secondary outcome measures are:

- Performance in a low-stakes maths test (continuous)
- Whether or not pupils choose to enter a lottery to win online tutoring (binary)

---

[1] Voelkl, K. E. (1996). Measuring students' identification with school. *Educational and psychological measurement*, *56*(5), 760-770

- Interest in doing in an apprenticeship (continuous)
- Interest in going to university (continuous)
- A rating of overall pupil effort over the half term in which the trial was implemented (continuous - provided by teachers)
- Pupil attendance over the half term in which the trial was implemented (proportion)

Analyses

I will use ordinary least square (OLS) regression and binary logistic regression (as appropriate) to compare outcomes in each treatment arm to the control arm and outcomes across treatment arms.

Risks

The two biggest risks to this trial are implementation failure (because schools implement the intervention themselves) and attrition in the sample due to data collection issues (because the trial requires schools to collect data and return on multiple occasions). These risks will be mitigated by providing simple project guidance documents and close stakeholder management of participating schools.

1. Background

This trial forms part of a doctoral research project on how to improve academic engagement and outcomes for white British boys from disadvantaged backgrounds. White 'working-class' male pupils have been identified as the worst performing in British secondary education and there is a well-established body of research describing how this group develop what we shall term 'anti-academic attitudes' and reject academic education (see for example Archer, Pratt, & Phillips, 2001; Willis, 1975).

I argue that two mutually reinforcing mechanisms support this process. First, white British boys from disadvantaged backgrounds are subject to chronic stereotype threat due to middle-class bias in the school environment (Croizet & Claire, 1998; Dee, 2014; Steele & Aronson, 1995; Walton & Spencer, 2009). Second, explicit and implicit messages from social networks support the norm of rejecting academic education (see for example Akerlof & Kranton, 2002). This explanation underpins a 'behavioural theory of role modelling' which suggests academically successful in-group exemplars can improve student attitudes towards education (Nguyen, 2008; Silva, Sanders, & Chonaire, 2016). Research suggests that role model efficacy depends on perceived similarity with the target audience and is likely to be moderated by existing social structures and norms within this group (Dasgupta, 2011; Ray, 2006). The overarching research questions and associated hypotheses are given below:

Table 1: Research questions and hypotheses

RQ. Can exposure to male role models improve attitudes to education among white working-class male pupils in English schools?
H1. *Exposure to male role models will improve attitudes to education among white working-class male pupils.*
H2. *Exposure to a male role model who is an apprentice will improve attitudes to education among white working-class male pupils to a greater extent than exposure to a male role model who is a university student.*
H3. *Exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils when pupils are encouraged to reflect on how they are similar to the role model.*
H4: *Exposure to a male role model will lead to a greater improvement in attitudes to education among white working-class male pupils in classes where white working-class male students constitute the minority of male pupils.*
H5. *Exposure to male role models will improve attitudes to education among white working-class male pupils more than among white working-class female pupils.*

By addressing this research question, I will contribute to our understanding of 'messengers' and a burgeoning literature on the use of role models in field trials. I also hope to produce evidence with direct policy relevance which universities (and other education stakeholders) can use to inform their use of role models to 'raise aspirations'.

2. Interventions

Because the research question and hypothesis relate to a set of pupils who meet particular targeting criteria, we require a large sample of schools to ensure that the trial has adequate statistical power (approximately 30 in total).[2] The scale of the trial means it would be very difficult to deliver in-person presentations from role models. Therefore, the project hypotheses will be tested using a video intervention.

It might be expected that 'real life' interaction with a role model would be best, however, a trial using role models to promote a youth engagement programme found that videos were more effective at generating interest among the student audience than an on-stage presentation from alumni (Behavioural Insights Team, 2016). The video boosted preliminary sign-up rates by approximately eight percentage points while the on-stage performance did not have a statistically significant effect (possibly because the video was of a consistently high quality while the in-person presentations varied). Therefore, as well as providing a practical solution, there may be some advantage to using video case studies, particularly around ensuring the quality of the intervention.

In each treatment arm, the intervention will be a 5-minute video featuring a role model. The videos will focus on:

- The role model's experience of school
- Their current studies/work
- Their plans for the future

The role model will either be 'academic' (a university student) or 'vocational' (an apprentice). The bulk of the video will be the role model talking but there will also be some simple introductory content in the form of an infographic with a voiceover.

The role model treatment will be overlaid with a 'similarity prime' treatment - for some pupils, there will be an infographic-style segment at the end of the video during which:

- Pupils will be reminded of the characteristics of the role model and some of the things they said in the video
- Pupils will be asked to write down two ways that they are similar to the role model

[2] The assumptions and calculations which support this statement are given later in this document.

3. Design

The trial will be run as a fractional factorial cluster-randomised controlled trial (with 2x2 treatment arms and a control arm). Tutor groups will be the unit of randomisation (as this is the most practical route to implementation).

Table 2: Trial design - number of clusters per condition

Condition	Clusters[3]	Role model	Similarity Prime
1	k/6	Academic	Yes
2	k/6		No
3	k/6	Vocational	Yes
4	k/6		No
5	k/3	Control	

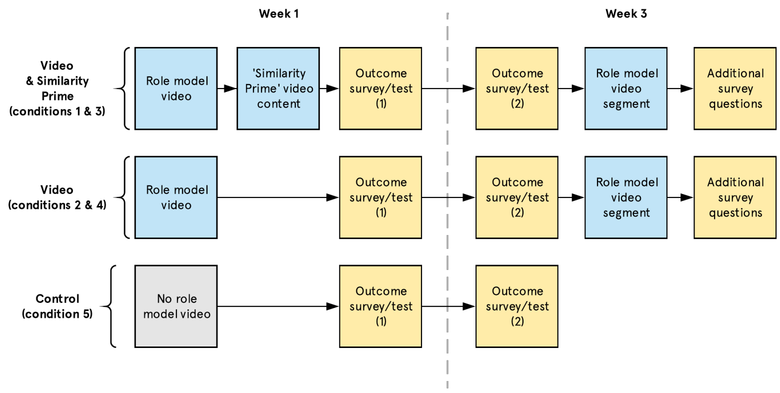
In each arm, tutors in participating schools will be asked to deliver two tutorial sessions separated by a period of three weeks:

- In the first session, tutors will deliver the intervention and collect immediate outcome data.
- In the second session, tutors will deliver follow-up outcome data. For the treatment arms, they will also replay a segment of the relevant video and ask pupils to rate how similar they think they are to the role model and how much they set an example which the pupil "would like to live up to". This format is employed so that pupils are not inadvertently exposed to a form of 'similarity' prime before providing the follow-up outcome data.

The process in each condition (as labelled in table 2) is shown in the figure overleaf.

[3] Where k is the total number of clusters

Figure 1: Intervention and data collection process in each condition



4. Outcome Measures

Primary outcome measures

The primary outcome measure is the value sub-scale of the 'Identification with School Questionnaire' (ISQ) (Voelkl, 1996). This subscale contains seven questions which measure the value which pupils place on education and map well onto the 'attitudes to education' which are the focus of this project.

Secondary outcome measures

Several secondary outcome measures will be drawn from pupils directly:

- How highly they score their interest in going to university/doing an apprenticeship.
- Scores in a low-stakes multiple-choice maths test (see for example Fryer, Levitt, & Sadoff, 2012; Levitt et al., 2012)
- Whether or not they enter a lottery to win £200 of online tutoring (entry implies positive attitudes towards education) (as per Baclini et al., 2017).

I will also collect two secondary outcome measures from the school:

- A rating of overall pupil effort over the half-term in which the trial takes place (provided by tutors)
- Pupil attendance over half-term in which the trial takes place.

See the Annex for a full list of outcome measures and the scales which will be used.

5. Sample Selection and Eligibility

For the purpose of analysis it is necessary to identify 'white working-class' (WWC) pupils. Rather than focusing on a single marker of disadvantage, I take a composite approach to targeting students using individual and geographic measures of disadvantage. The sample will be defined as the pupils within schools who meet the WWC criteria below:

Table 3: Criteria used to identify white 'working-class' pupils

Characteristic	Data source	Criteria
White British	*School demographic data*	*Ethnicity = White British*
Working-class	*Free school meals status* *AND/ OR* *Postcode mapped on to the ACORN categorisation of local areas*[4]	*Ever6FSM = Yes* *AND/OR* *ACORN = 4 or 5 ('financially stretched' and 'urban adversity')*

To maximise the sample size, the trial will be focused in schools where a higher than average proportion of the population are likely to meet these criteria i.e. schools with a high proportion of white British pupils and a high proportion of FSM-eligible pupils will be encouraged to participate.

[4] ACORN is a "segmentation tool which …segments households, postcodes and neighbourhoods into six categories". ACORN 4 and 5 areas are the least advantaged areas of England. ACORN is commonly used by universities to target widening participation activities.

The trial will take place across multiple areas of England. For initial rollout, there will be three geographical focus areas: Southampton/Portsmouth (for schools on or near the South coast), Nottingham (for schools in the East Midlands), Birmingham (for schools in the West Midlands). For each focus area, there will be a different set of academic/vocational role models (e.g. pupils in schools in the West Midlands will view a video of a university student from the University of Birmingham but those in the East Midlands will see a student from Nottingham Trent University). If I fail to meet my recruitment target, I will roll out the project in other geographical areas.

In every school, Years 8-11 will be included in the trial. In schools with a sixth form, Years 12-13 will be included too, but schools will not be required to have a sixth form to participate. In conversation with senior leaders in schools, I have determined that Year 7s are too young to participate (especially as the trial will start in the autumn term when they have just transitioned from primary school) so this year group will be excluded.

I hope to work with a sample of 30 schools in total. The estimated sample size is outlined below:

Table 4: Estimated sample size

Number of schools	Number of tutor groups[5]	Number of pupils[6]	Number of WWC boys[7]
30	720	18,000	3,600

6. Randomisation

The unit of randomisation is tutor groups within schools. Schools will be stratified by region and then by the proportion of the population in the school meeting the white working-class boy criteria. Then, within schools, tutor groups will be randomly allocated to trial arms (see Table 5).[8] The randomisation will be conducted in R.

[5] Assuming 6 tutor groups per year and 4 participating year-groups (Year 8-11). These are conservative assumptions based on DfE schools data.
[6] Assuming 25 pupils per tutor group.
[7] Assuming 5 WWCBs per tutor group.
[8] Tutor groups generally contain an approximately equal split by gender so it is not necessary to stratify on this.

Table 5. Stratifying strategy (assuming trial takes place in 2 regions)

All Schools	**First level**	**Second level**	**School**
	Region 1	Higher proportion target group	School 1
			…
			School n
		Lower proportion target group	School 1
			…
			School n
	Region 2	Higher proportion target group	School 1
			…
			School n
		Lower proportion target group	School 1
			…
			School n

Tests will be conducted to check balance on the covariates listed below.

Table 6. Covariates to be used in balance checks

Covariate to check balance on	Coding
Gender	Male=1, other=0[9]
Year group	Discrete levels
Ethnicity	White British=1, other=0
Special educational needs	Any SEN requirement=1, other=0
Free school meals eligibility	EVER 6FSM=1, other=0
ACORN 4 or 5 households	ACORN4/5=1, other=0
KS2 maths attainment	Continuous variable or discrete levels, depending on age group

Following randomisation schools will be provided with a lesson plan for each participating tutor group. The lesson plan will instruct teachers to deliver the intervention as per the randomisation strategy (i.e. the instructions will vary depending on the arm they are in). Teachers will be aware of the randomisation strategy but students will not, so this is a single-blind trial.

[9] Other includes female and non-binary genders.

7. Data Gathering

The three stages of data collection are shown in the table below.

Table 7: Data collection plan

Data	Collection Point	Source
Demographic data on pupils which will be used to conduct the randomisation	Schools to provide prior to randomisation	Schools
Outcome data from pupil surveys/tests	Collected via tutorial sessions - either using paper surveys or tests, whichever the school chooses	Schools collect the surveys/tests and return them
Outcome data from tutors/schools	Effort ratings collected on spreadsheet from tutors - attendance data collected routinely by schools	Schools to collate internally and return

8. Trial Procedure

The bulk of the trial will take place in the autumn term 2018. If the school recruitment target is not met, a further 'wave' of the trial will take place in the spring term 2019. The procedure for the first wave of the trial is shown below:

Table 8: Trial procedure

Timing	Action
Starting autumn term 2018	• School recruitment • Demographic data collection
November 2018	• Randomisation • Session 1 implemented by schools • Immediate outcome data collected via surveys/tests
December 2018	• Session 2 implemented by schools (three weeks after session 1) • Follow-up outcome data collected via surveys/tests • Additional outcome data collected from tutors/administrative data sources in schools • Data returned
Starting January 2019	• Wave 2 of the trial (if recruitment target not met)

9. Power Calculations

We conduct power calculations to describe the relationship between the effect size, sample size, significance level and statistical power.

Below we set out some assumptions which shape the calculations:

- Significance level: 0.05
- Power: 0.80
- Number of classes per year group: 6
- Number of classes in Years 8-11 per school: 24
- The power calculations are based on only WWC boys as this group are the main population of interest for the trial

Power graphs which plot the anticipated minimum detectable effect size as a function of sample size are given in the Annex.

It is important to note that these calculations reference the number of schools in the whole trial but the MDES relates to the main effects (i.e. comparison of each role model arm to control, comparison of academic versus vocational role models and comparison of 'similarity prime' against no 'similarity prime').

The recruitment target for this trial is 30 schools. If this target is achieved, the trial will be powered to detect a main effect of ~0.13-0.15.

To properly understand the implications of these power calculations, they are translated into 'real world' outcomes in the table below. This uses the ISQ scores from a pilot for this trial [M=23.9, SD=4.7] to translate the MDES into the score increase which the trial will be powered to detect:

Table 9: 'Real world' interpretation of MDES

MDES estimate	ISQ baseline estimate	Minimum score required in treatment group	Difference in score
0.14	M=23.9 SD=4.7	24.6	0.7

10. Analytical Strategy

OLS regression will be conducted using the following model for continuous outcomes (and the equivalent logistic regression for the binary/proportion outcome measures):

$$Y_{ij} = \beta_0 + \beta_1 T_j + \beta_2 X_i + \beta_3 C_j + \beta_4 S_j + e_{ij}$$

where *i* denotes the individual (student) and *j* the cluster (class), *Y* is the outcome variable, β_0 is a constant, T is a binary treatment indicator (which takes values of 0 for control and 1 for treatment), *X* and *C* are vectors of pupil and class characteristics respectively (see Table 10) and *S* is a school dummy variable. To enable statistical inference given the structured nature of the data, I will use cluster-robust standard errors (Campbell & Walters, 2014; Davis, Cameron, & Miller, 2015). Therefore, *e* is an error term where standard errors are clustered at the class-level

Table 10. Covariates to be used in analysis

Student-level covariates
• *Key Stage 2 maths attainment (standardised score or level depending on age group)* • *FSM eligibility (Ever FSM 6 = 0 or 1)* • *First in family (whether a pupil would be first in family to go to HE = 0 or 1)* • *Special educational needs (any SEN provision = 0 or 1)* • *Month of birth* • *[Sex – for comparing white working-class boys to girls]*
Class-level covariates
• *Year group* • *Proportion of class meeting white working-class boy criteria*

Primary analysis

For the purpose of primary analysis, I will restrict the sample to those pupils who meet the 'white working-class boy' criteria set-out earlier in this document. For these students, I will look at my primary outcome measure (the ISQ survey) and test hypotheses H1-H4 listed earlier by:

- Comparing outcomes for pupils in any role model treatment condition to control [H1]
- Comparing outcomes for pupils in the 'academic' role model treatment condition to the 'vocational' role model treatment condition [H2]
- Comparing outcomes for pupils in the 'similarity prime' conditions to those in the role model treatment condition without the 'similarity prime' [H3]
- Examining the interaction between treatment and the proportion of the class which meet the white working-class male criteria (where treatment is defined as being in any role model treatment condition) [H4]

Secondary analysis

As secondary analysis, I will replicate the primary analysis for my secondary outcome measures (again for the subgroup of pupils who meet the 'white working-class boy' criteria).

I will also test hypotheses H5 (listed earlier) in this document and replicate my primary and secondary analysis for the subgroup of pupils who meet the 'white working-class girl' criteria so that I can compare the relative impact on the male and female pupils in this population.

Additional analysis

I will also conduct some additional analysis which is not directly related to the trial but uses the data which will be collected:

- **Test-retest of the ISQ survey value sub-scale:** Using the immediate and follow-up survey outcomes for the control group (all pupils) I will conduct test-retest analysis so I am able to comment on the reliability of the instrument.
- **How identification with school varies by demographic factors:** I will examine how ISQ survey value sub-scale scores vary by ethnicity, gender and 'class'.

- **WWC marker analysis:** For the purpose of this trial, I have used a composite marker of ‘working-class’ based on free school meals eligibility and the ACORN classification of postcodes. However, there are several other geographical markers of socioeconomic status which are sometimes used to identify ‘disadvantaged’ or ‘working-class’ students for the purpose of widening participation. These include POLAR[10], indices of multiple deprivation (IMD) and the ‘first in family’ flag (which denotes when pupils would be the first in their family to go to university). Using data collected for the trial, I intend to generate a number of ‘working-class’ markers based on these indicators and explore how they overlap. I will use multilevel linear regression models (allowing for clustering) and vary the ‘'working-class' marker to see which explains the highest proportion of variance in outcomes - and is therefore the best marker to identify ‘working-class’ pupils.

11. Ethical Issues

Ethical considerations

The nature of the project necessitates working with children. Although it is preferable to work with less vulnerable groups, the intervention is non-harmful and similar to existing school activities. To protect students, schools will be invited to shield individuals from the intervention, as appropriate. To identify the target students and randomise classes, it is necessary to collect sensitive student-level data, for example ethnicity. This data will be handled securely and access restricted to the project team. To ensure anonymity, all results will be reported at an aggregate level. Individual-level identifiers (e.g. names) will be stripped from the data and stored separately.

The nature of controlled trials is that the treatment must be withheld from some students. There is limited research to support the hypothesis that inspirational role models are an effective tool for improving academic engagement among white working-class boys. Therefore, we can be said to be in a state of ‘equipoise; and an RCT approach can be justified.

[10] https://www.officeforstudents.org.uk/data-and-analysis/polar-participation-of-local-areas/

Informed consent

As the intervention will take place in school hours, consent from the school is sufficient for pupils to participate in the sessions. The school acts in loco-parentis in school-hours and is best placed to decide who should be involved in such activities.

For pupils in Years 8-11 it is necessary to seek opt-out consent from parents for them to be involved in the research while pupils in Years 12-13 can be asked directly.[11] Schools will be provided with a letter which can be used for this purpose.

12. Risks

Table 11: Risks and mitigation strategies

Risk	Strategy to mitigate risk
Spillover	Given the nature of the intervention, I judge this risk to be low.
Schools dropping out or failing to return data	Schools have been provided with a good overview of project information and signed data processing agreements in which they commit to project delivery and data collection.
Poor compliance with randomisation	The session plans given to teachers will be labelled with their tutor group name and include a clear statement that if tutors lose their sheet they should request a new one rather than copy a colleague's.
Poor compliance with intervention delivery	Sessions will be clearly outlined in documents which are provided for tutors. There will be a short list of instructions which are easy to understand and follow.
Attrition in data collection due to student absence	This risk cannot be mitigated but attrition of this sort should be balanced over trial arms.

[11] Although 'opt-out' consent cannot be used as the basis for data processing, it is still a valid approach with respect to ethical requirements.

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Annexes

Outcome measures

Table 12: Full list of outcome measures

Outcome type	Object of measurement	Questions	Scale	Coding
Primary	Identification with school	- I can get a good job even if my grades are bad. - School is one of the most important things in my life. - Many of the things we learn in class are useless. - Most of what I learn in school will be useful when I will get a job - School is often a waste of time. - Dropping out of school would be a huge mistake for me. - School is more important than most people think.	5 point Likert scale: Strongly disagree/Disagree/ Neither agree nor disagree/Agree/Strongly agree	Combined to a total out of 35
Secondary	Interest in going to university	How interested are you in going to university?	5 point Likert scale: Extremely interested/Interested/Neutral /Not interested/Not interested at all OR I have already applied	Score out of 5 OR I have already applied
Secondary	Interest in doing an apprenticeship	How interested are you in doing an apprenticeship	5 point Likert scale: Extremely interested/Interested/Neutral /Not interested/Not interested at all OR I have already applied	Score out of 5 OR I have already applied
Secondary	Lottery for tutoring	Invitation to enter lottery to win £200 of tutoring on my tutor (8-10 free sessions)	Yes/No	Binary

Secondary	A rating of overall pupil effort over the half-term in which the trial takes place	Please the pupil's overall effort over the last X weeks	Graded A-G	Coded 1-7
Secondary	Pupil attendance over the half-term in which the trial takes place	Administrative data	Percentage	Percentage

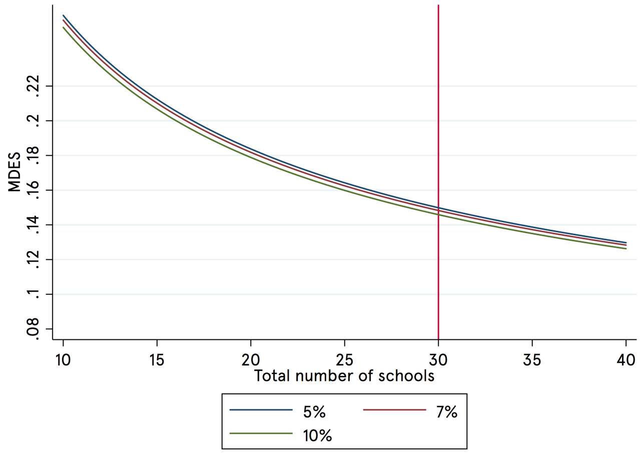
Power

The red line on each of the following graphs at y=30 indicates the recruitment target for this trial

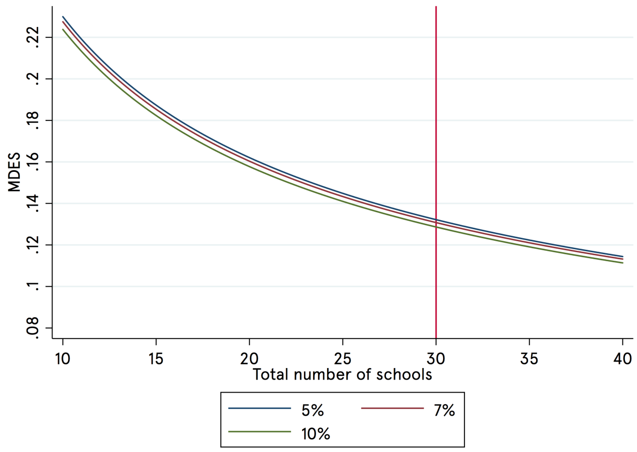
- Graph A assumes 5 WWCBs per class
- Graph B assumes 10 WWCBs per class

Each graph includes three lines which relate to different estimates for the proportion of the variance in the outcome which will be explained by covariates in the analysis. Because the main population of interest is fairly homogeneous (WWC boys are all the same sex, ethnicity and have similar socioeconomic status) perhaps it is not surprising that in the pilot of this trial, covariates only explained 5%-10% of the variance in outcomes (depending on the outcome measure); these estimates inform the assumptions behind the plots overleaf.

Graph 1: Power curve assuming 5 WWCBs per class



Graph 2: Power curve assuming 10 WWCBs per class



9.11 Developmental RCT video link

Figure 9.1: University role model video

9.12 Developmental RCT tutor briefing

ROLE MODEL RESEARCH PROJECT

Tutor briefing for [teacher name]

*First, **thank you** very much! We couldn't run this project without you. Please follow the instructions below. If you lose this sheet, please **do not** copy your colleague's as it may be different. Instead, contact for a replacement.*

Before the session

- Print the 'pupil sheets' file labelled with your tutor group name- this should be printed **double sided**.
- There will be one double-sided sheet for each pupil in your tutor group – they are labelled with names at the top. There are also two blank copies but please only use these if a pupil doesn't have a named sheet.
- **Please check that you can access the video at the link below!**

Session instructions

- ***Please do not give out the pupil sheets straight away and do not overemphasise that the session is part of a research project as this can affect how pupils respond. It's important that we get honest answers from pupils so we can learn as much as possible from this research.***
- Read the following introduction:
  - "Today we are going to be watching a short video. The video shows somebody talking about their experience of school and providing some advice about GCSEs."
- **Play the video at this link** [video link] (enter the password 'slm')
- After the video, give out the pupil sheets.
- Timings are:
  - Video: 5 minutes
  - Survey and lottery: 3 minutes
  - Test: 10 minutes
- **Please collect the pupil sheets and return them to [school lead contact].**

9.13 Developmental RCT survey

«RandomID»

TUTOR GROUP: «Tutor_group»

FIRSTNAME: «First_name»

SURNAME: «Surname»

SURVEY

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I can get a good job even if my grades are bad.	☐	☐	☐	☐	☐
School is one of the most important things in my life.	☐	☐	☐	☐	☐
Many of the things we learn in class are useless.	☐	☐	☐	☐	☐
Most of what I learn in school will be useful when I will get a job.	☐	☐	☐	☐	☐
School is often a waste of time.	☐	☐	☐	☐	☐
Dropping out of school would be a huge mistake for me.	☐	☐	☐	☐	☐
School is more important than most people think.	☐	☐	☐	☐	☐

	Very unlikely	Not that likely	Neither likely or unlikely	Likely	Very likely
How likely are you to do A-levels or BTECs after you are 16?	☐	☐	☐	☐	☐
How interested are you in doing A-levels or BTECs after you are 16	☐	☐	☐	☐	☐
How likely are you to go to university?	☐	☐	☐	☐	☐
How interested are you in going to university?	☐	☐	☐	☐	☐

What do you think you will do after GCSEs? Write a short answer in the box below:

«RandomID»

TUTOR GROUP: «Tutor_group»

FIRSTNAME: «First_name»

SURNAME: «Surname»

LOTTERY

Would you like the chance to win a pack of study resources worth £35? The pack includes revision cards and post-it notes, a pencil case, ruler, notebook, pen and a revision-planner to hang on the wall.

If you win, the teacher will give this pack to you in one of your lessons.

Tick one of these options:

- ☐ **Yes**, I would like to enter the lottery
- ☐ **No**, I do not want to enter the lottery

QUIZ

- Draw a circle around the answer you think is correct – do not use a calculator!

1. A fence is 1.3 metres high, how tall would a person need to be to see over it?	1.04m	1.43m	1.03m	1.17m
2. What is 1.45736 rounded to 2 decimal places	1.4	1.45	1.46	1.45
3. The distance measured around a circle is called the…	Radius	Circumference	Angle	Diameter
4. What is the square root of 36	3	4	6	12
5. What is the next number in the sequence 28, 24, 20…	24	16	14	18
6. I started walking at 3pm. When I finished walking, the hour hand of the clock had turned 90 degrees. What time did I finish?	5pm	6pm	7pm	9pm
7. Lessons are 55 minutes long. A lesson starts at 9:15am, at what time does the lesson end?	10.00	10.05	10.10	10.20
8. When y = 1, which expression has the largest value?	3+y	10-y	Y_2	3y
9. –2 is halfway between … and 8	-8	-10	-12	-14
10. Four boxes make a pile with a height of 72cm. Work out the height of a pile of five boxes.	80cm	85cm	90cm	94cm

9.14 Developmental RCT attrition by characteristics

	Present in outcome data								
	WWCBs			*WWCGs*			*All pupils*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FSM	−0.941*			−0.610			−0.605		
	(0.451)			(0.451)			(0.451)		
SEN		−1.013*			−0.073			−0.725**	
		(0.474)			(0.407)			(0.276)	
Maths score			0.012			−0.029			−0.015
			(0.047)			(0.030)			(0.031)
Constant	1.922**	1.775**	0.784**	1.526**	1.262**	0.770**	1.570**	1.545**	0.776**
	(0.438)	(0.325)	(0.045)	(0.438)	(0.330)	(0.054)	(0.438)	(0.240)	(0.036)
Observations	113	113	111	98	98	97	267	267	259

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. Presence is modelled as a function of binary indicators using binary logistic regression.The continuous maths variable is modelled using ordinary least squares regression.

Table 9.5: Developmental RCT — attrition of sample by characteristics

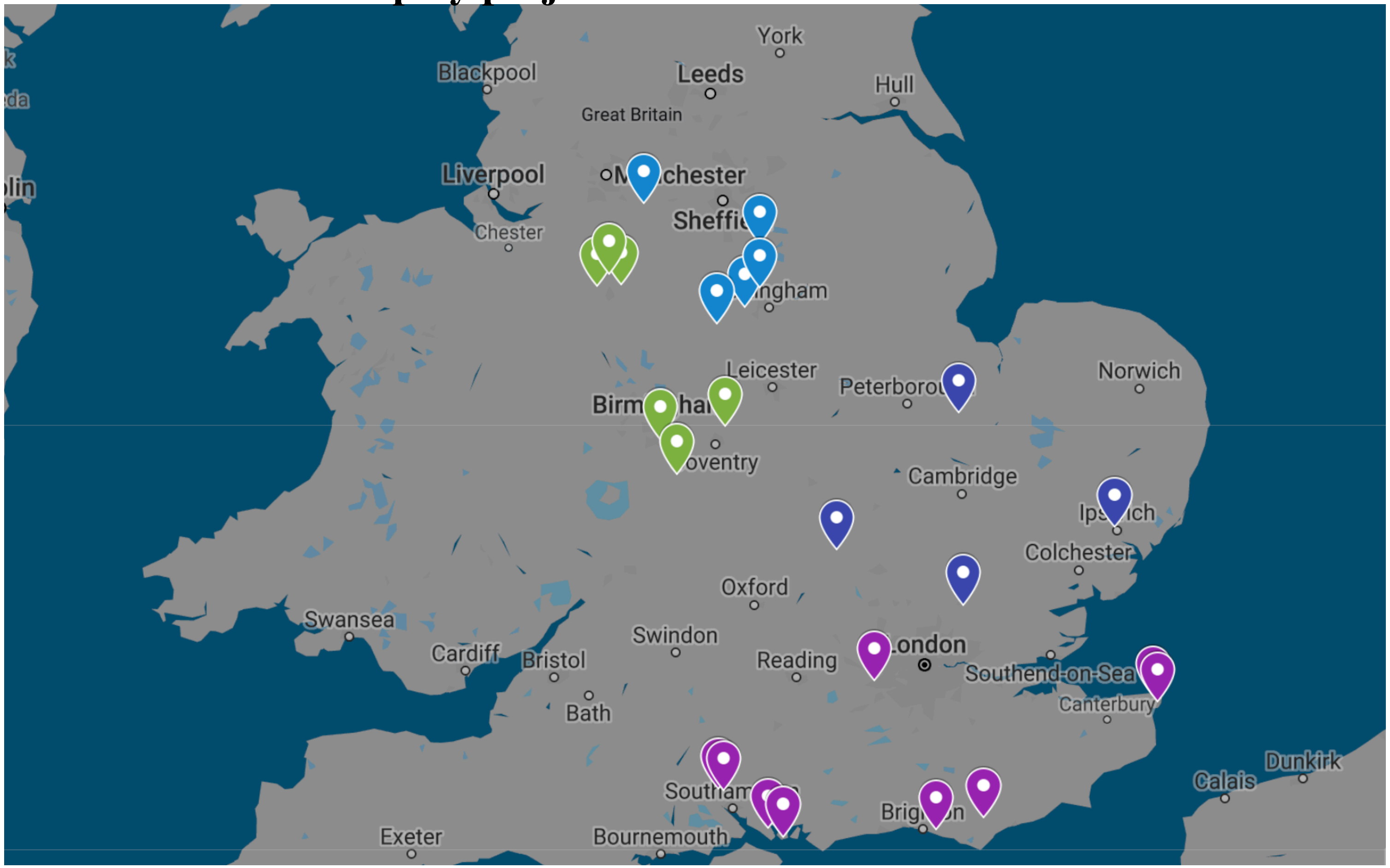
9.15 Developmental RCT balance checks

	WWCBs			*WWCGs*			*non-WWC pupils*		
	Treatment	*Control*	*p-value*	*Treatment*	*Control*	*p-value*	*Treatment*	*Control*	*p-value*
FSM	0.44	0.62	0.08	0.38	0.41	0.79	0.23	0.05	0.12
	(0.08)	(0.07)		(0.07)	(0.08)	(0.09)	(0.04)		
SEN	0.37	0.31	0.60	0.29	0.32	0.72	0.09	0.18	0.40
	(0.08)	(0.07)		(0.07)	(0.08)	(0.06)	(0.08)		
ACORN 4/5	0.95	1.00	0.16	1.00	1.00	0.32	0.43	0.27	0.30
	(0.03)	(0.00)		(0.00)	(0.00)	(0.11)	(0.09)		
Month of birth	-0.10	-0.08	0.86	0.19	0.04	0.46	0.39	-0.47	0.35
	(0.15)	(0.14)		(0.14)	(0.18)	(0.77)	(0.92)		
Maths score	0.25	-0.18	0.07	-0.02	-0.28	0.34	6.97	-1.18	0.24
	(0.13)	(0.16)			(0.16)	(0.19)	(3.59)	(4.71)	
Proportion class WWCB	0.12	0.34	0.34	-0.50	0.10	0.01	-0.01	-0.05	0.20
	(0.19)	(0.11)		(0.18)	(0.12)	(0.01)	(0.02)		
Observations	41	48		42	34	22	22		

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. "Maths score" is a standardised continuous measure of Key Stage 2 maths attainment."Proportion class WWCB" is a standardised continuous measure of the proportion of the class meeting the WWCB criteria.

Table 9.6: Balance checks for WWCBs and WWCGs

9.16 Full RCT school map by project area



9.17 Full RCT video links

9.17.1 University video links

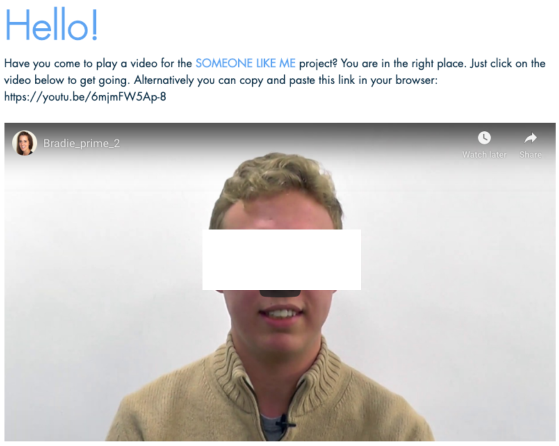


Figure 9.2: East of England university role model video

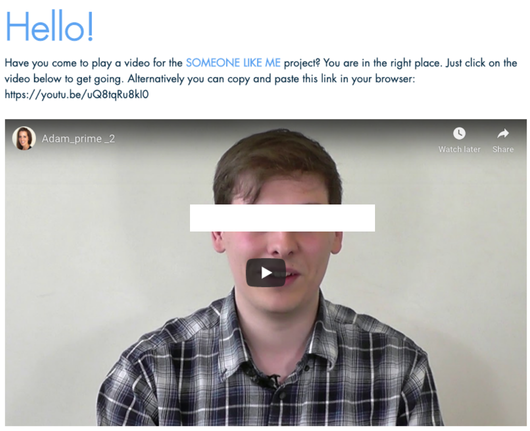


Figure 9.3: East Midlands university role model video

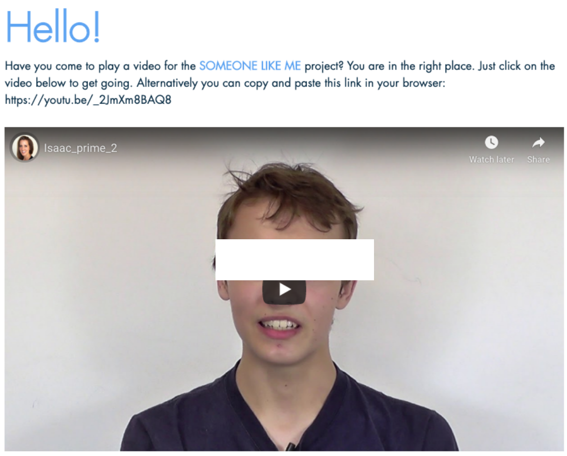


Figure 9.4: South university role model video

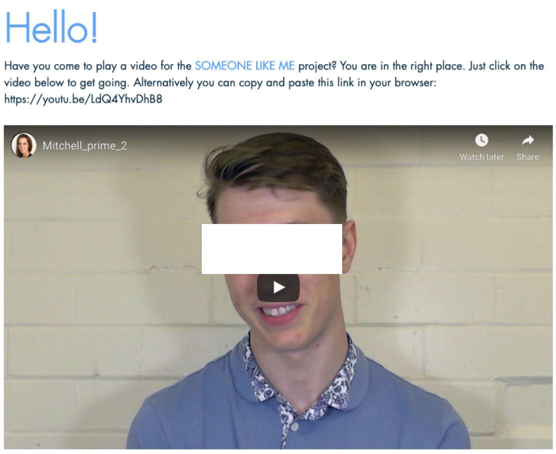


Figure 9.5: West Midlands university role model video

9.17.2 Apprentice video links

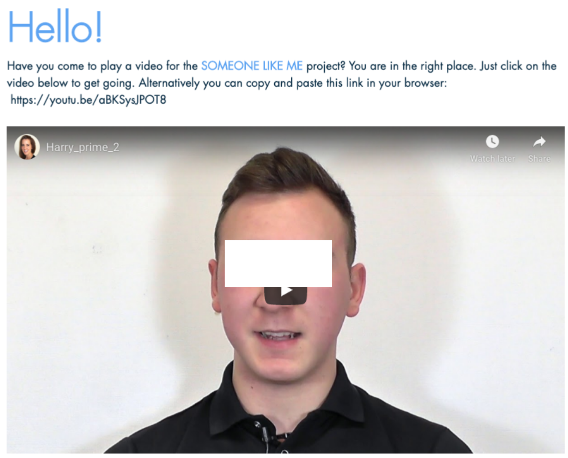


Figure 9.6: East of England apprenticeship role model video

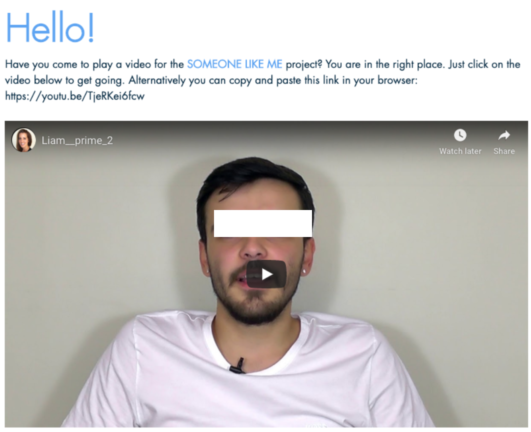


Figure 9.7: East Midlands apprenticeship role model video

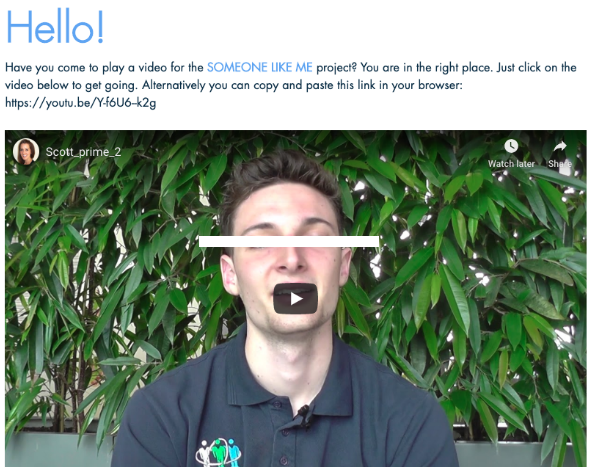


Figure 9.8: South apprenticeship role model video

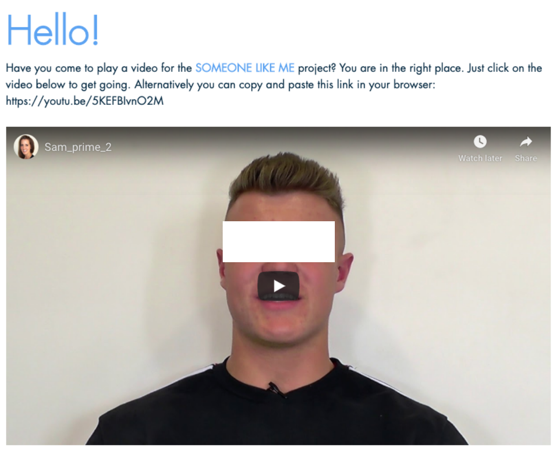


Figure 9.9: West Midlands apprenticeship role model video

9.18 Full RCT tutor briefing

SOMEONE LIKE ME - Tutor briefing for **[*tutor name*]**

You are requested to deliver 2 short sessions to your tutor group over the next couple of months.

To say thank you for helping us with this research, **all tutors in participating schools have been automatically entered into a lottery to win £30 of Amazon vouchers**. The winner will be informed on [date].

Thank you for your help!

Week commencing	Content
Session 1: [week window]	Short video + survey/test (15 minutes)
Session 2: [week window]	Short video + survey/test (15 minutes)

IMPORTANT! For all sessions:

- Please follow the instructions exactly e.g. don't give out the worksheets until the instructions say so.
- **Do not highlight that the session is part of a research project** as this can affect how pupils respond. It's important that we get honest answers from pupils so we can learn as much as possible from this research.
- All of the surveys/tests should be collected and given to [staff member] as soon as possible after the session.

Session 1: w/c [date] (15 minutes)

Printing required

- Print 1 survey/test sheet per pupil (2-sides of A4)

Instructions

- Introduce a short video on apprenticeships:
  - "Today we are going to start with a short video…."
- Play the 5-minute video at this link: [*video link here*]
- Give out the survey/test sheets – they will be labelled with pupil names.
- Give pupils 5 minutes to fill-in the survey
- Give pupils a further 5 minutes to complete the test
- Collect the survey/test sheets

Session 2: w/c [[date] (15 minutes)

Printing required

- Print 1 survey/test sheet per pupil (2-sides of A4)

Instructions

- Give out the survey/test sheets – they will be labelled with pupil names.
- Give pupils 3 minutes to complete the survey.
- Give pupils a further 5 minutes to complete the test.
- Play the 2-minute video at this link: [*video link here*]
- Give pupils 2 minutes to complete the final survey question.

9.19 Full RCT session 1 survey form

SCHOOL: «School»
GROUP: «Class»
NAME: «Name»

- **PAGE 1 – PLEASE DON'T START UNTIL YOU ARE TOLD TO**
- **CAREFULLY SHADE ONE BOX ONLY FOR EACH QUESTION – USE A DARK PEN OR PENCIL**

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I can get a good job even if my grades are bad.	○	○	○	○	○
2. School is one of the most important things in my life.	○	○	○	○	○
3. Many of the things we learn in class are useless.	○	○	○	○	○
4. Most of what I learn in school will be useful when I will get a job.	○	○	○	○	○
5. School is often a waste of time.	○	○	○	○	○
6. Dropping out of school would be a huge mistake for me.	○	○	○	○	○
7. School is more important than most people think.	○	○	○	○	○

	Not at all interested	Not that interested	Neutral	A little interested	Very interested	Doing this already/ applied
8. How interested are you in going to university?	○	○	○	○	○	○
9. How interested are you in doing an apprenticeship?	○	○	○	○	○	○

Lottery!

	Yes	No
*10. **We are offering you a chance to win £200 worth of online tutoring on mytutor.co.uk. This will buy you between 6 and 10 personal tutoring sessions which will focus on helping you do better at school.*** *Tick **Yes** if you would like to be entered into this lottery. Your teacher will tell you if you win in the Spring term.*	○	○

	Yes	No
11. If you went to university, would you be the first person in your family to go?	○	○

9.20 Full RCT session 2 survey form

SCHOOL: «School»
GROUP: «Class»
NAME: «Name»

- **PAGE 1 – PLEASE DON'T START UNTIL YOU ARE TOLD TO**
- **CAREFULLY SHADE ONE BOX ONLY FOR EACH QUESTION – USE DARK PEN OR PENCIL**

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I can get a good job even if my grades are bad.	○	○	○	○	○
2. School is one of the most important things in my life.	○	○	○	○	○
3. Many of the things we learn in class are useless.	○	○	○	○	○
4. Most of what I learn in school will be useful when I will get a job.	○	○	○	○	○
5. School is often a waste of time.	○	○	○	○	○
6. Dropping out of school would be a huge mistake for me.	○	○	○	○	○
7. School is more important than most people think.	○	○	○	○	○

	Not at all interested	Not that interested	Neutral	A little interested	Very interested	Doing this already/ applied
8. How interested are you in going to university?	○	○	○	○	○	○
9. How interested are you in doing an apprenticeship?	○	○	○	○	○	○

Lottery! **– second chance to enter!**
If you already entered, you can enter again to boost your chance of winning!

	Yes	No
10. ***We are offering you a chance to win £200 worth of online tutoring on mytutor.co.uk. This will buy you between 6 and 10 personal tutoring sessions which will focus on helping you do better at school.*** *Tick* ***Yes*** *if you would like to be entered into this lottery. Your teacher will tell you if you win in the Spring term.*	○	○

COME BACK TO THIS QUESTION IN A MINUTE WHEN YOUR TEACHER TELLS YOU TO

Think about the person/people you just saw speaking in the video

	Not at all 1	2	3	4	5	6	Very much 7
11. How similar are you to them?	○	○	○	○	○	○	○
12. How much do they set an example which you would like to live up to?	○	○	○	○	○	○	○

9.21 Full RCT attrition by characteristics

Over the following pages, I present analysis of attrition by pupil characteristics. I first present this analysis for WWCBs, WWCGs and all pupils, in the session 1 data. Then replicate this table for the session 2 data.

	Present in session 1 outcome data											
	WWCBs				*WWCGs*				*All pupils*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FSM	−0.381**				−0.205*				−0.381**			
	(0.093)				(0.093)				(0.093)			
SEN		0.112				0.291*				0.112		
		(0.107)				(0.128)				(0.107)		
Maths score			0.035**				0.038**				0.035**	
			(0.012)				(0.012)				(0.012)	
Year				−0.019				−0.018				−0.019
				(0.012)				(0.012)				(0.012)
Constant	1.001**	0.786**	0.715**	0.721**	1.034**	0.894**	0.733**	0.744**	1.001**	0.786**	0.715**	0.721**
	(0.098)	(0.092)	(0.025)	(0.025)	(0.098)	(0.091)	(0.026)	(0.026)	(0.098)	(0.092)	(0.025)	(0.025)
Observations	3,576	3,576	1,592	3,576	3,329	3,329	1,535	3,329	3,576	3,576	1,592	3,576

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. Presence is modelled as a function of binary indicators using binary logistic regression.

Table 9.7: Full RCT — session 1 — attrition of sample by characteristics

	Present in session 2 outcome data											
	WWCBs				*WWCGs*				*All pupils*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FSM	−0.182*				−0.266**				−0.182*			
	(0.074)				(0.074)				(0.074)			
SEN		−0.250**				−0.051				−0.250**		
		(0.091)				(0.110)				(0.091)		
Maths score			0.050**				0.044**				0.050**	
			(0.013)				(0.014)				(0.013)	
Year				−0.057**				−0.048**				−0.057**
				(0.013)				(0.014)				(0.013)
Constant	0.171*	0.148*	0.597**	0.605**	0.249**	0.127+	0.592**	0.601**	0.171*	0.148*	0.597**	0.605**
	(0.079)	(0.075)	(0.023)	(0.023)	(0.079)	(0.074)	(0.025)	(0.025)	(0.079)	(0.075)	(0.023)	(0.023)
Observations	3,576	3,576	1,592	3,576	3,329	3,329	1,535	3,329	3,576	3,576	1,592	3,576

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. Presence is modelled as a function of binary indicators using binary logistic regression.

Table 9.8: Full RCT — session 2 — attrition of sample by characteristics

9.22 Examining ISQ score by pupil characteristics

	ISQ score						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year	-0.135^{**}	-0.137^{**}	-0.142^{**}	-0.142^{**}	-0.142^{**}	-0.142^{**}	-0.143^{**}
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
WWCB	-0.166^{**}	-0.157^{**}					
	(0.027)	(0.027)					
White British			-0.066^{*}	-0.038	-0.066^{*}	-0.059	0.032
			(0.030)	(0.043)	(0.030)	(0.046)	(0.073)
Working-class			-0.063^{**}	-0.062^{*}	-0.019	-0.053	0.063
			(0.024)	(0.024)	(0.034)	(0.051)	(0.081)
Male			-0.113^{**}	-0.073	-0.067^{*}	-0.113^{**}	0.054
			(0.023)	(0.049)	(0.034)	(0.023)	(0.086)
White British male				-0.050			-0.141
				(0.054)			(0.093)
Working-class male					-0.082^{+}		-0.184^{+}
					(0.044)		(0.102)
White British working-class						-0.012	-0.093
						(0.056)	(0.088)
White British working-class male							0.116
							(0.114)
Constant	4.884^{**}	4.704^{**}	4.852^{**}	4.828^{**}	4.829^{**}	4.847^{**}	4.750^{**}
	(0.114)	(0.131)	(0.138)	(0.141)	(0.139)	(0.140)	(0.148)
Observations	3,004	3,004	2,954	2,954	2,954	2,954	2,954
Significance of added variables (P<F)	-	0.0	-	0.36	0.06	0.80	0.20
R^2	0.102	0.105	0.107	0.108	0.108	0.107	0.109
Adjusted R^2	0.096	0.099	0.100	0.100	0.101	0.100	0.101
Other controls	N	Y	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01. Models show ISQ score as a function of pupil characteristics using the control group where I have Key Stage 2 maths data. Models 1 and 2 use a WWCB marker whereas as models 3-7 control for ethnicity, class and gender independently. For model 2, the significance of added variables is relative to model 1. For models 4-5, the significance of added variables is relative to model 3. The "other controls" are measure of Key Stage 2 maths attainment ("maths unified") and SEN status (binary). All models control for a school dummy variable.

Table 9.9: ISQ score by pupil characteristics — control group only

9.23 Survey validity and reliability

9.23.1 Internal consistency

Internal consistency is the extent to which "individuals who respond in one way to items tend to respond the same way to other items intended to measure the same construct" (Fredricks et al., 2011). As the ISQ has several component items, it is relevant to assess the extent to which the responses to these items align with each another. Internal consistency is measured using "Cronbach's alpha", for which a value of 0.70 or higher is considered to represent acceptable. For session 1, the Cronbach's alpha of the ISQ survey was 0.80 and for session 2 it was 0.78, as shown in Table 9.10 below. Therefore, this survey has an acceptable degree of internal consistency.

	Session 1	**Session 2**
Cronbach's alpha	0.80	0.78
	[0.79-0.80]	[0.78-0.79]
Observations	10,897	8,139

Notes: Cronbach's alpha for ISQ survey with 95 per cent confidence intervals in parentheses.

Table 9.10: Internal consistency

9.23.2 Test-retest reliability

As surveys were administered to pupils on two occasions (in session 1 and then, three weeks later, in session 2) I conduct test-retest analysis to check whether the surveys consistently reproduce the same results for pupils. Using data for all pupils, I measure the extent to which the session 1 and session 2 survey outcomes correlate. The results are give in Table 9.11 below and show that the survey results from the two sessions correlate reasonably well with Pearson's R of between approximately 0.7-0.8.

Variable	Observations	Pearson's R	ICC
ISQ total	8,012	0.78	0.77
		[0.77-0.79]	[0.76-0.78]
University interest	8,023	0.82	0.82
		[0.81-0.83]	[0.81-0.83]
Apprenticeship interest	8,020	0.72	0.72
		[0.71-0.73]	[0.71-0.73]

Notes: Test-retest statistics with 95 per cent confidence intervals in parentheses.

Table 9.11: Test-retest reliability statistics

9.23.3 Validity

Criterion-related validity refers to the extent to which a measure is associated with a relevant behaviour or outcome (Creswell, 2014). To assess the validity of the ISQ, I can examine how relates to other actual measures of pupil engagement. Specifically, I explore how it correlates with the maths test score and lottery entry from my trial and also the effort and attendance data provided by schools. In Table 9.12 I show that there is a weak but significant correlation between the ISQ and other outcomes, suggesting that the survey does have validity.

	ISQ total	Maths test	Lottery	Effort	Attendance
ISQ total	1.00**	0.05**	0.14**	0.03**	0.11**
Maths test		1.00**	0.05**	0.01	0.02+
Lottery			1.00**	0.02	0.01+
Effort				1.00**	0.06**
Attendance					1.00**

Table 9.12: Correlation of outcome measures

To test this more thoroughly, I regress the maths test score, lottery entry, effort and attendance on ISQ scores and control for covariates. Table 9.13 shows that there is not a significant association between ISQ score and maths test score when we control for covariates. However, Tables 9.14-9.16 suggest that, in the case of lottery entry, effort and attendance, the ISQ score is significantly associated with positive pupil behaviours.

	Maths test			
	(1)	(2)	(3)	(4)
ISQ total	0.077^{+}	0.072	0.033	0.070
	(0.046)	(0.045)	(0.045)	(0.048)
Constant	5.146**	5.605**	3.502**	3.972**
	(0.265)	(0.272)	(0.330)	(0.347)
Observations	10,542	10,454	8,487	8,487
Maths control	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Other controls" are gender, ethnicity, FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12) and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 9.13: Survey validity check — maths test score as a function of ISQ

	Lottery			
	(1)	(2)	(3)	(4)
ISQ total	0.444**	0.428**	0.432**	0.466**
	(0.036)	(0.036)	(0.040)	(0.040)
Constant	−1.910**	−1.860**	−2.070**	−2.059**
	(0.204)	(0.219)	(0.232)	(0.229)
Observations	10,495	10,409	8,430	8,430
Maths control	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Other controls" are gender, ethnicity, FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12) and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.14: Survey validity check — lottery as a function of ISQ

	Effort			
	(1)	(2)	(3)	(4)
ISQ total	0.197*	0.184+	0.220*	0.125
	(0.098)	(0.096)	(0.111)	(0.102)
Constant	1.120**	1.120**	1.516**	1.511**
	(0.340)	(0.383)	(0.467)	(0.465)
Observations	7,999	7,948	6,613	6,613
Maths control	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Other controls" are gender, ethnicity, FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12) and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 9.15: Survey validity check — effort as a function of ISQ

	Attendance			
	(1)	(2)	(3)	(4)
ISQ total	1.098**	1.048**	0.864**	0.849**
	(0.110)	(0.110)	(0.112)	(0.113)
Constant	91.240**	92.581**	92.208**	92.453**
	(0.577)	(0.620)	(0.625)	(0.627)
Observations	9,706	9,617	7,670	7,670
Maths control	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. "Other controls" are gender, ethnicity, FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12) and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 9.16: Survey validity check — attendance as a function of ISQ

9.24 Estimating the ICC

Outcome measure	**Class**	**School (Arms 1-2)**	**School (arms 3-4)**	**School (arm 5)**
		WWCB		
ISQ total	0.09	0.03	0.03	0.03
	[0.05-0.13]	[0.01-0.09]	[0.00-0.09]	[0.01-0.09]
University interest	0.05	0.03	0.06	0.01
	[0.02-0.09]	[0.01-0.10]	[0.02-0.14]	[0.00-0.05]
Apprenticeship interest	0.02	0.00	0.01	0.00
	[-0.02-0.05]	[-0.01-0.03]	[-0.00-0.06]	[0.01-0.03]
Lottery	0.04	0.00	-0.01	0.00
	[0.00-0.08]	[-0.01-0.05]	[-0.02-0.02]	[-0.01-0.02]
		All pupils		
ISQ total	0.11	0.03	0.03	0.03
	[0.09-0.12]	[0.01-0.06]	[0.01-0.07]	[0.02-0.07]
University interest	0.06	0.03	0.03	0.03
	[0.05-0.07]	[0.02-0.07]	[0.02-0.07]	[0.02-0.07]
Apprenticeship interest	0.04	0.01	0.02	0.03
	[0.03-0.05]	[0.00-0.03]	[0.00-0.04]	[0.00-0.01]
Lottery	0.04	0.01	0.02	0.01
	[0.04-0.06]	[0.00-0.02]	[0.00-0.04]	[0.00-0.02]

Notes: ICC estimates for outcomes with 95 per cent confidence intervals in parentheses. Estimates are given assuming the class is the cluster and then assuming the school is the cluster. For the purpose of the latter, the sample is split into three: treatment arms 1 and 2 (exposed to the university role model), arms 3 and 3 (exposed to the apprenticeship role model) and arm 5 (the control arm)

Table 9.17: ICC estimates using the full RCT data

9.25 Primary analysis — WWCBs — replicated with session 2 data

The following tables replicate the primary analysis using ISQ scores collected during the second session, three weeks after the intervention was delivered.

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
Any role model	0.001	0.018	0.004	0.004	0.050	0.157*
	(0.045)	(0.040)	(0.044)	(0.044)	(0.046)	(0.071)
Similarity prime	0.032	0.025	0.047	0.049	0.025	0.029
	(0.048)	(0.042)	(0.046)	(0.046)	(0.042)	(0.042)
Proportion WWCB		−0.022	−0.018	−0.019	0.016	
		(0.026)	(0.028)	(0.028)	(0.035)	
High WWCB						0.136*
						(0.066)
Any role model x Proportion WWCB					−0.062	
					(0.040)	
Any role model x High WWCB						−0.193*
						(0.078)
Constant	3.414**	3.590**	3.619**	3.664**	3.572**	3.473**
	(0.082)	(0.083)	(0.080)	(0.089)	(0.084)	(0.100)
Observations	1,805	1,793	1,482	1,482	1,793	1,793

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5-9 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 9.18: Primary analysis — ISQ score (session 2) — WWCBs — any role model versus control

	ISQ score			
	(1)	(2)	(3)	(4)
University role model	0.042	0.047	0.005	0.007
	(0.066)	(0.060)	(0.068)	(0.069)
Similarity prime	0.003	0.012	0.019	0.022
	(0.064)	(0.058)	(0.062)	(0.063)
University role model x Similarity prime	0.069	0.038	0.069	0.065
	(0.090)	(0.081)	(0.089)	(0.089)
Constant	3.428**	3.627**	3.648**	3.683**
	(0.103)	(0.108)	(0.124)	(0.130)
Observations	1,147	1,142	933	933

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 9.19: Primary analysis — ISQ score (session 2) — WWCBs — comparison of treatment arms

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
University role model	0.013	0.032	0.001	0.003	0.056	0.165^{*}
	(0.058)	(0.051)	(0.058)	(0.057)	(0.055)	(0.083)
Similarity prime	0.064	0.036	0.057	0.055	0.036	0.034
	(0.068)	(0.059)	(0.065)	(0.065)	(0.059)	(0.058)
Proportion WWCB		0.006	0.019	0.017	0.028	
		(0.029)	(0.031)	(0.031)	(0.037)	
High WWCB						0.116^{+}
						(0.068)
University role model x Proportion WWCB					−0.044	
					(0.044)	
University role model x High WWCB						-0.182^{*}
						(0.088)
Constant	3.372^{**}	3.565^{**}	3.602^{**}	3.687^{**}	3.556^{**}	3.476^{**}
	(0.085)	(0.113)	(0.095)	(0.106)	(0.111)	(0.126)
Observations	1,229	1,220	998	998	1,220	1,220

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). Models 5 and 6 include interactions with the proportion of the class meeting the WWCB criteria ("Proportion WWCB", continuous) and a marker for whether a class contains a higher than average number of WWCBs ("High WWCB", binary). All models control for a school dummy variable.

Table 9.20: Primary analysis — ISQ score (session 2) — WWCBs — university role model versus control

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
Apprenticeship role model	−0.011	0.004	0.005	0.003	0.056	0.155^{+}
	(0.057)	(0.050)	(0.055)	(0.055)	(0.058)	(0.086)
Similarity prime	−0.007	−0.004	0.016	0.019	−0.001	0.011
	(0.065)	(0.058)	(0.062)	(0.062)	(0.058)	(0.057)
Proportion WWCB		-0.052^{+}	−0.042	−0.043	−0.009	
		(0.031)	(0.033)	(0.033)	(0.036)	
High WWCB						0.130^{+}
						(0.067)
Apprenticeship role model x Proportion WWCB					-0.111^{*}	
					(0.050)	
Apprenticeship role model x High WWCB						-0.215^{*}
						(0.092)
Constant	3.429^{**}	3.582^{**}	3.598^{**}	3.621^{**}	3.566^{**}	3.454^{**}
	(0.112)	(0.094)	(0.091)	(0.105)	(0.101)	(0.111)
Observations	1,234	1,224	1,033	1,033	1,224	1,224

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5 and 6 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 9.21: Primary analysis — ISQ score (session 2) — WWCBs — apprenticeship role model versus control

9.26 Secondary analysis — WWCBs

Over the following pages, I first present my secondary analysis of WWCB survey outcomes collected during the first session, immediately after the intervention was delivered. I then my secondary analysis of WWCB survey outcomes collected during the second session, three weeks after the intervention was delivered. Finally, I present my secondary analysis of WWCB effort and attendance outcomes. I analyse the full data set as an intention to treat analysis (labelled "ITT") and a restricted dataset which only contains rows where a survey was also received as average treatment effect analysis (labelled "ATE").

	University interest		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.082	0.068	0.037	0.016	0.019	−0.071	0.240*	0.251*
	(0.069)	(0.078)	(0.064)	(0.071)	(0.149)	(0.158)	(0.113)	(0.125)
Similarity prime	−0.077	−0.077	0.083	0.083	−0.091	−0.090	−0.083	−0.083
	(0.073)	(0.073)	(0.063)	(0.063)	(0.156)	(0.156)	(0.115)	(0.115)
Proportion WWCB	0.017	−0.001	0.029	0.002	−0.129	−0.247*	−0.059	−0.044
	(0.041)	(0.055)	(0.040)	(0.056)	(0.089)	(0.119)	(0.069)	(0.099)
Any role model		0.029		0.045		0.194		−0.025
x Proportion WWCB		(0.065)		(0.059)		(0.135)		(0.111)
Constant	3.624**	3.630**	3.913**	3.923**	5.311**	5.353**	−0.658**	−0.663**
	(0.153)	(0.152)	(0.137)	(0.139)	(0.315)	(0.313)	(0.248)	(0.248)
Observations	2,210	2,210	2,199	2,199	2,118	2,118	2,133	2,133

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.22: Secondary analysis — session 1 survey outcomes — WWCBs — any role model versus control

	University interest	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	0.061	−0.025	−0.238	−0.010
	(0.100)	(0.096)	(0.216)	(0.161)
Similarity prime	−0.119	0.050	−0.191	−0.154
	(0.103)	(0.092)	(0.216)	(0.166)
University role model x Similarity prime	0.086	0.060	0.177	0.108
	(0.142)	(0.125)	(0.303)	(0.228)
Constant	3.870**	3.940**	5.507**	−0.586*
	(0.190)	(0.177)	(0.459)	(0.293)
Observations	1,419	1,412	1,352	1,361

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.Lottery entry is binary and analysed using binary logistic regression.

Table 9.23: Secondary analysis — session 1 survey outcomes — WWCBs — comparison of treatment arms

	University interest		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.142^{+}	0.096	0.025	−0.011	−0.076	−0.152	0.236^{+}	0.231
	(0.084)	(0.094)	(0.078)	(0.084)	(0.174)	(0.184)	(0.132)	(0.145)
Similarity prime	−0.061	−0.066	0.107	0.103	−0.014	−0.021	−0.032	−0.032
	(0.100)	(0.099)	(0.085)	(0.085)	(0.218)	(0.218)	(0.157)	(0.157)
Proportion WWCB	0.048	−0.0004	0.043	0.005	−0.160	-0.243^{*}	−0.054	−0.059
	(0.045)	(0.055)	(0.048)	(0.059)	(0.102)	(0.123)	(0.081)	(0.106)
University role model		0.101		0.080		0.167		0.010
x Proportion WWCB		(0.071)		(0.067)		(0.146)		(0.125)
Constant	3.644^{**}	3.653^{**}	3.793^{**}	3.800^{**}	5.377^{**}	5.392^{**}	−0.350	−0.349
	(0.161)	(0.158)	(0.153)	(0.156)	(0.352)	(0.349)	(0.278)	(0.278)
Observations	1,522	1,522	1,512	1,512	1,472	1,472	1,466	1,466

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.24: Secondary analysis — session 1 survey outcomes — WWCBs — university role model versus control

	University interest		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	0.025	0.061	0.048	0.053	0.129	0.010	0.204	0.254
	(0.091)	(0.099)	(0.079)	(0.091)	(0.190)	(0.206)	(0.148)	(0.163)
Similarity prime	−0.121	−0.127	0.048	0.048	−0.203	−0.181	−0.105	−0.113
	(0.107)	(0.107)	(0.092)	(0.093)	(0.219)	(0.219)	(0.164)	(0.165)
Proportion WWCB	−0.025	0.005	−0.003	0.001	−0.141	-0.240^{+}	−0.039	0.005
	(0.052)	(0.059)	(0.049)	(0.059)	(0.110)	(0.126)	(0.086)	(0.103)
Apprenticeship role model		−0.082		−0.009		0.262		−0.112
x Proportion WWCB		(0.088)		(0.071)		(0.172)		(0.137)
Constant	3.410^{**}	3.395^{**}	4.055^{**}	4.054^{**}	5.269^{**}	5.320^{**}	-0.829^{*}	-0.851^{**}
	(0.194)	(0.199)	(0.155)	(0.156)	(0.346)	(0.338)	(0.325)	(0.326)
Observations	1,479	1,479	1,474	1,474	1,412	1,412	1,439	1,439

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.25: Secondary analysis — session 1 survey outcomes — WWCBs — apprenticeship role model versus control

	University interest		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)
Any role model	0.047	0.067	0.078	0.059	0.237^{+}	0.322^{*}
	(0.079)	(0.092)	(0.075)	(0.081)	(0.137)	(0.153)
Similarity prime	0.026	0.026	−0.095	−0.095	−0.046	−0.045
	(0.082)	(0.082)	(0.073)	(0.073)	(0.144)	(0.144)
Proportion WWCB	0.021	0.045	−0.006	−0.029	−0.059	0.046
	(0.052)	(0.072)	(0.050)	(0.068)	(0.089)	(0.129)
Any role model x Proportion WWCB		−0.037		0.036		−0.158
		(0.077)		(0.074)		(0.135)
Constant	3.844^{**}	3.833^{**}	3.896^{**}	3.906^{**}	-0.702^{*}	-0.747^{*}
	(0.174)	(0.175)	(0.218)	(0.223)	(0.312)	(0.317)
Observations	1,823	1,823	1,818	1,818	1,461	1,461

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.26: Secondary analysis — session 2 survey outcomes — WWCBs — any role model versus control

	University interest	*Apprenticeship interest*	*Lottery*
	(1)	(2)	(3)
University role model	0.025	−0.045	0.107
	(0.114)	(0.114)	(0.190)
Similarity prime	−0.073	−0.150	−0.134
	(0.115)	(0.110)	(0.198)
University role model x Similarity prime	0.198	0.119	0.171
	(0.154)	(0.150)	(0.286)
Constant	4.118**	3.975**	−0.445
	(0.206)	(0.299)	(0.405)
Observations	1,163	1,160	948

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.Lottery entry is binary and analysed using binary logistic regression.

Table 9.27: Secondary analysis — session 2 survey outcomes — WWCBs — comparison of treatment arms

	University interest		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)
University role model	0.062	0.067	0.095	0.060	0.294^{+}	0.331^{+}
	(0.095)	(0.109)	(0.088)	(0.097)	(0.166)	(0.181)
Similarity prime	0.116	0.116	−0.085	−0.085	0.041	0.040
	(0.110)	(0.110)	(0.098)	(0.097)	(0.212)	(0.211)
Proportion WWCB	0.056	0.060	0.001	−0.032	−0.055	−0.019
	(0.060)	(0.077)	(0.056)	(0.069)	(0.105)	(0.136)
University role model x Proportion WWCB		−0.008		0.064		−0.065
		(0.084)		(0.081)		(0.149)
Constant	3.859^{**}	3.857^{**}	3.637^{**}	3.651^{**}	−0.411	−0.426
	(0.229)	(0.229)	(0.257)	(0.267)	(0.317)	(0.319)
Observations	1,244	1,244	1,243	1,243	994	994

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.28: Secondary analysis — session 2 survey outcomes — WWCBs — university role model versus control

	University interest		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)
Apprenticeship role model	0.042	0.088	0.069	0.059	0.128	0.279
	(0.101)	(0.116)	(0.096)	(0.104)	(0.165)	(0.186)
Similarity prime	−0.068	−0.066	−0.118	−0.119	−0.081	−0.070
	(0.118)	(0.117)	(0.109)	(0.109)	(0.190)	(0.189)
Proportion WWCB	0.013	0.051	−0.040	−0.049	−0.041	0.089
	(0.067)	(0.076)	(0.060)	(0.071)	(0.110)	(0.134)
Apprenticeship role model x Proportion WWCB		−0.098		0.022		−0.316*
		(0.098)		(0.088)		(0.160)
Constant	3.631**	3.617**	4.163**	4.166**	−1.010**	−1.049**
	(0.182)	(0.182)	(0.189)	(0.188)	(0.383)	(0.398)
Observations	1,239	1,239	1,233	1,233	980	980

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.29: Secondary analysis — session 2 survey outcomes — WWCBs — apprenticeship role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Any role model	0.004	−0.009	−0.011	−0.002	−0.012	0.097	0.410	0.446
	0.069	0.080	0.067	0.080	0.522	0.527	0.436	0.454
Similarity prime	0.066	0.067	0.092	0.092	−0.023	−0.024	−0.457	−0.458
	0.075	0.075	0.075	0.075	0.506	0.506	0.437	0.437
Proportion WWCB	−0.008	−0.022	−0.014	−0.002	−0.770*	−0.651	−0.577*	−0.537
	0.043	0.062	0.043	0.060	0.339	0.422	0.284	0.426
Any role model		0.024		−0.018		−0.199		−0.067
x Proportion WWCB		0.066		0.066		0.472		0.425
Constant	−0.142	−0.134	−0.134	−0.140	95.602**	95.527**	95.154**	95.136**
	0.143	0.148	0.138	0.143	0.879	0.876	0.938	0.946
Observations	1,381	1,381	1,245	1,245	2,272	2,272	2,013	2,013

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.30: Secondary analysis — effort and attendance — WWCBs — any role model versus control

	Effort		*Attendance*	
	ITT	ATE	ITT	ATE
	1	2	3	4
University role model	0.076	0.084	0.208	0.479
	0.084	0.086	0.804	0.593
Similarity prime	0.083	0.158	−0.509	−0.818
	0.106	0.102	0.733	0.643
University role model x Similarity prime	−0.031	−0.138	1.005	0.659
	0.144	0.143	1.071	0.884
Constant	−0.033	−0.131	95.652**	95.229**
	0.143	0.145	1.271	1.235
Observations	918	830	1,477	1,297

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.

Table 9.31: Secondary analysis — effort and attendance — WWCBs — comparison of treatment arms

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
University role model	0.043	0.025	0.037	0.046	0.125	0.322	0.685	0.797
	0.082	0.093	0.084	0.097	0.629	0.607	0.436	0.533
Similarity prime	0.058	0.059	0.018	0.018	0.370	0.395	−0.197	−0.183
	0.105	0.105	0.107	0.108	0.708	0.716	0.437	0.599
Proportion WWCB	−0.005	−0.021	−0.001	0.008	-1.015^{*}	-0.837^{+}	-0.660^{*}	−0.553
	0.052	0.066	0.052	0.065	0.401	0.451	0.284	0.444
University role model		0.033		−0.017		−0.374		−0.222
x Proportion WWCB		0.073		0.076		0.529		0.447
Constant	−0.293	−0.285	-0.307^{+}	-0.309^{+}	95.994^{**}	95.891^{**}	95.630^{**}	95.601^{**}
	0.188	0.190	0.184	0.186	0.955	0.945	0.938	0.982
Observations	922	922	824	824	1,566	1,566	1,387	1,387

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.32: Secondary analysis — effort and attendance — WWCBs — university role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Apprenticeship role model	−0.038	−0.054	−0.059	−0.063	−0.082	−0.043	0.116	0.132
	0.081	0.096	0.079	0.095	0.646	0.683	0.436	0.558
Similarity prime	0.073	0.076	0.179^{+}	0.179^{+}	−0.636	−0.643	-0.819^{+}	−0.822
	0.108	0.109	0.102	0.104	0.722	0.724	0.437	0.633
Proportion WWCB	0.011	−0.001	0.019	0.015	−0.621	−0.595	-0.549^{+}	−0.538
	0.055	0.065	0.053	0.063	0.379	0.439	0.284	0.443
Apprenticeship role model		0.032		0.008		−0.075		−0.029
x Proportion WWCB		0.083		0.080		0.581		0.523
Constant	−0.170	−0.158	−0.030	−0.028	94.606^{**}	94.583^{**}	94.466^{**}	94.460^{**}
	0.173	0.180	0.167	0.172	1.122	1.150	0.938	1.243
Observations	922	922	836	836	1,501	1,501	1,342	1,342

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.33: Secondary analysis — effort and attendance — WWCBs — apprenticeship role model versus control

9.27 Secondary analysis — WWCGs

Over the following pages, I first present my secondary analysis of WWCG survey outcomes collected during the first session, immediately after the intervention was delivered. I then my secondary analysis of WWCG survey outcomes collected during the second session, three weeks after the intervention was delivered. Finally, I present my secondary analysis of WWCG effort and attendance outcomes. I analyse the full data set as an intention to treat analysis (labelled "ITT") and a restricted dataset which only contains rows where a survey was also received as average treatment effect analysis (labelled "ATE").

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.028	0.019	−0.016	−0.041	0.010	0.018	0.031	−0.029	−0.165	−0.165
	(0.036)	(0.036)	(0.071)	(0.071)	(0.064)	(0.066)	(0.159)	(0.158)	(0.125)	(0.126)
Similarity prime	0.003	0.001	0.018	0.013	0.023	0.024	−0.037	−0.047	0.026	0.026
	(0.036)	(0.035)	(0.069)	(0.069)	(0.064)	(0.063)	(0.170)	(0.169)	(0.125)	(0.125)
Proportion WWCB	−0.021	−0.055^{+}	−0.001	−0.100	0.064^{+}	0.096^{+}	−0.011	−0.247^{+}	0.021	0.018
	(0.021)	(0.032)	(0.043)	(0.063)	(0.037)	(0.052)	(0.095)	(0.128)	(0.071)	(0.101)
Any role model x Proportion WWCB		0.050		0.142*		−0.046		0.342*		0.005
		(0.033)		(0.067)		(0.057)		(0.142)		(0.108)
Constant	3.664**	3.670**	4.076**	4.094**	3.789**	3.783**	5.188**	5.227**	−0.757**	−0.756**
	(0.069)	(0.069)	(0.145)	(0.145)	(0.128)	(0.127)	(0.398)	(0.381)	(0.238)	(0.238)
Observations	2,079	2,079	2,109	2,109	2,103	2,103	2,039	2,039	2,029	2,029

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.34: Secondary analysis — session 1 survey outcomes — WWCGs — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.071	−0.054	0.146	−0.525*	0.069
	(0.049)	(0.095)	(0.094)	(0.221)	(0.170)
Similarity prime	0.013	−0.002	0.143	−0.393^{+}	−0.019
	(0.049)	(0.097)	(0.095)	(0.215)	(0.184)
University role model x Similarity prime	−0.012	0.033	−0.226^{+}	0.581^{+}	0.106
	(0.069)	(0.139)	(0.128)	(0.311)	(0.246)
Constant	3.759**	4.011**	3.708**	5.385**	−1.139**
	(0.073)	(0.191)	(0.169)	(0.505)	(0.344)
Observations	1,354	1,370	1,368	1,313	1,309

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.Lottery entry is binary and analysed using binary logistic regression.

Table 9.35: Secondary analysis — session 1 survey outcomes — WWCGs — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.065	0.057	−0.044	−0.061	0.081	0.094	−0.218	−0.285	−0.122	−0.110
	(0.045)	(0.045)	(0.090)	(0.090)	(0.075)	(0.077)	(0.207)	(0.201)	(0.141)	(0.143)
Similarity prime	−0.011	−0.014	0.053	0.048	−0.097	−0.092	0.256	0.235	0.095	0.100
	(0.050)	(0.049)	(0.098)	(0.098)	(0.083)	(0.082)	(0.250)	(0.245)	(0.168)	(0.169)
Proportion WWCB	−0.027	−0.054	0.002	−0.052	0.062	0.104^{+}	−0.028	-0.251^{+}	−0.027	0.012
	(0.025)	(0.033)	(0.052)	(0.065)	(0.045)	(0.053)	(0.116)	(0.134)	(0.085)	(0.105)
University role model x Proportion WWCB		0.048		0.096		−0.074		0.401^{*}		−0.072
		(0.038)		(0.076)		(0.067)		(0.170)		(0.124)
Constant	3.596^{**}	3.596^{**}	4.114^{**}	4.115^{**}	3.784^{**}	3.784^{**}	5.315^{**}	5.310^{**}	-0.488^{+}	-0.490^{+}
	(0.081)	(0.080)	(0.188)	(0.188)	(0.154)	(0.150)	(0.500)	(0.476)	(0.255)	(0.254)
Observations	1,442	1,442	1,463	1,463	1,459	1,459	1,418	1,418	1,399	1,399

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.36: Secondary analysis — session 1 survey outcomes — WWCGs — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	−0.009	−0.017	0.019	−0.011	−0.056	−0.055	0.243	0.206	−0.183	−0.194
	(0.042)	(0.042)	(0.082)	(0.080)	(0.080)	(0.081)	(0.191)	(0.190)	(0.164)	(0.164)
Similarity prime	0.005	0.004	−0.016	−0.020	0.161^{+}	0.162^{+}	−0.296	−0.298	−0.065	−0.067
	(0.050)	(0.049)	(0.099)	(0.097)	(0.092)	(0.092)	(0.222)	(0.220)	(0.182)	(0.183)
Proportion WWCB	−0.034	-0.057^{+}	−0.025	-0.124^{+}	0.107^{*}	0.110^{*}	−0.085	−0.199	0.092	0.056
	(0.027)	(0.033)	(0.052)	(0.065)	(0.046)	(0.056)	(0.109)	(0.132)	(0.086)	(0.107)
Apprenticeship role model x Proportion WWCB		0.048		0.203^{**}		−0.008		0.234		0.075
		(0.038)		(0.077)		(0.065)		(0.162)		(0.122)
Constant	3.639^{**}	3.646^{**}	4.113^{**}	4.146^{**}	3.806^{**}	3.804^{**}	5.138^{**}	5.176^{**}	-0.900^{**}	-0.886^{**}
	(0.086)	(0.086)	(0.148)	(0.149)	(0.153)	(0.155)	(0.429)	(0.413)	(0.263)	(0.264)
Observations	1,362	1,362	1,385	1,385	1,379	1,379	1,347	1,347	1,350	1,350

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.37: Secondary analysis — session 1 survey outcomes — WWCGs — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	−0.020	−0.045	−0.088	−0.138^{+}	0.012	0.025	−0.138	−0.185
	(0.040)	(0.040)	(0.077)	(0.076)	(0.067)	(0.070)	(0.156)	(0.159)
Similarity prime	0.034	0.030	0.046	0.039	0.065	0.067	−0.132	−0.140
	(0.041)	(0.041)	(0.076)	(0.077)	(0.072)	(0.072)	(0.152)	(0.151)
Proportion WWCB	−0.007	−0.069^{+}	0.038	−0.084	0.036	0.067	−0.075	−0.185
	(0.025)	(0.038)	(0.051)	(0.077)	(0.038)	(0.049)	(0.088)	(0.137)
Any role model x Proportion WWCB		0.089*		0.173*		−0.044		0.157
		(0.039)		(0.077)		(0.057)		(0.145)
Constant	3.635**	3.654**	4.084**	4.119**	3.910**	3.901**	−0.812**	−0.786**
	(0.093)	(0.091)	(0.158)	(0.157)	(0.153)	(0.154)	(0.263)	(0.268)
Observations	1,706	1,706	1,728	1,728	1,721	1,721	1,418	1,418

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.38: Secondary analysis — session 2 survey outcomes — WWCGs — any role model versus control

	ISQ score	*University interest*	*Apprenticeship interest*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	0.043	-0.252^{*}	0.025	-0.329
	(0.059)	(0.104)	(0.111)	(0.214)
Similarity prime	0.023	-0.042	0.057	-0.282
	(0.061)	(0.120)	(0.114)	(0.227)
University role model x Similarity prime	0.043	0.155	0.022	0.278
	(0.083)	(0.150)	(0.143)	(0.301)
Constant	3.644^{**}	4.111^{**}	3.828^{**}	-0.857^{*}
	(0.114)	(0.190)	(0.184)	(0.373)
Observations	1,112	1,131	1,126	931

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.39: Secondary analysis — session 2 survey outcomes — WWCGs — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.004	−0.027	−0.205*	−0.251**	0.018	0.040	−0.268	−0.293
	(0.050)	(0.050)	(0.082)	(0.081)	(0.075)	(0.079)	(0.185)	(0.186)
Similarity prime	0.040	0.038	0.122	0.117	0.071	0.073	0.002	−0.002
	(0.054)	(0.054)	(0.086)	(0.086)	(0.089)	(0.089)	(0.208)	(0.207)
Proportion WWCB	−0.004	−0.064+	0.042	−0.050	0.014	0.058	−0.137	−0.185
	(0.029)	(0.039)	(0.057)	(0.078)	(0.040)	(0.051)	(0.106)	(0.137)
University role model x Proportion WWCB		0.104*		0.160*		−0.077		0.085
		(0.042)		(0.077)		(0.066)		(0.157)
Constant	3.716**	3.728**	4.105**	4.122**	3.873**	3.864**	−0.693*	−0.687*
	(0.121)	(0.115)	(0.206)	(0.204)	(0.186)	(0.183)	(0.323)	(0.326)
Observations	1,189	1,189	1,204	1,204	1,200	1,200	994	994

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.40: Secondary analysis — session 2 survey outcomes — WWCGs — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	−0.045	−0.060	0.030	−0.017	0.023	0.025	0.028	−0.040
	(0.049)	(0.049)	(0.104)	(0.102)	(0.095)	(0.098)	(0.200)	(0.204)
Similarity prime	0.016	0.010	−0.038	−0.054	0.067	0.068	−0.289	−0.316
	(0.061)	(0.061)	(0.119)	(0.118)	(0.108)	(0.108)	(0.228)	(0.224)
Proportion WWCB	−0.039	-0.071^{+}	−0.005	−0.101	0.082	0.087	−0.045	−0.177
	(0.031)	(0.040)	(0.069)	(0.084)	(0.050)	(0.056)	(0.106)	(0.138)
Apprenticeship role model x Proportion WWCB		0.066		0.196^{*}		−0.011		0.273^{+}
		(0.046)		(0.097)		(0.072)		(0.163)
Constant	3.498^{**}	3.508^{**}	4.079^{**}	4.108^{**}	4.014^{**}	4.012^{**}	-0.873^{**}	-0.847^{**}
	(0.067)	(0.066)	(0.171)	(0.170)	(0.187)	(0.187)	(0.293)	(0.302)
Observations	1,111	1,111	1,121	1,121	1,116	1,116	911	911

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.41: Secondary analysis — session 2 survey outcomes — WWCGs — apprenticeship role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Any role model	0.090	0.110	0.084	0.099	−0.552	−0.592	−0.566	−0.517
	(0.075)	(0.077)	(0.079)	(0.080)	(0.557)	(0.557)	(0.514)	(0.528)
Similarity prime	0.052	0.051	0.079	0.078	0.372	0.365	0.582	0.591
	(0.073)	(0.073)	(0.076)	(0.076)	(0.558)	(0.560)	(0.514)	(0.514)
Proportion WWCB	−0.030	0.033	−0.048	0.005	-0.796^{*}	-0.901^{+}	-0.475^{+}	−0.343
	(0.041)	(0.060)	(0.043)	(0.067)	(0.360)	(0.499)	(0.272)	(0.378)
Any role model x Proportion WWCB		−0.095		−0.077		0.157		−0.199
		(0.063)		(0.069)		(0.501)		(0.386)
Constant	0.407^{**}	0.385^{**}	0.405^{**}	0.393^{**}	95.707^{**}	95.747^{**}	96.882^{**}	96.850^{**}
	(0.115)	(0.116)	(0.124)	(0.124)	(1.044)	(1.029)	(1.053)	(1.054)
Observations	1,178	1,178	1,082	1,082	2,141	2,141	1,889	1,889

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.42: Secondary analysis — effort and attendance — WWCGs — any role model versus control

	Effort		*Attendance*	
	ITT	ATE	ITT	ATE
	1	2	3	4
University role model	−0.183	−0.158	−0.450	−0.043
	(0.096)	(0.086)	(0.809)	(0.742)
Similarity prime	−0.042	0.015	−0.972	−0.069
	(0.102)	(0.102)	(0.843)	(0.827)
University role model x Similarity prime	0.172	0.095	2.508*	1.147
	(0.135)	(0.129)	(1.163)	(1.055)
Constant	0.500**	0.486**	97.223**	97.690**
	(0.145)	(0.143)	(1.185)	(1.356)
Observations	786	720	1,403	1,220

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. The coefficients for the university role model in models 1 and 2 were originally labelled as +p (<0.1) but this marker has been stripped from the table to avoid overinterpreting a result in which I do not have full confidence — see further detail in Chapter 6.

Table 9.43: Secondary analysis — effort and attendance — WWCGs — comparison of treatment arms

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
University role model	−0.027	−0.013	−0.015	−0.003	−0.718	−0.667	−0.552	−0.421
	(0.088)	(0.090)	(0.078)	(0.079)	(0.730)	(0.711)	(0.514)	(0.683)
Similarity prime	0.159	0.158	0.147^{+}	0.147^{+}	1.545^{*}	1.564^{*}	1.039^{*}	1.094^{+}
	(0.100)	(0.100)	(0.085)	(0.085)	(0.759)	(0.773)	(0.514)	(0.656)
Proportion WWCB	−0.025	0.011	−0.040	−0.006	-1.202^{**}	-1.079^{*}	-0.650^{*}	−0.326
	(0.052)	(0.064)	(0.048)	(0.065)	(0.443)	(0.514)	(0.272)	(0.378)
University role model x Proportion WWCB		−0.072		−0.063		−0.230		−0.609
		(0.072)		(0.072)		(0.578)		(0.409)
Constant	0.513^{**}	0.506^{**}	0.520^{**}	0.519^{**}	95.543^{**}	95.514^{**}	96.805^{**}	96.796^{**}
	(0.131)	(0.130)	(0.128)	(0.128)	(1.305)	(1.294)	(1.053)	(1.296)
Observations	779	779	719	719	1,480	1,480	1,319	1,319

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.44: Secondary analysis — effort and attendance — WWCGs — university role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Apprenticeship role model	0.186	0.206	0.165	0.180	−0.329	−0.427	−0.586	−0.648
	(0.092)	(0.093)	(0.080)	(0.080)	(0.639)	(0.654)	(0.514)	(0.577)
Similarity prime	−0.025	−0.029	0.043	0.042	−0.886	−0.901	0.133	0.129
	(0.104)	(0.104)	(0.103)	(0.103)	(0.860)	(0.859)	(0.514)	(0.823)
Proportion WWCB	0.005	0.051	−0.012	0.024	−0.382	−0.587	0.045	−0.073
	(0.050)	(0.062)	(0.051)	(0.065)	(0.427)	(0.516)	(0.272)	(0.414)
Apprenticeship role model x Proportion WWCB		−0.098		−0.074		0.440		0.262
		(0.076)		(0.078)		(0.554)		(0.469)
Constant	0.356*	0.326*	0.354**	0.338*	94.405**	94.528**	95.916**	95.966**
	(0.139)	(0.143)	(0.132)	(0.133)	(1.289)	(1.278)	(1.053)	(1.216)
Observations	791	791	725	725	1,399	1,399	1,239	1,239

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. The coefficients for the apprenticeship role model in models 1-4 were originally labelled as *p (<0.05) but this marker has been stripped from the table to avoid overinterpreting a result in which I do not have full confidence — see further detail in Chapter 6.

Table 9.45: Secondary analysis — effort and attendance — WWCGs — apprenticeship role model versus control

9.28 Exploring the interaction of treatment and sex

In my primary and secondary analysis, I observe that the role model intervention appears to have an impact on ISQ scores and rates of lottery entry for WWCBs but not WWCGs. The analysis presented below checks whether there is a significant difference in how these groups respond.

	ISQ score				*Lottery*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.058	0.067^{*}	0.066^{+}	0.067^{+}	0.196^{+}	0.198^{+}	0.276^{*}	0.282^{*}
	(0.036)	(0.031)	(0.034)	(0.034)	(0.112)	(0.113)	(0.125)	(0.125)
Similarity prime	0.001	0.010	0.022	0.023	−0.013	−0.019	−0.106	−0.107
	(0.031)	(0.025)	(0.028)	(0.028)	(0.092)	(0.092)	(0.099)	(0.099)
Female	0.149^{**}	0.140^{**}	0.145^{**}	0.144^{**}	0.430^{**}	0.445^{**}	0.459^{**}	0.463^{**}
	(0.036)	(0.035)	(0.038)	(0.038)	(0.108)	(0.110)	(0.128)	(0.128)
Any role model x Female	−0.040	−0.045	−0.063	−0.064	-0.313^{*}	-0.326^{*}	-0.343^{*}	-0.352^{*}
	(0.043)	(0.042)	(0.046)	(0.046)	(0.133)	(0.133)	(0.154)	(0.154)
Constant	3.365^{**}	3.585^{**}	3.655^{**}	3.674^{**}	-0.742^{**}	-0.921^{**}	-0.860^{**}	-0.724^{**}
	(0.055)	(0.049)	(0.056)	(0.059)	(0.187)	(0.205)	(0.196)	(0.203)
Observations	4,261	4,232	3,451	3,451	4,162	4,135	3,367	3,367

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.46: Secondary analysis — session 1 ISQ scores and lottery entry — WWC interaction with gender — any role model versus control

	ISQ score				*Lottery*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.093^{*}	0.111^{**}	0.094^{*}	0.095^{*}	0.206	0.206	0.297^{*}	0.304^{*}
	(0.043)	(0.039)	(0.045)	(0.044)	(0.128)	(0.128)	(0.141)	(0.141)
Similarity prime	−0.013	−0.018	0.004	0.004	0.050	0.040	−0.068	−0.074
	(0.044)	(0.037)	(0.043)	(0.043)	(0.123)	(0.123)	(0.129)	(0.129)
Female	0.149^{**}	0.142^{**}	0.147^{**}	0.147^{**}	0.425^{**}	0.426^{**}	0.444^{**}	0.445^{**}
	(0.036)	(0.035)	(0.039)	(0.039)	(0.108)	(0.111)	(0.129)	(0.128)
University role model x Female	−0.042	−0.044	−0.041	−0.043	-0.302^{*}	-0.306^{*}	-0.364^{*}	-0.376^{*}
	(0.048)	(0.047)	(0.052)	(0.052)	(0.152)	(0.152)	(0.176)	(0.176)
Constant	3.319^{**}	3.564^{**}	3.654^{**}	3.677^{**}	-0.536^{**}	-0.619^{**}	-0.612^{**}	-0.458^{*}
	(0.054)	(0.055)	(0.067)	(0.070)	(0.197)	(0.226)	(0.204)	(0.211)
Observations	2,942	2,923	2,355	2,355	2,862	2,844	2,286	2,286

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.47: Secondary analysis — session 1 ISQ scores and lottery entry — WWC interaction with gender — university role model versus control

	ISQ score				*Lottery*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	0.024	0.024	0.041	0.042	0.177	0.182	0.227	0.235
	(0.044)	(0.036)	(0.039)	(0.039)	(0.144)	(0.144)	(0.159)	(0.159)
Similarity prime	0.006	0.029	0.031	0.032	−0.085	−0.079	−0.127	−0.129
	(0.042)	(0.032)	(0.035)	(0.035)	(0.132)	(0.134)	(0.148)	(0.148)
Female	0.151**	0.141**	0.145**	0.146**	0.433**	0.464**	0.461**	0.473**
	(0.036)	(0.035)	(0.039)	(0.039)	(0.108)	(0.112)	(0.129)	(0.129)
Apprenticeship role model x Female	−0.042	−0.049	−0.086	−0.086	−0.324*	−0.351*	−0.311+	−0.320+
	(0.051)	(0.050)	(0.054)	(0.054)	(0.156)	(0.157)	(0.181)	(0.181)
Constant	3.380**	3.585**	3.653**	3.682**	−0.905**	−1.103**	−1.027**	−0.891**
	(0.068)	(0.057)	(0.051)	(0.056)	(0.226)	(0.243)	(0.240)	(0.255)
Observations	2,820	2,799	2,307	2,307	2,789	2,769	2,282	2,282

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.48: Secondary analysis — session 1 ISQ scores and lottery entry — WWC interaction with gender — apprenticeship role model versus control

9.29 Robustness checks with imputed data

Over the following pages I present robustness checks of my primary and secondary analysis for session 1 and session 2 in turn. Note: the tables refer to ISQ scores derived via mean and multiple imputation (as described in Section 6.9).

	Mean imputation		*Multiple imputation*							
	ISQ total		*ISQ total*		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.073*	0.101**	0.070*	0.098**	0.082	0.068	0.037	0.016	0.240*	0.251*
	(0.033)	(0.037)	(0.033)	(0.036)	(0.069)	(0.078)	(0.064)	(0.071)	(0.113)	(0.125)
Similarity prime	0.003	0.003	0.009	0.009	−0.077	−0.077	0.083	0.083	−0.083	−0.083
	(0.034)	(0.034)	(0.035)	(0.035)	(0.073)	(0.073)	(0.063)	(0.063)	(0.115)	(0.115)
Proportion WWCB	−0.006	0.031	−0.011	−0.139**	0.017	−0.001	0.029	0.002	−0.059	−0.044
	(0.020)	(0.028)	(0.020)	(0.012)	(0.041)	(0.055)	(0.040)	(0.056)	(0.069)	(0.099)
Any role model x Proportion WWCB		−0.061+		−0.060+		0.029		0.045		−0.025
		(0.032)		(0.031)		(0.065)		(0.059)		(0.111)
Constant	3.618**	3.605**	3.636**	3.623**	3.624**	3.630**	3.913**	3.923**	−0.658**	−0.663**
	(0.073)	(0.073)	(0.060)	(0.060)	(0.153)	(0.152)	(0.137)	(0.139)	(0.248)	(0.248)
Observations	2,232	2,232	2,232	2,232	2,232	2,232	2,232	2,232	2,232	2,232

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. The analysis uses data derived via mean and multiple imputation as described in Section 6.9. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.49: Robustness check — session 1 — WWCBs — any role model versus control

	Mean imputation		Multiple imputation							
	ISQ total		*ISQ total*		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.121**	0.132**	0.121**	0.132**	0.142+	0.096	0.025	−0.011	0.236+	0.231
	(0.041)	(0.044)	(0.043)	(0.045)	(0.084)	(0.094)	(0.078)	(0.084)	(0.132)	(0.145)
Similarity prime	−0.028	−0.027	−0.028	−0.027	−0.061	−0.066	0.107	0.103	−0.032	−0.032
	(0.048)	(0.048)	(0.050)	(0.050)	(0.100)	(0.099)	(0.085)	(0.085)	(0.157)	(0.157)
Proportion WWCB	0.008	0.021	0.008	−0.145**	0.048	−0.0004	0.043	0.005	−0.054	−0.059
	(0.024)	(0.029)	(0.021)	(0.015)	(0.045)	(0.055)	(0.048)	(0.059)	(0.081)	(0.106)
University role model x Proportion WWCB		−0.026		−0.026		0.101		0.080		0.010
		(0.036)		(0.034)		(0.071)		(0.067)		(0.125)
Constant	3.642**	3.640**	3.642**	3.640**	3.644**	3.653**	3.793**	3.800**	−0.350	−0.349
	(0.085)	(0.085)	(0.070)	(0.070)	(0.161)	(0.158)	(0.153)	(0.156)	(0.278)	(0.278)
Observations	1,503	1,503	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. The analysis uses data derived via mean and multiple imputation as described in Section 6.9. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.50: Robustness check — session 1 — WWCBs — university role model versus control

	Mean imputation		*Multiple imputation*							
	ISQ total		*ISQ total*		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	0.024	0.077^{+}	0.024	0.077^{+}	0.025	0.061	0.048	0.053	0.204	0.254
	(0.042)	(0.046)	(0.039)	(0.044)	(0.091)	(0.099)	(0.079)	(0.091)	(0.148)	(0.163)
Similarity prime	0.035	0.026	0.035	0.026	−0.121	−0.127	0.048	0.048	−0.105	−0.113
	(0.050)	(0.050)	(0.046)	(0.046)	(0.107)	(0.107)	(0.092)	(0.093)	(0.164)	(0.165)
Proportion WWCB	−0.018	0.025	−0.018	−0.154**	−0.025	0.005	−0.003	0.001	−0.039	0.005
	(0.026)	(0.030)	(0.023)	(0.014)	(0.052)	(0.059)	(0.049)	(0.059)	(0.086)	(0.103)
Apprenticeship role model x Proportion WWCB		−0.116**		−0.116**		−0.082		−0.009		−0.112
		(0.040)		(0.037)		(0.088)		(0.071)		(0.137)
Constant	3.661**	3.638**	3.661**	3.638**	3.410**	3.395**	4.055**	4.054**	−0.829*	−0.851**
	(0.088)	(0.088)	(0.066)	(0.068)	(0.194)	(0.199)	(0.155)	(0.156)	(0.325)	(0.326)
Observations	1,457	1,457	1,491	1,491	1,491	1,491	1,491	1,491	1,491	1,491

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. The analysis uses data derived via mean and multiple imputation as described in Section 6.9. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.51: Robustness check — session 1 — WWCBs — apprenticeship role model versus control

	Mean imputation		*Multiple imputation*							
	ISQ total		*ISQ total*		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.030	0.062	0.018	0.050	0.047	0.067	0.078	0.059	0.237^{+}	0.322^{*}
	(0.039)	(0.044)	(0.040)	(0.046)	(0.079)	(0.092)	(0.075)	(0.081)	(0.137)	(0.153)
Similarity prime	0.015	0.016	0.025	0.025	0.026	0.026	−0.095	−0.095	−0.046	−0.045
	(0.041)	(0.041)	(0.042)	(0.042)	(0.082)	(0.082)	(0.073)	(0.073)	(0.144)	(0.144)
Proportion WWCB	−0.020	0.017	−0.022	-0.144^{**}	0.021	0.045	−0.006	−0.029	−0.059	0.046
	(0.025)	(0.034)	(0.026)	(0.015)	(0.052)	(0.072)	(0.050)	(0.068)	(0.089)	(0.129)
Any role model x Proportion WWCB		−0.060		−0.062		−0.037		0.036		−0.158
		(0.038)		(0.040)		(0.077)		(0.074)		(0.135)
Constant	3.587^{**}	3.570^{**}	3.590^{**}	3.572^{**}	3.844^{**}	3.833^{**}	3.896^{**}	3.906^{**}	-0.702^{*}	-0.747^{*}
	(0.090)	(0.091)	(0.083)	(0.084)	(0.174)	(0.175)	(0.218)	(0.223)	(0.312)	(0.317)
Observations	1,847	1,847	1,852	1,852	1,852	1,852	1,852	1,852	1,852	1,852

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. The analysis uses data derived via mean and multiple imputation as described in Section 6.9. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.52: Robustness check — session 2 — WWCBs — any role model versus control

	Mean imputation		Multiple imputation							
	ISQ total		*ISQ total*		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.032	0.056	0.032	0.056	0.062	0.067	0.095	0.060	0.294^{+}	0.331^{+}
	(0.048)	(0.053)	(0.051)	(0.055)	(0.095)	(0.109)	(0.088)	(0.097)	(0.166)	(0.181)
Similarity prime	0.036	0.036	0.036	0.036	0.116	0.116	−0.085	−0.085	0.041	0.040
	(0.057)	(0.057)	(0.059)	(0.059)	(0.110)	(0.110)	(0.098)	(0.097)	(0.212)	(0.211)
Proportion WWCB	0.006	0.028	0.006	−0.155**	0.056	0.060	0.001	−0.032	−0.055	−0.019
	(0.029)	(0.036)	(0.029)	(0.020)	(0.060)	(0.077)	(0.056)	(0.069)	(0.105)	(0.136)
Any role model x Proportion WWCB		−0.044		−0.044		−0.008		0.064		−0.065
		(0.043)		(0.044)		(0.084)		(0.081)		(0.149)
Constant	3.565**	3.556**	3.565**	3.556**	3.859**	3.857**	3.637**	3.651**	−0.411	−0.426
	(0.110)	(0.111)	(0.113)	(0.111)	(0.229)	(0.229)	(0.257)	(0.267)	(0.317)	(0.319)
Observations	1,220	1,220	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. The analysis uses data derived via mean and multiple imputation as described in Section 6.9. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.53: Robustness check — session 2 — WWCBs — university role model versus control

	Mean imputation		*Multiple imputation*							
	ISQ total		*ISQ total*		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	0.004	0.056	0.004	0.056	0.042	0.088	0.069	0.059	0.128	0.279
	(0.051)	(0.056)	(0.050)	(0.058)	(0.101)	(0.116)	(0.096)	(0.104)	(0.165)	(0.186)
Similarity prime	−0.004	−0.001	−0.004	−0.001	−0.068	−0.066	−0.118	−0.119	−0.081	−0.070
	(0.059)	(0.059)	(0.058)	(0.058)	(0.118)	(0.117)	(0.109)	(0.109)	(0.190)	(0.189)
Proportion WWCB	−0.052	−0.009	−0.052+	−0.127**	0.013	0.051	−0.040	−0.049	−0.041	0.089
	(0.033)	(0.037)	(0.031)	(0.018)	(0.067)	(0.076)	(0.060)	(0.071)	(0.110)	(0.134)
Any role model x Proportion WWCB		−0.111*		−0.111*		−0.098		0.022		−0.316*
		(0.048)		(0.050)		(0.098)		(0.088)		(0.160)
Constant	3.582**	3.566**	3.582**	3.566**	3.631**	3.617**	4.163**	4.166**	−1.010**	−1.049**
	(0.110)	(0.111)	(0.094)	(0.101)	(0.182)	(0.182)	(0.189)	(0.188)	(0.383)	(0.398)
Observations	1,224	1,224	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. The analysis uses data derived via mean and multiple imputation as described in Section 6.9. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.54: Robustness check — session 2 — WWCBs — apprenticeship role model versus control

9.30 Robustness checks — clustering errors at school-level

Over the following pages I present analysis to check the main findings of my full RCT by clustering the standard errors at the level of schools rather than classes. I first present robustness checks of the primary analysis, focused on ISQ scores for WWCBs, and then present a robustness checks of the finding relating to secondary outcomes for this group.

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
Any role model	0.067*	0.070*	0.072*	0.072*	0.098**	0.148**
	(0.032)	(0.028)	(0.034)	(0.034)	(0.030)	(0.043)
Similarity prime	−0.013	0.009	0.020	0.022	0.009	0.010
	(0.043)	(0.038)	(0.040)	(0.041)	(0.038)	(0.038)
Proportion WWCB		−0.011	−0.009	−0.009	0.025	
		(0.021)	(0.028)	(0.028)	(0.032)	
High WWCB						0.059
						(0.050)
Any role model x Proportion WWCB					−0.060*	
					(0.027)	
Any role model x High WWCB						−0.112*
						(0.050)
Constant	3.422**	3.636**	3.562**	3.571**	3.623**	3.590**
	(0.013)	(0.044)	(0.067)	(0.078)	(0.044)	(0.054)
Observations	2,195	2,181	1,785	1,785	2,181	2,181
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5-9 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 9.55: Robustness check — ISQ score (session 1) — WWCBs — any role model versus control (errors clustered at school-level

	ISQ score			
	(1)	(2)	(3)	(4)
University role model	0.079	0.097^{+}	0.064	0.065
	(0.051)	(0.050)	(0.053)	(0.052)
Similarity prime	0.008	0.035	0.038	0.041
	(0.059)	(0.053)	(0.055)	(0.053)
University role model x Similarity prime	−0.037	−0.056	−0.041	−0.042
	(0.089)	(0.076)	(0.077)	(0.076)
Constant	3.425^{**}	3.623^{**}	3.498^{**}	3.473^{**}
	(0.029)	(0.052)	(0.069)	(0.081)
Observations	1,407	1,402	1,146	1,146
Maths control	N	N	Maths unified	Maths high
Other controls	N	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). All models control for a school dummy variable.

Table 9.56: Robustness check — ISQ score (session 1) — WWCBs — compairons of treatment arms (errors clustered at school-level

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
University role model	0.110*	0.121**	0.109*	0.111*	0.132**	0.167*
	(0.046)	(0.042)	(0.050)	(0.051)	(0.045)	(0.073)
Similarity prime	−0.039	−0.028	−0.014	−0.013	−0.027	−0.027
	(0.065)	(0.053)	(0.057)	(0.058)	(0.054)	(0.053)
Proportion WWCB		0.008	0.018	0.019	0.021	
		(0.028)	(0.034)	(0.035)	(0.036)	
High WWCB						0.040
						(0.057)
University role model x Proportion WWCB					−0.026	
					(0.034)	
University role model x High WWCB						−0.068
						(0.070)
Constant	3.410**	3.642**	3.565**	3.602**	3.640**	3.622**
	(0.013)	(0.056)	(0.089)	(0.096)	(0.056)	(0.070)
Observations	1,515	1,503	1,216	1,216	1,503	1,503
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. This analysis compares pupils in the university role model condition to control. "Other controls" are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score ("maths unified") or a binary indicator of being in the top third of pupils on this measure ("maths high"). Models 5 and 6 include interactions with the proportion of the class meeting the WWCB criteria ("Proportion WWCB", continuous) and a marker for whether a class contains a higher than average number of WWCBs ("High WWCB", binary). All models control for a school dummy variable.

Table 9.57: Robustness check — ISQ score (session 1) — WWCBs — university role model versus control (errors clustered at school-level

	ISQ score					
	(1)	(2)	(3)	(4)	(5)	(6)
Apprenticeship role model	0.027	0.024	0.044	0.044	0.077*	0.146**
	(0.037)	(0.032)	(0.034)	(0.034)	(0.038)	(0.057)
Similarity prime	0.002	0.035	0.040	0.040	0.026	0.040
	(0.057)	(0.053)	(0.052)	(0.052)	(0.054)	(0.051)
Proportion WWCB		−0.018	−0.012	−0.012	0.025	
		(0.031)	(0.037)	(0.037)	(0.034)	
High WWCB						0.071
						(0.052)
Apprenticeship role model x Proportion WWCB					−0.116**	
					(0.037)	
Apprenticeship role model x High WWCB						−0.177**
						(0.066)
Constant	3.448**	3.661**	3.633**	3.642**	3.638**	3.599**
	(0.011)	(0.044)	(0.074)	(0.087)	(0.045)	(0.056)
Observations	1,468	1,457	1,208	1,208	1,457	1,457
Maths control	N	N	Maths unified	Maths high	N	N
Other controls	N	Y	Y	Y	Y	Y

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. “Other controls” are FSM eligibility (binary), SEN status (binary), month of birth and year group. Models 3 and 4 control for Key Stage 2 maths score coded as either a discrete score (“maths unified”) or a binary indicator of being in the top third of pupils on this measure (“maths high”). Models 5 and 6 include interactions with the proportion of the class meeting the WWCB criteria (“Proportion WWCB”, continuous) and a marker for whether a class contains a higher than average number of WWCBs (“High WWCB”, binary). All models control for a school dummy variable.

Table 9.58: Robustness check — ISQ score (session 1) — WWCBs — apprenticeship role model versus control(errors clustered at school-level

	University interest		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.082	0.068	0.037	0.016	0.019	−0.071	0.240*	0.251*
	(0.099)	(0.108)	(0.052)	(0.051)	(0.121)	(0.151)	(0.110)	(0.124)
Similarity prime	−0.077	−0.077	0.083	0.083	−0.091	−0.090	−0.083	−0.083
	(0.081)	(0.081)	(0.067)	(0.067)	(0.123)	(0.123)	(0.139)	(0.139)
Proportion WWCB	0.017	−0.001	0.029	0.002	−0.129	−0.247+	−0.059	−0.044
	(0.045)	(0.054)	(0.035)	(0.047)	(0.098)	(0.136)	(0.057)	(0.068)
Any role model x Proportion WWCB		0.029		0.045		0.194		−0.025
		(0.068)		(0.047)		(0.145)		(0.080)
Constant	3.624**	3.630**	3.913**	3.923**	5.311**	5.353**	−0.658**	−0.663**
	(0.116)	(0.118)	(0.066)	(0.066)	(0.197)	(0.208)	(0.124)	(0.130)
Observations	2,210	2,210	2,199	2,199	2,118	2,118	2,133	2,133

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.59: Robustness check — session 1 survey outcomes — WWCBs — any role model versus control (errors clustered at school-level

	University interest	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	0.061	−0.025	−0.238	−0.010
	(0.100)	(0.092)	(0.220)	(0.160)
Similarity prime	−0.119	0.050	−0.191	−0.154
	(0.128)	(0.111)	(0.226)	(0.207)
University role model x Similarity prime	0.086	0.060	0.177	0.108
	(0.157)	(0.123)	(0.291)	(0.233)
Constant	3.870**	3.940**	5.507**	−0.586**
	(0.128)	(0.095)	(0.324)	(0.182)
Observations	1,419	1,412	1,352	1,361

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.60: Robustness check — session 1 survey outcomes — WWCBs — comparison of treatment arms (errors clustered at school-level

	University interest		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.142	0.096	0.025	−0.011	−0.076	−0.152	0.236	0.231
	(0.107)	(0.128)	(0.063)	(0.064)	(0.150)	(0.182)	(0.145)	(0.154)
Similarity prime	−0.061	−0.066	0.107	0.103	−0.014	−0.021	−0.032	−0.032
	(0.105)	(0.105)	(0.069)	(0.069)	(0.154)	(0.150)	(0.147)	(0.146)
Proportion WWCB	0.048	−0.0004	0.043	0.005	-0.160^{+}	-0.243^{+}	−0.054	−0.059
	(0.047)	(0.055)	(0.047)	(0.053)	(0.088)	(0.127)	(0.065)	(0.081)
University role model x Proportion WWCB		0.101		0.080		0.167		0.010
		(0.081)		(0.050)		(0.161)		(0.106)
Constant	3.644^{**}	3.653^{**}	3.793^{**}	3.800^{**}	5.377^{**}	5.392^{**}	-0.350^{*}	-0.349^{*}
	(0.119)	(0.121)	(0.073)	(0.072)	(0.227)	(0.236)	(0.156)	(0.159)
Observations	1,522	1,522	1,512	1,512	1,472	1,472	1,466	1,466

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.61: Robustness check — session 1 survey outcomes — WWCBs — university role model versus control (errors clustered at school-level

	University interest		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	0.025	0.061	0.048	0.053	0.129	0.010	0.204^{+}	0.254*
	(0.114)	(0.116)	(0.077)	(0.087)	(0.182)	(0.227)	(0.120)	(0.129)
Similarity prime	−0.121	−0.127	0.048	0.048	−0.203	−0.181	−0.105	−0.113
	(0.121)	(0.122)	(0.121)	(0.122)	(0.236)	(0.246)	(0.204)	(0.202)
Proportion WWCB	−0.025	0.005	−0.003	0.001	−0.141	−0.240^{+}	−0.039	0.005
	(0.056)	(0.057)	(0.047)	(0.049)	(0.143)	(0.144)	(0.072)	(0.070)
Apprenticeship role model x Proportion WWCB		−0.082		−0.009		0.262		−0.112
		(0.067)		(0.068)		(0.203)		(0.091)
Constant	3.410**	3.395**	4.055**	4.054**	5.269**	5.320**	−0.829**	−0.851**
	(0.109)	(0.106)	(0.067)	(0.065)	(0.183)	(0.188)	(0.148)	(0.149)
Observations	1,479	1,479	1,474	1,474	1,412	1,412	1,439	1,439

Notes: +p <0.1; *p <0.05, **p <0.01, robust standard errors (clustered at school-level) in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.62: Robustness check — session 1 survey outcomes — WWCBs — apprenticeship role model versus control (errors clustered at school-level

9.31 Robustness checks using data for WWCBs present in both sessions

Over the following pages, I present analysis of primary and secondary outcomes, for both sessions 1 and 2, but restricted to WWCBs who were present in both the session 1 and session 2 data.

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.086*	0.082+	0.053	0.051	−0.0004	−0.030	0.067	0.042	0.163	0.287+
	(0.038)	(0.042)	(0.082)	(0.090)	(0.079)	(0.085)	(0.176)	(0.192)	(0.132)	(0.147)
Similarity prime	0.018	0.036	−0.018	−0.038	0.101	0.181*	−0.079	−0.109	−0.108	−0.276+
	(0.041)	(0.045)	(0.090)	(0.099)	(0.077)	(0.084)	(0.185)	(0.191)	(0.140)	(0.145)
Constant	3.641**	3.654**	3.733**	2.882**	3.875**	3.262**	5.397**	3.499**	−0.821**	−0.451
	(0.078)	(0.083)	(0.191)	(0.188)	(0.170)	(0.184)	(0.373)	(0.402)	(0.258)	(0.314)
Observations	1,523	1,253	1,549	1,271	1,542	1,264	1,483	1,218	1,499	1,228
Maths control	N	Y	N	Y	N	Y	N	Y	N	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.63: Robustness check — session 1 survey outcomes — WWCBs present in both s1 and s2 data — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.130**	0.085	−0.003	0.093	0.122
	(0.044)	(0.095)	(0.093)	(0.189)	(0.147)
Similarity prime	0.053	−0.096	0.115	0.095	−0.119
	(0.046)	(0.098)	(0.083)	(0.209)	(0.145)
University role model x Similarity prime	−0.044	0.168	−0.027	−0.317	0.135
	(0.071)	(0.152)	(0.134)	(0.310)	(0.238)
Constant	3.652**	3.745**	3.875**	5.410**	−0.754**
	(0.076)	(0.182)	(0.165)	(0.376)	(0.247)
Observations	1,523	1,549	1,542	1,483	1,499
Maths control	N	N	N	N	N

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. “Maths control” is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.64: Robustness check — session 1 survey outcomes — WWCBs present in both s1 and s2 data — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.132^{**}	0.107^{*}	0.090	0.097	0.009	0.006	0.128	0.034	0.170	0.317^{+}
	(0.046)	(0.049)	(0.099)	(0.109)	(0.095)	(0.099)	(0.201)	(0.230)	(0.151)	(0.166)
Similarity prime	0.009	0.029	0.084	0.038	0.066	0.144	−0.262	−0.185	0.027	−0.189
	(0.055)	(0.061)	(0.119)	(0.131)	(0.105)	(0.111)	(0.239)	(0.251)	(0.188)	(0.190)
Constant	3.671^{**}	3.594^{**}	3.804^{**}	2.915^{**}	3.681^{**}	3.208^{**}	5.469^{**}	4.026^{**}	-0.560^{*}	−0.040
	(0.092)	(0.097)	(0.213)	(0.218)	(0.186)	(0.223)	(0.387)	(0.443)	(0.265)	(0.320)
Observations	1,049	851	1,065	862	1,058	855	1,028	833	1,030	833
Maths control	N	Y	N	Y	N	Y	N	Y	N	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. “Maths control” is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.65: Robustness check — session 1 survey outcomes — WWCBs present in both s1 and s2 data — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	0.043	0.062	0.015	−0.036	−0.016	−0.094	−0.012	0.025	0.102	0.161
	(0.048)	(0.054)	(0.109)	(0.123)	(0.100)	(0.110)	(0.228)	(0.237)	(0.177)	(0.196)
Similarity prime	0.019	0.029	−0.117	−0.069	0.139	0.250*	0.129	−0.013	−0.184	−0.249
	(0.056)	(0.062)	(0.131)	(0.147)	(0.115)	(0.124)	(0.268)	(0.270)	(0.198)	(0.215)
Constant	3.648**	3.705**	3.571**	2.765**	4.097**	3.302**	5.517**	3.219**	−1.070**	−0.716+
	(0.087)	(0.093)	(0.223)	(0.205)	(0.186)	(0.224)	(0.447)	(0.480)	(0.333)	(0.385)
Observations	1,022	858	1,042	873	1,038	869	993	831	1,012	845
Maths control	N	Y	N	Y	N	Y	N	Y	N	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.66: Robustness check — session 1 survey outcomes — WWCBs present in both s1 and s2 data — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.043	0.032	0.067	0.080	0.095	0.056	0.268^{+}	0.374^{*}
	(0.042)	(0.047)	(0.084)	(0.092)	(0.080)	(0.083)	(0.146)	(0.168)
Similarity prime	−0.012	0.005	0.005	−0.049	−0.078	−0.038	0.001	−0.081
	(0.043)	(0.047)	(0.089)	(0.097)	(0.079)	(0.087)	(0.154)	(0.171)
Constant	3.595^{**}	3.683^{**}	3.819^{**}	3.157^{**}	3.892^{**}	3.305^{**}	-0.752^{*}	-0.702^{*}
	(0.092)	(0.082)	(0.176)	(0.186)	(0.230)	(0.164)	(0.318)	(0.355)
Observations	1,514	1,245	1,540	1,260	1,536	1,256	1,243	1,017
Maths control	N	Y	N	Y	N	Y	N	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.67: Robustness check — session 2 survey outcomes — WWCBs present in both s1 and s2 data — any role model versus control

	ISQ score	*University interest*	*Apprenticeship interest*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	0.062	0.070	−0.005	0.204
	(0.050)	(0.097)	(0.098)	(0.159)
Similarity prime	−0.030	−0.080	−0.075	0.049
	(0.048)	(0.092)	(0.093)	(0.173)
University role model x Similarity prime	0.053	0.207	0.101	0.078
	(0.077)	(0.148)	(0.145)	(0.276)
Constant	3.603^{**}	3.845^{**}	3.954^{**}	-0.648^{*}
	(0.093)	(0.168)	(0.226)	(0.299)
Observations	1,514	1,540	1,536	1,243
Maths control	N	N	N	N

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.68: Robustness check — session 2 survey outcomes — WWCBs present in both s1 and s2 data — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.057	0.021	0.083	0.079	0.077	0.073	0.299^{+}	0.339^{+}
	(0.052)	(0.059)	(0.100)	(0.107)	(0.096)	(0.100)	(0.171)	(0.201)
Similarity prime	0.017	0.037	0.135	0.087	−0.024	0.005	0.139	0.147
	(0.062)	(0.069)	(0.120)	(0.125)	(0.106)	(0.116)	(0.215)	(0.244)
Constant	3.578^{**}	3.640^{**}	3.900^{**}	3.283^{**}	3.647^{**}	3.241^{**}	−0.351	−0.408
	(0.118)	(0.099)	(0.225)	(0.211)	(0.273)	(0.183)	(0.330)	(0.368)
Observations	1,037	842	1,057	852	1,056	851	852	691
Maths control	N	Y	N	Y	N	Y	N	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.This analysis compares pupils in the university role model condition to control.All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.69: Robustness check — session 2 survey outcomes — WWCBs present in both s1 and s2 data — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	0.028	0.039	0.055	0.038	0.131	0.032	0.181	0.343
	(0.053)	(0.057)	(0.109)	(0.123)	(0.099)	(0.107)	(0.186)	(0.209)
Similarity prime	−0.055	−0.046	−0.124	−0.131	−0.156	−0.074	−0.067	−0.225
	(0.060)	(0.063)	(0.123)	(0.141)	(0.117)	(0.126)	(0.215)	(0.238)
Constant	3.574**	3.674**	3.603**	2.918**	4.173**	3.459**	−1.072**	−0.921*
	(0.104)	(0.095)	(0.186)	(0.213)	(0.190)	(0.198)	(0.381)	(0.429)
Observations	1,027	860	1,038	868	1,033	863	826	684
Maths control	N	Y	N	Y	N	Y	N	Y

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.70: Robustness check — session 2 survey outcomes — WWCBs present in both s1 and s2 data — apprenticeship role model versus control

9.32 Exploratory analysis — interaction with year group and attainment

Over the following pages, I present exploratory analysis of survey outcomes collected during the first session. I interact the treatment term with year group and my unified measure of attainment to examine whether treatment effects vary by these factors. I remove post-16 students from my sample for this exploratory analysis (they comprise only a very small portion of the overall sample, see a discussion in the body of this thesis). Throughout this analysis I control for prior maths attainment to improve the precision of my estimates (accepting that this reduces my sample somewhat). I present this analysis for WWCBs, WWCGs and all pupils.

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.003	0.064^{+}	0.139	0.076	0.032	0.020	−0.131	−0.051	0.245	0.321^{+}
	(0.051)	(0.038)	(0.104)	(0.080)	(0.089)	(0.071)	(0.245)	(0.164)	(0.245)	(0.164)
Similarity prime	0.021	0.021	−0.096	−0.098	0.113	0.112	−0.100	−0.102	−0.231	−0.235
	(0.038)	(0.038)	(0.080)	(0.080)	(0.069)	(0.069)	(0.164)	(0.164)	(0.164)	(0.164)
Year group	-0.169^{**}	-0.136^{**}	-0.209^{**}	-0.235^{**}	0.044	0.042	0.304^{**}	0.355^{**}	−0.035	0.032
	(0.024)	(0.014)	(0.052)	(0.031)	(0.044)	(0.028)	(0.118)	(0.067)	(0.118)	(0.067)
Maths unified	0.020	0.008	0.286^{**}	0.264^{**}	−0.034	−0.053	1.247^{**}	1.191^{**}	0.064	−0.076
	(0.021)	(0.027)	(0.045)	(0.073)	(0.039)	(0.060)	(0.072)	(0.112)	(0.072)	(0.112)
Any role model x Year	0.049^{+}		−0.041		−0.004		0.076		0.095	
	(0.029)		(0.064)		(0.055)		(0.142)		(0.142)	
Any role model x Maths unified		0.018		0.036		0.031		0.083		0.216
		(0.038)		(0.089)		(0.073)		(0.140)		(0.140)
Constant	3.606^{**}	3.564^{**}	3.110^{**}	3.153^{**}	3.303^{**}	3.310^{**}	3.471^{**}	3.416^{**}	−0.375	−0.435
	(0.088)	(0.082)	(0.177)	(0.164)	(0.145)	(0.149)	(0.399)	(0.389)	(0.399)	(0.389)
Observations	1,777	1,777	1,798	1,798	1,787	1,787	1,719	1,719	1,734	1,734

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.71: Exploratory analysis — session 1 survey outcomes — WWCBs — any role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.014	0.087^{+}	0.302*	0.124	0.066	0.013	−0.084	−0.178	0.218	0.297
	(0.066)	(0.050)	(0.124)	(0.098)	(0.101)	(0.083)	(0.291)	(0.199)	(0.291)	(0.199)
Similarity prime	−0.010	−0.009	−0.085	−0.092	0.129	0.125	0.003	−0.001	−0.235	−0.233
	(0.057)	(0.058)	(0.108)	(0.110)	(0.090)	(0.090)	(0.228)	(0.229)	(0.228)	(0.229)
Year group	−0.175**	−0.140**	−0.211**	−0.264**	0.037	0.032	0.323**	0.301**	−0.047	0.028
	(0.025)	(0.018)	(0.051)	(0.038)	(0.045)	(0.033)	(0.118)	(0.082)	(0.118)	(0.082)
Maths unified	0.031	0.003	0.316**	0.257**	0.011	−0.051	1.246**	1.191**	0.101	−0.077
	(0.023)	(0.027)	(0.056)	(0.075)	(0.044)	(0.061)	(0.088)	(0.114)	(0.088)	(0.114)
University role model x Year	0.065*		−0.111		−0.016		−0.047		0.133	
	(0.033)		(0.072)		(0.062)		(0.159)		(0.159)	
University role model x Maths unified		0.058		0.134		0.134^{+}		0.116		0.373*
		(0.045)		(0.104)		(0.076)		(0.169)		(0.169)
Constant	3.606**	3.569**	3.092**	3.171**	3.289**	3.308**	3.519**	3.560**	0.004	−0.050
	(0.095)	(0.093)	(0.192)	(0.183)	(0.175)	(0.177)	(0.428)	(0.430)	(0.428)	(0.430)
Observations	1,210	1,210	1,224	1,224	1,214	1,214	1,182	1,182	1,178	1,178

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.72: Exploratory analysis — session 1 survey outcomes — WWCBs — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	−0.005	0.050	−0.037	0.016	−0.053	0.005	−0.139	0.096	0.196	0.267
	(0.060)	(0.044)	(0.127)	(0.102)	(0.106)	(0.089)	(0.300)	(0.209)	(0.300)	(0.209)
Similarity prime	0.035	0.037	−0.115	−0.111	0.111	0.116	−0.245	−0.247	−0.158	−0.161
	(0.050)	(0.050)	(0.119)	(0.119)	(0.104)	(0.104)	(0.224)	(0.225)	(0.224)	(0.225)
Year group	−0.165**	−0.148**	−0.199**	−0.186**	0.043	0.056	0.296*	0.384**	−0.027	0.003
	(0.024)	(0.017)	(0.053)	(0.036)	(0.044)	(0.035)	(0.118)	(0.083)	(0.118)	(0.083)
Maths unified	−0.002	0.008	0.231**	0.258**	−0.093+	−0.060	1.225**	1.198**	−0.074	−0.098
	(0.025)	(0.027)	(0.053)	(0.073)	(0.051)	(0.061)	(0.085)	(0.113)	(0.085)	(0.113)
Apprenticeship role model x Year	0.036		0.029		0.029		0.180		0.059	
	(0.034)		(0.074)		(0.067)		(0.163)		(0.163)	
Apprenticeship role model x Maths unified		−0.025		−0.060		−0.074		0.047		0.049
		(0.049)		(0.102)		(0.092)		(0.159)		(0.159)
Constant	3.661**	3.631**	3.084**	3.055**	3.314**	3.283**	3.462**	3.323**	−0.503	−0.546
	(0.093)	(0.086)	(0.216)	(0.206)	(0.186)	(0.193)	(0.497)	(0.505)	(0.497)	(0.505)
Observations	1,205	1,205	1,223	1,223	1,218	1,218	1,161	1,161	1,187	1,187

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.73: Exploratory analysis — session 1 survey outcomes — WWCBs — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	−0.052	0.010	−0.093	−0.020	−0.143	−0.031	−0.049	−0.098	−0.361	−0.120
	(0.054)	(0.040)	(0.103)	(0.083)	(0.100)	(0.076)	(0.237)	(0.162)	(0.237)	(0.162)
Similarity prime	0.022	0.020	0.018	0.016	0.046	0.043	−0.005	−0.004	−0.025	−0.030
	(0.039)	(0.039)	(0.078)	(0.078)	(0.071)	(0.071)	(0.170)	(0.169)	(0.170)	(0.169)
Year group	−0.171**	−0.140**	−0.217**	−0.187**	−0.157**	−0.098**	0.401**	0.379**	−0.026	0.099
	(0.025)	(0.014)	(0.056)	(0.031)	(0.053)	(0.029)	(0.121)	(0.065)	(0.121)	(0.065)
Maths unified	0.002	0.015	0.271**	0.320**	−0.082*	−0.077	1.204**	1.182**	−0.058	−0.046
	(0.021)	(0.035)	(0.045)	(0.072)	(0.040)	(0.070)	(0.073)	(0.108)	(0.073)	(0.108)
Any role model x Year	0.045		0.044		0.087		−0.033		0.184	
	(0.030)		(0.065)		(0.062)		(0.145)		(0.145)	
Any role model x Maths unified		−0.020		−0.074		−0.006		0.034		−0.019
		(0.043)		(0.089)		(0.084)		(0.139)		(0.139)
Constant	3.926**	3.878**	3.723**	3.671**	3.671**	3.583**	3.132**	3.168**	−0.588	−0.778*
	(0.073)	(0.070)	(0.138)	(0.125)	(0.136)	(0.120)	(0.379)	(0.375)	(0.379)	(0.375)
Observations	1,679	1,679	1,704	1,704	1,698	1,698	1,654	1,654	1,637	1,637

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.74: Exploratory analysis — session 1 survey outcomes — WWCGs — any role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	−0.003	0.050	−0.133	−0.092	−0.018	0.071	−0.367	−0.390^{+}	−0.387	−0.140
	(0.071)	(0.051)	(0.130)	(0.103)	(0.125)	(0.092)	(0.300)	(0.211)	(0.300)	(0.211)
Similarity prime	0.027	0.024	0.072	0.070	−0.124	−0.128	0.304	0.307	0.062	0.054
	(0.056)	(0.056)	(0.106)	(0.106)	(0.096)	(0.097)	(0.254)	(0.252)	(0.254)	(0.252)
Year group	−0.169**	−0.152**	−0.226**	−0.208**	−0.158**	−0.118**	0.416**	0.414**	−0.044	0.061
	(0.025)	(0.018)	(0.054)	(0.037)	(0.053)	(0.034)	(0.118)	(0.083)	(0.118)	(0.083)
Maths unified	−0.009	0.016	0.312**	0.309**	−0.069	−0.090	1.251**	1.206**	−0.008	−0.047
	(0.026)	(0.035)	(0.055)	(0.073)	(0.048)	(0.071)	(0.086)	(0.110)	(0.086)	(0.110)
University role model x Year	0.033		0.033		0.076		−0.003		0.203	
	(0.034)		(0.071)		(0.068)		(0.167)		(0.167)	
University role model x Maths unified		−0.046		0.006		0.041		0.084		0.080
		(0.050)		(0.100)		(0.093)		(0.169)		(0.169)
Constant	3.905**	3.878**	3.733**	3.709**	3.650**	3.596**	2.867**	2.875**	−0.536	−0.681
	(0.081)	(0.079)	(0.154)	(0.145)	(0.162)	(0.151)	(0.434)	(0.437)	(0.434)	(0.437)
Observations	1,151	1,151	1,168	1,168	1,164	1,164	1,137	1,137	1,113	1,113

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.75: Exploratory analysis — session 1 survey outcomes — WWCGs — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	-0.107^{+}	-0.037	-0.054	0.048	-0.259^{*}	-0.110	0.282	0.149	-0.310	-0.092
	(0.056)	(0.046)	(0.122)	(0.097)	(0.114)	(0.091)	(0.291)	(0.199)	(0.291)	(0.199)
Similarity prime	0.001	-0.001	-0.028	-0.023	0.228^{*}	0.229^{*}	-0.284	-0.279	-0.113	-0.113
	(0.053)	(0.053)	(0.114)	(0.114)	(0.102)	(0.101)	(0.227)	(0.228)	(0.227)	(0.228)
Year group	-0.171^{**}	-0.141^{**}	-0.207^{**}	-0.180^{**}	-0.149^{**}	-0.097^{**}	0.423^{**}	0.368^{**}	-0.014	0.063
	(0.025)	(0.018)	(0.057)	(0.040)	(0.052)	(0.038)	(0.116)	(0.078)	(0.116)	(0.078)
Maths unified	0.024	0.012	0.247^{**}	0.324^{**}	-0.106^{*}	-0.064	1.161^{**}	1.180^{**}	-0.114	-0.062
	(0.025)	(0.035)	(0.056)	(0.073)	(0.051)	(0.071)	(0.090)	(0.112)	(0.090)	(0.112)
Apprenticeship role model x Year	0.058^{+}		0.051		0.099		-0.108		0.147	
	(0.033)		(0.075)		(0.070)		(0.158)		(0.158)	
Apprenticeship role model x Maths unified		0.022		-0.168		-0.093		-0.035		-0.117
		(0.051)		(0.111)		(0.100)		(0.169)		(0.169)
Constant	3.855^{**}	3.806^{**}	3.683^{**}	3.625^{**}	3.726^{**}	3.630^{**}	2.857^{**}	2.951^{**}	-0.829^{+}	-0.973^{*}
	(0.083)	(0.080)	(0.162)	(0.149)	(0.150)	(0.137)	(0.424)	(0.422)	(0.424)	(0.422)
Observations	1,113	1,113	1,134	1,134	1,128	1,128	1,103	1,103	1,106	1,106

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.76: Exploratory analysis — session 1 survey outcomes — WWCGs — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.027	0.060**	0.030	0.046	−0.087+	−0.024	−0.197	−0.122	0.067	0.132
	(0.030)	(0.022)	(0.048)	(0.040)	(0.048)	(0.038)	(0.167)	(0.112)	(0.167)	(0.112)
Similarity prime	−0.006	−0.005	−0.032	−0.031	0.069*	0.069*	−0.064	−0.063	−0.052	−0.052
	(0.020)	(0.020)	(0.036)	(0.036)	(0.035)	(0.035)	(0.111)	(0.111)	(0.111)	(0.111)
Year group	−0.142**	−0.129**	−0.146**	−0.154**	−0.127**	−0.094**	0.377**	0.411**	0.057	0.092*
	(0.013)	(0.007)	(0.025)	(0.014)	(0.024)	(0.014)	(0.082)	(0.044)	(0.082)	(0.044)
Maths unified	0.037**	0.051**	0.307**	0.361**	−0.096**	−0.101**	1.319**	1.330**	0.078*	0.070
	(0.010)	(0.015)	(0.021)	(0.036)	(0.018)	(0.031)	(0.037)	(0.060)	(0.037)	(0.060)
Any role model x Year	0.020		−0.010		0.049+		0.051		0.051	
	(0.016)		(0.030)		(0.029)		(0.097)		(0.097)	
Any role model x Maths unified		−0.021		−0.081+		0.006		−0.018		0.012
		(0.019)		(0.043)		(0.038)		(0.072)		(0.072)
Constant	3.811**	3.786**	3.835**	3.827**	3.724**	3.674**	3.285**	3.228**	−0.666+	−0.717*
	(0.049)	(0.047)	(0.092)	(0.087)	(0.094)	(0.089)	(0.355)	(0.351)	(0.355)	(0.351)
Observations	8,743	8,743	8,903	8,903	8,854	8,854	8,641	8,641	8,529	8,529

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.77: Exploratory analysis — session 1 survey outcomes — all pupils — any role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.073*	0.090**	0.075	0.018	−0.106+	−0.036	−0.142	−0.161	0.040	0.119
	(0.036)	(0.027)	(0.056)	(0.047)	(0.055)	(0.042)	(0.191)	(0.136)	(0.191)	(0.136)
Similarity prime	−0.011	−0.011	−0.025	−0.027	0.075	0.076+	−0.025	−0.026	−0.032	−0.030
	(0.030)	(0.030)	(0.049)	(0.049)	(0.046)	(0.046)	(0.157)	(0.157)	(0.157)	(0.157)
Year group	−0.141**	−0.137**	−0.149**	−0.177**	−0.132**	−0.101**	0.375**	0.371**	0.061	0.099+
	(0.013)	(0.009)	(0.025)	(0.017)	(0.024)	(0.017)	(0.081)	(0.054)	(0.081)	(0.054)
Maths unified	0.043**	0.052**	0.344**	0.364**	−0.098**	−0.111**	1.331**	1.320**	0.108*	0.083
	(0.011)	(0.015)	(0.025)	(0.036)	(0.022)	(0.031)	(0.045)	(0.060)	(0.045)	(0.060)
University role model x Year	0.008		−0.053		0.059+		−0.008		0.073	
	(0.018)		(0.034)		(0.034)		(0.108)		(0.108)	
University role model x Maths unified		−0.018		−0.038		0.024		0.021		0.048
		(0.022)		(0.048)		(0.042)		(0.083)		(0.083)
Constant	3.775**	3.767**	3.798**	3.833**	3.729**	3.688**	3.200**	3.209**	−0.576	−0.624+
	(0.060)	(0.059)	(0.104)	(0.102)	(0.110)	(0.107)	(0.381)	(0.379)	(0.381)	(0.379)
Observations	5,816	5,816	5,927	5,927	5,895	5,895	5,776	5,776	5,671	5,671

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.78: Exploratory analysis — session 1 survey outcomes — all pupils — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	−0.014	0.035	−0.006	0.075	−0.083	−0.020	−0.211	−0.069	0.082	0.127
	(0.035)	(0.027)	(0.059)	(0.048)	(0.057)	(0.048)	(0.204)	(0.139)	(0.204)	(0.139)
Similarity prime	−0.005	−0.005	−0.043	−0.040	0.063	0.063	−0.112	−0.110	−0.062	−0.062
	(0.027)	(0.027)	(0.050)	(0.050)	(0.051)	(0.051)	(0.154)	(0.155)	(0.154)	(0.155)
Year group	−0.144**	−0.128**	−0.144**	−0.130**	−0.125**	−0.102**	0.385**	0.430**	0.052	0.067
	(0.013)	(0.009)	(0.025)	(0.017)	(0.024)	(0.018)	(0.082)	(0.055)	(0.082)	(0.055)
Maths unified	0.039**	0.051**	0.293**	0.355**	−0.103**	−0.097**	1.307**	1.337**	0.060	0.069
	(0.012)	(0.015)	(0.026)	(0.036)	(0.024)	(0.032)	(0.044)	(0.060)	(0.044)	(0.060)
Apprenticeship role model x Year	0.030+		0.028		0.044		0.089		0.028	
	(0.018)		(0.034)		(0.034)		(0.112)		(0.112)	
Apprenticeship role model x Maths unified		−0.024		−0.125*		−0.012		−0.064		−0.019
		(0.023)		(0.051)		(0.045)		(0.083)		(0.083)
Constant	3.816**	3.785**	3.803**	3.758**	3.740**	3.698**	3.099**	3.008**	−0.896*	−0.925*
	(0.044)	(0.041)	(0.112)	(0.106)	(0.113)	(0.106)	(0.443)	(0.447)	(0.443)	(0.447)
Observations	5,892	5,892	6,002	6,002	5,971	5,971	5,824	5,824	5,799	5,799

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the “maths unified” measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Year is coded from 0-4 (for Years 8-11). Lottery entry is binary and analysed using binary logistic regression.

Table 9.79: Exploratory analysis — session 1 survey outcomes — all pupils — apprenticeship role model versus control

9.33 Exploratory analysis — effect on WWCB — by area

Over the following pages I present analysis of role model effects on WWCBs by project area.

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.111	−0.156	−0.047	−0.318	0.148
	(0.069)	(0.140)	(0.114)	(0.279)	(0.238)
Similarity prime	−0.031	0.113	−0.041	−0.195	−0.440*
	(0.067)	(0.137)	(0.112)	(0.317)	(0.220)
Constant	3.445**	3.679**	3.517**	5.316**	−0.415
	(0.106)	(0.217)	(0.186)	(0.409)	(0.321)
Observations	531	540	540	508	515

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.80: Exploratory analysis — session 1 survey outcomes — WWCB in EE — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.099	−0.032	−0.043	−0.252	−0.273
	(0.081)	(0.178)	(0.133)	(0.282)	(0.252)
Similarity prime	0.066	0.044	−0.070	−0.329	−0.336
	(0.069)	(0.129)	(0.136)	(0.345)	(0.238)
University role model x Similarity prime	−0.133	−0.006	0.029	0.041	0.028
	(0.121)	(0.249)	(0.204)	(0.581)	(0.419)
Constant	3.460**	3.642**	3.512**	5.290**	−0.309
	(0.104)	(0.218)	(0.185)	(0.412)	(0.314)
Observations	531	540	540	508	515

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.81: Exploratory analysis — session 1 survey outcomes — WWCB in EE — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.131	−0.082	−0.065	−0.339	−0.051
	(0.086)	(0.187)	(0.143)	(0.320)	(0.272)
Similarity prime	−0.067	0.025	−0.051	−0.321	−0.401
	(0.097)	(0.214)	(0.149)	(0.483)	(0.352)
Constant	3.484**	3.945**	3.658**	5.641**	0.148
	(0.117)	(0.264)	(0.231)	(0.476)	(0.365)
Observations	350	356	355	334	339

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.82: Exploratory analysis — session 1 survey outcomes — WWCB in EE — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.085	−0.245	−0.033	−0.256	0.453
	(0.083)	(0.151)	(0.133)	(0.350)	(0.299)
Similarity prime	0.018	0.230	−0.031	−0.134	−0.626*
	(0.087)	(0.159)	(0.163)	(0.432)	(0.303)
Constant	3.386**	3.406**	3.499**	5.227**	−0.407
	(0.118)	(0.235)	(0.216)	(0.445)	(0.369)
Observations	358	364	364	344	352

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.83: Exploratory analysis — session 1 survey outcomes — WWCB in EE — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.032	−0.098	0.294*	−0.024	−0.013
	(0.066)	(0.135)	(0.142)	(0.294)	(0.248)
Similarity prime	−0.020	0.055	0.003	−0.025	0.268
	(0.068)	(0.167)	(0.133)	(0.312)	(0.250)
Constant	3.745**	3.817**	3.408**	6.388**	−0.425
	(0.144)	(0.267)	(0.234)	(0.595)	(0.408)
Observations	512	515	513	510	502

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.84: Exploratory analysis — session 1 survey outcomes — WWCB in EM — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.201^{*}	−0.129	0.093	0.187	−0.379
	(0.093)	(0.160)	(0.173)	(0.345)	(0.284)
Similarity prime	−0.095	−0.240	0.034	−0.071	−0.007
	(0.074)	(0.197)	(0.144)	(0.349)	(0.225)
University role model x Similarity prime	0.039	0.513^{+}	0.168	−0.057	0.714^{+}
	(0.125)	(0.283)	(0.239)	(0.556)	(0.410)
Constant	3.691^{**}	3.729^{**}	3.584^{**}	6.309^{**}	−0.391
	(0.136)	(0.253)	(0.197)	(0.532)	(0.356)
Observations	512	515	513	510	502

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.85: Exploratory analysis — session 1 survey outcomes — WWCB in EM — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.155^{+}	−0.109	0.250	0.219	−0.381
	(0.086)	(0.159)	(0.188)	(0.361)	(0.318)
Similarity prime	−0.050	0.220	0.171	−0.237	0.780^{*}
	(0.094)	(0.199)	(0.194)	(0.438)	(0.356)
Constant	3.734^{**}	3.975^{**}	3.328^{**}	6.759^{**}	−0.206
	(0.163)	(0.325)	(0.295)	(0.809)	(0.543)
Observations	338	339	338	335	330

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.86: Exploratory analysis — session 1 survey outcomes — WWCB in EM — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	−0.064	0.006	0.319^{*}	−0.248	0.188
	(0.073)	(0.161)	(0.160)	(0.327)	(0.289)
Similarity prime	−0.057	−0.296	−0.183	0.150	−0.097
	(0.088)	(0.229)	(0.182)	(0.435)	(0.315)
Constant	3.858^{**}	3.494^{**}	3.511^{**}	6.346^{**}	−0.204
	(0.168)	(0.297)	(0.263)	(0.570)	(0.479)
Observations	343	344	342	345	336

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.87: Exploratory analysis — session 1 survey outcomes — WWCB in EM — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.030	0.229	−0.068	0.364	0.173
	(0.071)	(0.143)	(0.132)	(0.336)	(0.211)
Similarity prime	0.103	-0.242^{+}	0.212^{+}	−0.336	−0.086
	(0.070)	(0.143)	(0.129)	(0.312)	(0.226)
Constant	3.610^{**}	3.156^{**}	3.323^{**}	4.303^{**}	-0.763^{+}
	(0.104)	(0.213)	(0.230)	(0.480)	(0.392)
Observations	594	606	601	569	586

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.88: Exploratory analysis — session 1 survey outcomes — WWCB in S — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.047	0.206	0.183	−0.360	0.346
	(0.081)	(0.151)	(0.137)	(0.326)	(0.254)
Similarity prime	0.140^{+}	−0.058	0.286^{*}	−0.109	0.078
	(0.077)	(0.163)	(0.130)	(0.297)	(0.291)
University role model x Similarity prime	−0.065	−0.226	−0.311	0.151	−0.328
	(0.126)	(0.242)	(0.197)	(0.475)	(0.415)
Constant	3.612^{**}	3.193^{**}	3.262^{**}	4.545^{**}	-0.782^{*}
	(0.106)	(0.214)	(0.207)	(0.509)	(0.375)
Observations	594	606	601	569	586

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.89: Exploratory analysis — session 1 survey outcomes — WWCB in S — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.057	0.297^{+}	0.104	−0.089	0.369
	(0.088)	(0.152)	(0.137)	(0.326)	(0.251)
Similarity prime	0.061	-0.309^{+}	−0.028	0.036	−0.274
	(0.101)	(0.181)	(0.147)	(0.371)	(0.285)
Constant	3.654^{**}	3.089^{**}	3.227^{**}	4.751^{**}	−0.348
	(0.121)	(0.236)	(0.251)	(0.558)	(0.383)
Observations	413	422	418	404	408

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.90: Exploratory analysis — session 1 survey outcomes — WWCB in S — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.009	0.168	−0.273	0.896^{*}	−0.035
	(0.086)	(0.205)	(0.188)	(0.450)	(0.275)
Similarity prime	0.131	−0.185	0.482^{*}	-0.817^{+}	0.104
	(0.094)	(0.231)	(0.207)	(0.437)	(0.342)
Constant	3.666^{**}	3.017^{**}	3.309^{**}	4.169^{**}	-1.021^{*}
	(0.126)	(0.275)	(0.285)	(0.592)	(0.475)
Observations	388	398	396	366	389

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.91: Exploratory analysis — session 1 survey outcomes — WWCB in S — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.102^{+}	0.302^{*}	0.088	−0.190	0.478^{*}
	(0.058)	(0.124)	(0.125)	(0.281)	(0.230)
Similarity prime	−0.023	-0.259^{+}	0.074	0.350	0.006
	(0.069)	(0.140)	(0.136)	(0.301)	(0.230)
Constant	3.518^{**}	3.444^{**}	3.905^{**}	5.341^{**}	−0.435
	(0.092)	(0.184)	(0.184)	(0.398)	(0.411)
Observations	544	549	545	531	530

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.92: Exploratory analysis — session 1 survey outcomes — WWCB in WM-any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.113	0.359*	−0.164	−0.202	0.823**
	(0.072)	(0.157)	(0.158)	(0.310)	(0.231)
Similarity prime	0.079	−0.198	0.041	0.203	0.356
	(0.086)	(0.163)	(0.129)	(0.320)	(0.290)
University role model x Similarity prime	−0.142	−0.020	0.242	0.187	−0.619
	(0.127)	(0.246)	(0.219)	(0.502)	(0.393)
Constant	3.549**	3.531**	4.020**	5.280**	−0.368
	(0.093)	(0.191)	(0.173)	(0.398)	(0.374)
Observations	544	549	545	531	530

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.93: Exploratory analysis — session 1 survey outcomes — WWCB in WM-comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.135^{+}	0.397^{*}	−0.080	−0.178	0.825^{**}
	(0.075)	(0.171)	(0.156)	(0.318)	(0.237)
Similarity prime	−0.063	−0.207	0.257	0.335	−0.238
	(0.096)	(0.192)	(0.187)	(0.393)	(0.248)
Constant	3.497^{**}	3.532^{**}	3.876^{**}	5.018^{**}	−0.410
	(0.109)	(0.215)	(0.202)	(0.495)	(0.450)
Observations	402	405	401	399	389

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.94: Exploratory analysis — session 1 survey outcomes — WWCB in WM-university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.067	0.200	0.335^{**}	−0.123	0.041
	(0.073)	(0.140)	(0.122)	(0.412)	(0.317)
Similarity prime	0.059	-0.343^{+}	−0.201	0.233	0.401
	(0.099)	(0.186)	(0.150)	(0.454)	(0.385)
Constant	3.530^{**}	3.267^{**}	3.868^{**}	5.591^{**}	−0.523
	(0.102)	(0.215)	(0.186)	(0.438)	(0.440)
Observations	368	373	372	357	362

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.95: Exploratory analysis — session 1 survey outcomes — WWCB in WM-apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.113^{+}	−0.052	−0.159	−0.209	0.035
	(0.059)	(0.118)	(0.112)	(0.272)	(0.212)
Similarity prime	0.002	−0.095	0.075	−0.149	−0.106
	(0.037)	(0.080)	(0.064)	(0.162)	(0.116)
EM	0.124^{+}	0.064	−0.102	-0.665^{*}	−0.122
	(0.069)	(0.122)	(0.136)	(0.304)	(0.239)
S	0.025	−0.157	−0.048	-1.241^{**}	−0.102
	(0.067)	(0.125)	(0.126)	(0.330)	(0.212)
WM	0.172^{**}	0.048	0.105	-0.465^{+}	−0.358
	(0.059)	(0.119)	(0.117)	(0.258)	(0.222)
Any role model x EM	−0.061	0.073	0.391^{*}	0.360	0.212
	(0.088)	(0.169)	(0.161)	(0.378)	(0.292)
Any role model x S	−0.018	0.208	0.160	0.546	0.157
	(0.083)	(0.160)	(0.153)	(0.400)	(0.267)
Any role model x WM	−0.031	0.283^{+}	0.239	0.229	0.539^{+}
	(0.077)	(0.156)	(0.147)	(0.346)	(0.276)
Constant	3.547^{**}	3.492^{**}	3.615^{**}	5.784^{**}	-0.428^{*}
	(0.054)	(0.107)	(0.103)	(0.239)	(0.192)
Observations	2,181	2,210	2,199	2,118	2,133

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.96: Exploratory analysis — session 1 survey outcomes — WWCB by area — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.128^{+}	−0.058	−0.169	−0.334	−0.144
	(0.072)	(0.149)	(0.129)	(0.320)	(0.242)
Similarity prime	−0.036	−0.091	0.085	−0.070	−0.121
	(0.052)	(0.106)	(0.089)	(0.225)	(0.158)
EM	0.125^{+}	0.054	−0.100	−0.650*	−0.130
	(0.070)	(0.124)	(0.136)	(0.307)	(0.240)
S	0.032	−0.160	−0.042	−1.253**	−0.097
	(0.067)	(0.125)	(0.126)	(0.327)	(0.211)
WM	0.170**	0.041	0.110	−0.463^{+}	−0.359
	(0.059)	(0.120)	(0.117)	(0.260)	(0.222)
University role model x EM	0.063	0.175	0.430*	0.568	0.395
	(0.102)	(0.210)	(0.188)	(0.456)	(0.353)
University role model x S	−0.011	0.207	0.196	0.353	0.409
	(0.096)	(0.185)	(0.168)	(0.456)	(0.309)
University role model x WM	−0.021	0.411*	0.199	0.281	0.920**
	(0.091)	(0.189)	(0.170)	(0.414)	(0.308)
Constant	3.547**	3.551**	3.616**	5.970**	−0.303
	(0.058)	(0.115)	(0.106)	(0.253)	(0.199)
Observations	1,503	1,522	1,512	1,472	1,466

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.97: Exploratory analysis — session 1 survey outcomes — WWCB by area — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.106	−0.047	−0.144	−0.074	0.216
	(0.070)	(0.138)	(0.131)	(0.326)	(0.253)
Similarity prime	0.031	−0.128	0.054	−0.256	−0.120
	(0.050)	(0.114)	(0.093)	(0.225)	(0.166)
EM	0.131^{+}	0.070	−0.104	-0.678^{*}	−0.107
	(0.069)	(0.121)	(0.137)	(0.305)	(0.239)
S	0.032	−0.167	−0.059	-1.252^{**}	−0.101
	(0.066)	(0.127)	(0.127)	(0.333)	(0.212)
WM	0.180^{**}	0.054	0.104	-0.457^{+}	−0.351
	(0.059)	(0.120)	(0.117)	(0.259)	(0.221)
Apprenticeship role model x EM	-0.187^{+}	−0.008	0.350^{*}	0.161	0.033
	(0.096)	(0.197)	(0.177)	(0.434)	(0.319)
Apprenticeship role model x S	−0.026	0.215	0.110	0.811^{+}	−0.100
	(0.095)	(0.195)	(0.186)	(0.450)	(0.319)
Apprenticeship role model x WM	−0.036	0.136	0.281	0.157	0.119
	(0.094)	(0.182)	(0.173)	(0.419)	(0.334)
Constant	3.575^{**}	3.408^{**}	3.633^{**}	5.705^{**}	-0.428^{*}
	(0.058)	(0.116)	(0.109)	(0.252)	(0.203)
Observations	1,457	1,479	1,474	1,412	1,439

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.98: Exploratory analysis — session 1 survey outcomes — WWCB by area — apprenticeship role model versus control

9.34 Exploratory analysis — effect on WWCG — by area

Over the following pages I present analysis of role model effects on WWCGs by project area.

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.006	−0.013	0.001	−0.286	−0.478^{+}
	(0.073)	(0.156)	(0.113)	(0.284)	(0.268)
Similarity prime	−0.043	0.069	0.076	−0.018	0.266
	(0.065)	(0.140)	(0.125)	(0.342)	(0.247)
Constant	3.810**	3.711**	3.230**	5.125**	−0.157
	(0.090)	(0.221)	(0.145)	(0.316)	(0.362)
Observations	501	506	505	477	486

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.99: Exploratory analysis — session 1 survey outcomes — WWCG in EE — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.030	−0.067	0.201^{+}	-0.630^{+}	−0.294
	(0.081)	(0.173)	(0.119)	(0.377)	(0.274)
Similarity prime	0.007	0.026	0.104	−0.429	−0.199
	(0.067)	(0.159)	(0.125)	(0.312)	(0.265)
University role model x Similarity prime	−0.111	0.104	−0.142	0.834	0.596
	(0.117)	(0.261)	(0.217)	(0.598)	(0.448)
Constant	3.804^{**}	3.720^{**}	3.199^{**}	5.145^{**}	−0.243
	(0.090)	(0.220)	(0.143)	(0.329)	(0.349)
Observations	501	506	505	477	486

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.100: Exploratory analysis — session 1 survey outcomes — WWCG in EE — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.038	0.016	0.120	-0.645^{+}	-0.367
	(0.087)	(0.184)	(0.127)	(0.389)	(0.298)
Similarity prime	-0.113	0.134	-0.006	0.404	0.354
	(0.093)	(0.198)	(0.173)	(0.531)	(0.372)
Constant	3.920^{**}	3.968^{**}	3.156^{**}	5.446^{**}	0.106
	(0.101)	(0.251)	(0.162)	(0.367)	(0.431)
Observations	337	341	341	321	325

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.101: Exploratory analysis — session 1 survey outcomes — WWCG in EE — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	-0.023	0.028	-0.116	0.099	-0.512
	(0.088)	(0.178)	(0.149)	(0.323)	(0.331)
Similarity prime	0.029	-0.010	0.191	-0.493	0.139
	(0.087)	(0.183)	(0.171)	(0.401)	(0.328)
Constant	3.762^{**}	3.737^{**}	3.442^{**}	4.894^{**}	0.062
	(0.106)	(0.271)	(0.180)	(0.344)	(0.384)
Observations	327	330	329	317	322

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.102: Exploratory analysis — session 1 survey outcomes — WWCG in EE — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	−0.019	0.024	0.042	−0.218	−0.338
	(0.072)	(0.151)	(0.133)	(0.338)	(0.263)
Similarity prime	0.014	0.062	0.149	0.579^{+}	0.313
	(0.073)	(0.129)	(0.135)	(0.317)	(0.243)
Constant	3.672^{**}	3.879^{**}	3.757^{**}	5.155^{**}	−0.008
	(0.130)	(0.301)	(0.272)	(0.571)	(0.414)
Observations	489	490	491	480	471

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.103: Exploratory analysis — session 1 survey outcomes — WWCG in EM — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.073	−0.058	0.011	−0.353	−0.428
	(0.069)	(0.162)	(0.134)	(0.422)	(0.306)
Similarity prime	−0.0004	0.084	0.317*	0.255	−0.063
	(0.073)	(0.124)	(0.127)	(0.343)	(0.242)
University role model x Similarity prime	−0.038	0.022	−0.265	0.576	0.588
	(0.111)	(0.248)	(0.220)	(0.563)	(0.426)
Constant	3.647**	3.904**	3.796**	5.079**	−0.118
	(0.118)	(0.287)	(0.255)	(0.526)	(0.417)
Observations	489	490	491	480	471

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.104: Exploratory analysis — session 1 survey outcomes — WWCG in EM — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.057	−0.032	0.045	−0.383	−0.387
	(0.079)	(0.171)	(0.148)	(0.452)	(0.330)
Similarity prime	−0.047	0.130	0.011	0.819^{+}	0.510
	(0.093)	(0.205)	(0.174)	(0.468)	(0.360)
Constant	3.783^{**}	4.104^{**}	4.127^{**}	4.522^{**}	0.365
	(0.164)	(0.351)	(0.325)	(0.668)	(0.511)
Observations	336	337	337	327	321

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.105: Exploratory analysis — session 1 survey outcomes — WWCG in EM — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	−0.050	0.141	0.060	−0.190	−0.192
	(0.087)	(0.194)	(0.182)	(0.363)	(0.349)
Similarity prime	0.018	−0.065	0.255	0.469	0.099
	(0.094)	(0.172)	(0.190)	(0.408)	(0.352)
Constant	3.599^{**}	3.587^{**}	3.501^{**}	6.002^{**}	0.293
	(0.163)	(0.380)	(0.361)	(0.741)	(0.537)
Observations	315	318	319	314	309

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.106: Exploratory analysis — session 1 survey outcomes — WWCG in EM — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.084	0.016	−0.066	0.265	−0.124
	(0.063)	(0.124)	(0.126)	(0.295)	(0.218)
Similarity prime	0.100	−0.025	−0.007	-0.510^{+}	−0.007
	(0.069)	(0.129)	(0.123)	(0.302)	(0.227)
Constant	3.958^{**}	3.993^{**}	3.560^{**}	3.074^{**}	−0.489
	(0.089)	(0.178)	(0.179)	(0.381)	(0.317)
Observations	598	610	606	587	589

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.107: Exploratory analysis — session 1 survey outcomes — WWCG in S — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.139*	0.167	0.082	−0.279	0.112
	(0.070)	(0.126)	(0.171)	(0.331)	(0.226)
Similarity prime	0.035	−0.001	0.110	−0.312	−0.050
	(0.080)	(0.172)	(0.151)	(0.358)	(0.277)
University role model x Similarity prime	0.111	−0.125	−0.310	0.064	−0.105
	(0.116)	(0.232)	(0.235)	(0.537)	(0.397)
Constant	3.945**	3.961**	3.530**	3.210**	−0.557+
	(0.088)	(0.180)	(0.177)	(0.394)	(0.303)
Observations	598	610	606	587	589

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.108: Exploratory analysis — session 1 survey outcomes — WWCG in S — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.145*	0.140	0.045	−0.079	0.052
	(0.072)	(0.142)	(0.172)	(0.347)	(0.251)
Similarity prime	0.144+	−0.115	−0.222	−0.233	−0.161
	(0.084)	(0.158)	(0.170)	(0.403)	(0.293)
Constant	3.933**	4.098**	3.560**	2.995**	−0.498
	(0.104)	(0.199)	(0.217)	(0.401)	(0.362)
Observations	423	431	429	416	414

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.109: Exploratory analysis — session 1 survey outcomes — WWCG in S — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.015	−0.097	−0.166	0.576	−0.343
	(0.080)	(0.167)	(0.143)	(0.393)	(0.263)
Similarity prime	0.033	0.050	0.259	−0.690	0.173
	(0.100)	(0.211)	(0.172)	(0.445)	(0.327)
Constant	3.923**	3.850**	3.564**	3.027**	−0.733+
	(0.103)	(0.207)	(0.203)	(0.439)	(0.382)
Observations	391	398	394	383	389

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.110: Exploratory analysis — session 1 survey outcomes — WWCG in S — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.056	−0.123	0.107	0.068	0.236
	(0.074)	(0.144)	(0.135)	(0.326)	(0.260)
Similarity prime	−0.085	0.004	−0.137	0.013	−0.498
	(0.081)	(0.149)	(0.127)	(0.348)	(0.309)
Constant	3.529**	4.081**	3.637**	5.518**	−1.430**
	(0.104)	(0.187)	(0.185)	(0.552)	(0.325)
Observations	491	503	501	495	483

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.111: Exploratory analysis — session 1 survey outcomes — WWCG in WM-any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.028	-0.328^{+}	0.088	-0.064	0.259
	(0.102)	(0.194)	(0.139)	(0.402)	(0.263)
Similarity prime	-0.049	-0.016	-0.100	-0.097	-0.488
	(0.109)	(0.224)	(0.194)	(0.355)	(0.369)
University role model x Similarity prime	-0.025	0.115	-0.013	0.292	0.060
	(0.159)	(0.308)	(0.238)	(0.622)	(0.522)
Constant	3.556^{**}	4.107^{**}	3.680^{**}	5.585^{**}	-1.364^{**}
	(0.101)	(0.182)	(0.168)	(0.505)	(0.327)
Observations	491	503	501	495	483

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.112: Exploratory analysis — session 1 survey outcomes — WWCG in WM-comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.055	-0.332^{+}	0.098	-0.041	0.254
	(0.107)	(0.196)	(0.142)	(0.414)	(0.265)
Similarity prime	-0.095	0.100	-0.112	0.260	-0.340
	(0.117)	(0.192)	(0.133)	(0.500)	(0.360)
Constant	3.438^{**}	4.201^{**}	3.768^{**}	5.574^{**}	-1.093^{**}
	(0.110)	(0.238)	(0.214)	(0.691)	(0.320)
Observations	346	354	352	354	339

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.113: Exploratory analysis — session 1 survey outcomes — WWCG in WM-university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.076	0.073	0.097	0.087	0.204
	(0.089)	(0.145)	(0.191)	(0.388)	(0.373)
Similarity prime	-0.111	-0.067	-0.131	-0.114	-0.622
	(0.132)	(0.258)	(0.243)	(0.450)	(0.469)
Constant	3.486^{**}	3.907^{**}	3.634^{**}	5.352^{**}	-1.486^{**}
	(0.128)	(0.206)	(0.217)	(0.499)	(0.373)
Observations	329	339	337	333	330

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary),SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.114: Exploratory analysis — session 1 survey outcomes — WWCG in WM-apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	−0.040	0.027	0.053	−0.266	−0.325
	(0.063)	(0.141)	(0.101)	(0.252)	(0.243)
Similarity prime	0.009	0.017	0.001	−0.051	−0.026
	(0.036)	(0.070)	(0.065)	(0.166)	(0.126)
EM	0.100	0.303^{+}	0.088	−0.340	0.108
	(0.075)	(0.162)	(0.122)	(0.284)	(0.265)
S	−0.101	0.024	0.145	-0.926^{**}	−0.103
	(0.067)	(0.149)	(0.105)	(0.303)	(0.258)
WM	−0.024	0.370^{*}	0.208^{+}	−0.198	−0.026
	(0.076)	(0.160)	(0.123)	(0.252)	(0.257)
Any role model x EM	0.033	0.034	0.074	0.395	0.283
	(0.090)	(0.191)	(0.152)	(0.365)	(0.318)
Any role model x S	0.147^{+}	−0.053	−0.126	0.376	0.242
	(0.083)	(0.177)	(0.139)	(0.381)	(0.305)
Any role model x WM	0.044	−0.168	−0.036	0.390	0.309
	(0.091)	(0.190)	(0.155)	(0.356)	(0.321)
Constant	3.747^{**}	3.767^{**}	3.419^{**}	5.277^{**}	−0.360
	(0.057)	(0.133)	(0.086)	(0.196)	(0.221)
Observations	2,079	2,109	2,103	2,039	2,029

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.115: Exploratory analysis — session 1 survey outcomes — WWCG by area — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	−0.041	0.025	0.212^{+}	−0.544	−0.280
	(0.074)	(0.163)	(0.116)	(0.340)	(0.271)
Similarity prime	−0.008	0.037	−0.110	0.240	0.051
	(0.049)	(0.100)	(0.084)	(0.245)	(0.164)
EM	0.103	0.310^{+}	0.096	−0.343	0.109
	(0.075)	(0.162)	(0.120)	(0.285)	(0.265)
S	−0.102	0.018	0.152	-0.943^{**}	−0.116
	(0.067)	(0.148)	(0.106)	(0.305)	(0.256)
WM	−0.022	0.371^{*}	0.214^{+}	−0.205	−0.025
	(0.076)	(0.160)	(0.123)	(0.253)	(0.257)
University role model x EM	0.100	0.025	−0.065	0.537	0.200
	(0.101)	(0.225)	(0.177)	(0.452)	(0.362)
University role model x S	0.252^{**}	−0.016	−0.222	0.237	0.225
	(0.094)	(0.196)	(0.165)	(0.461)	(0.341)
University role model x WM	0.042	−0.311	−0.118	0.495	0.323
	(0.104)	(0.217)	(0.168)	(0.456)	(0.356)
Constant	3.744^{**}	3.827^{**}	3.480^{**}	5.327^{**}	-0.396^{+}
	(0.060)	(0.142)	(0.091)	(0.216)	(0.227)
Observations	1,442	1,463	1,459	1,418	1,399

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.116: Exploratory analysis — session 1 survey outcomes — WWCG by area — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	−0.030	0.033	−0.114	0.059	−0.363
	(0.071)	(0.161)	(0.129)	(0.291)	(0.284)
Similarity prime	0.015	0.006	0.128	−0.359	−0.113
	(0.052)	(0.100)	(0.099)	(0.223)	(0.190)
EM	0.099	0.309^{+}	0.085	−0.319	0.106
	(0.074)	(0.162)	(0.122)	(0.285)	(0.263)
S	−0.106	0.026	0.148	-0.931^{**}	−0.092
	(0.067)	(0.150)	(0.105)	(0.298)	(0.259)
WM	−0.024	0.373^{*}	0.208^{+}	−0.190	−0.025
	(0.076)	(0.160)	(0.122)	(0.252)	(0.257)
Apprenticeship role model x EM	−0.042	0.030	0.218	0.192	0.373
	(0.101)	(0.205)	(0.172)	(0.413)	(0.360)
Apprenticeship role model x S	0.020	−0.112	−0.018	0.477	0.255
	(0.096)	(0.206)	(0.169)	(0.424)	(0.350)
Apprenticeship role model x WM	0.041	−0.040	0.052	0.189	0.280
	(0.103)	(0.216)	(0.196)	(0.403)	(0.394)
Constant	3.734^{**}	3.730^{**}	3.404^{**}	5.106^{**}	−0.340
	(0.060)	(0.141)	(0.094)	(0.208)	(0.231)
Observations	1,362	1,385	1,379	1,347	1,350

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.117: Exploratory analysis — session 1 survey outcomes — WWCG by area — apprenticeship role model versus control

9.35 Exploratory analysis — effect on all pupils — by area

Over the following pages I present analysis of role model effects on all pupils by project area.

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.066	−0.044	0.092	−0.287	−0.154
	(0.046)	(0.076)	(0.065)	(0.189)	(0.143)
Similarity prime	−0.032	0.038	−0.076	−0.064	0.011
	(0.042)	(0.082)	(0.071)	(0.215)	(0.133)
Constant	3.527**	4.064**	3.457**	5.133**	−0.371*
	(0.064)	(0.115)	(0.106)	(0.238)	(0.181)
Observations	2,203	2,242	2,237	2,150	2,161

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. “Maths control” is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.118: Exploratory analysis — session 1 survey outcomes — all pupils EE — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.091^{+}	-0.100	0.116	-0.375	-0.268^{+}
	(0.048)	(0.090)	(0.075)	(0.255)	(0.160)
Similarity prime	0.024	-0.022	-0.023	-0.373^{+}	-0.168
	(0.042)	(0.082)	(0.064)	(0.198)	(0.150)
University role model x Similarity prime	-0.090	0.126	-0.069	0.521	0.340
	(0.073)	(0.156)	(0.130)	(0.396)	(0.242)
Constant	3.538^{**}	4.063^{**}	3.475^{**}	5.079^{**}	-0.386^{*}
	(0.065)	(0.111)	(0.100)	(0.233)	(0.180)
Observations	2,203	2,242	2,237	2,150	2,161

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.119: Exploratory analysis — session 1 survey outcomes — all pupils EE — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.110*	−0.093	0.129	−0.448+	−0.243
	(0.050)	(0.097)	(0.079)	(0.261)	(0.175)
Similarity prime	−0.073	0.108	−0.092	0.156	0.142
	(0.060)	(0.131)	(0.112)	(0.347)	(0.193)
Constant	3.567**	4.145**	3.547**	5.277**	−0.431+
	(0.068)	(0.150)	(0.134)	(0.297)	(0.232)
Observations	1,470	1,495	1,489	1,430	1,438

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.120: Exploratory analysis — session 1 survey outcomes — all pupils EE — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.025	−0.003	0.065	−0.114	−0.022
	(0.058)	(0.082)	(0.080)	(0.221)	(0.177)
Similarity prime	0.006	−0.021	−0.058	−0.275	−0.152
	(0.059)	(0.092)	(0.085)	(0.257)	(0.191)
Constant	3.501**	4.090**	3.478**	5.004**	−0.251
	(0.075)	(0.128)	(0.119)	(0.266)	(0.196)
Observations	1,487	1,510	1,506	1,459	1,468

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. "Maths control" is the maths unified marker. Lottery entry is binary and analysed using binary logistic regression.

Table 9.121: Exploratory analysis — session 1 survey outcomes — all pupils EE — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.065^{+}	-0.005	0.081	-0.289	-0.077
	(0.036)	(0.068)	(0.064)	(0.222)	(0.131)
Similarity prime	-0.080^{+}	-0.004	-0.032	0.342^{+}	0.077
	(0.041)	(0.070)	(0.054)	(0.206)	(0.123)
Constant	3.641^{**}	3.992^{**}	3.853^{**}	5.765^{**}	-0.146
	(0.065)	(0.105)	(0.100)	(0.329)	(0.194)
Observations	2,614	2,653	2,649	2,619	2,519

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.122: Exploratory analysis — session 1 survey outcomes — all pupils in EM — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.161**	0.086	0.053	0.043	−0.071
	(0.036)	(0.066)	(0.059)	(0.231)	(0.155)
Similarity prime	−0.034	0.007	0.072	0.081	−0.026
	(0.044)	(0.071)	(0.066)	(0.250)	(0.149)
University role model x Similarity prime	−0.106	−0.071	−0.148	0.191	0.158
	(0.069)	(0.119)	(0.102)	(0.364)	(0.229)
Constant	3.641**	3.965**	3.904**	5.534**	−0.188
	(0.054)	(0.096)	(0.083)	(0.314)	(0.178)
Observations	2,614	2,653	2,649	2,619	2,519

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.123: Exploratory analysis — session 1 survey outcomes — all pupils in EM — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.150**	0.078	0.076	−0.087	−0.087
	(0.039)	(0.075)	(0.070)	(0.256)	(0.164)
Similarity prime	−0.146**	−0.082	−0.083	0.266	0.112
	(0.052)	(0.101)	(0.075)	(0.278)	(0.176)
Constant	3.679**	3.994**	4.010**	5.678**	−0.028
	(0.069)	(0.128)	(0.103)	(0.370)	(0.236)
Observations	1,740	1,765	1,762	1,739	1,678

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.124: Exploratory analysis — session 1 survey outcomes — all pupils in EM — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	−0.011	−0.066	0.071	−0.511+	−0.070
	(0.047)	(0.089)	(0.082)	(0.265)	(0.157)
Similarity prime	−0.036	0.048	0.021	0.465	0.028
	(0.055)	(0.100)	(0.080)	(0.303)	(0.189)
Constant	3.611**	3.951**	3.864**	5.763**	−0.129
	(0.073)	(0.122)	(0.134)	(0.389)	(0.243)
Observations	1,719	1,745	1,741	1,728	1,668

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control.All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.125: Exploratory analysis — session 1 survey outcomes — all pupils in EM — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.051	0.047	-0.138^{**}	0.090	0.203^{+}
	(0.033)	(0.055)	(0.053)	(0.205)	(0.119)
Similarity prime	0.035	-0.107^{+}	0.130^{*}	-0.447^{*}	-0.046
	(0.032)	(0.057)	(0.053)	(0.186)	(0.104)
Constant	3.845^{**}	4.101^{**}	3.643^{**}	4.057^{**}	-0.656^{**}
	(0.053)	(0.104)	(0.116)	(0.354)	(0.197)
Observations	3,526	3,598	3,575	3,447	3,464

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.126: Exploratory analysis — session 1 survey outcomes — all pupils in S — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.045	−0.014	−0.108^{+}	−0.140	0.181
	(0.038)	(0.063)	(0.062)	(0.214)	(0.130)
Similarity prime	0.049	−0.073	0.050	−0.440*	0.095
	(0.034)	(0.068)	(0.064)	(0.201)	(0.119)
University role model x Similarity prime	−0.001	−0.012	0.078	0.148	−0.171
	(0.059)	(0.104)	(0.098)	(0.325)	(0.178)
Constant	3.857**	4.128**	3.606**	4.136**	−0.607**
	(0.050)	(0.103)	(0.112)	(0.367)	(0.185)
Observations	3,526	3,598	3,575	3,447	3,464

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.127: Exploratory analysis — session 1 survey outcomes — all pupils in S — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.061	0.018	−0.148*	−0.077	0.243+
	(0.040)	(0.064)	(0.066)	(0.232)	(0.133)
Similarity prime	0.045	−0.091	0.126+	−0.278	−0.082
	(0.048)	(0.077)	(0.072)	(0.255)	(0.126)
Constant	3.831**	4.128**	3.591**	4.205**	−0.561**
	(0.067)	(0.129)	(0.135)	(0.385)	(0.202)
Observations	2,372	2,424	2,409	2,339	2,334

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control.All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.128: Exploratory analysis — session 1 survey outcomes — all pupils in S — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.039	0.066	−0.129+	0.268	0.140
	(0.040)	(0.069)	(0.067)	(0.257)	(0.148)
Similarity prime	0.020	−0.123	0.133+	−0.602*	−0.002
	(0.042)	(0.084)	(0.077)	(0.260)	(0.150)
Constant	3.872**	4.042**	3.577**	3.852**	−0.828**
	(0.049)	(0.116)	(0.140)	(0.429)	(0.252)
Observations	2,325	2,374	2,361	2,270	2,301

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.129: Exploratory analysis — session 1 survey outcomes — all pupils in S — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.023	−0.043	0.092	−0.195	0.211
	(0.040)	(0.066)	(0.069)	(0.216)	(0.145)
Similarity prime	0.009	0.048	0.048	0.195	0.062
	(0.041)	(0.067)	(0.071)	(0.221)	(0.151)
Constant	3.721**	4.268**	3.713**	5.515**	−0.802**
	(0.059)	(0.123)	(0.118)	(0.372)	(0.231)
Observations	2,543	2,601	2,582	2,544	2,505

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.130: Exploratory analysis — session 1 survey outcomes — all pupils in WM — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.004	−0.082	0.003	−0.187	0.277*
	(0.048)	(0.077)	(0.076)	(0.252)	(0.136)
Similarity prime	0.030	0.054	0.060	0.095	0.171
	(0.044)	(0.094)	(0.097)	(0.253)	(0.150)
University role model x Similarity prime	−0.019	−0.008	0.066	0.100	−0.147
	(0.072)	(0.128)	(0.126)	(0.391)	(0.215)
Constant	3.733**	4.267**	3.769**	5.459**	−0.765**
	(0.058)	(0.121)	(0.118)	(0.345)	(0.235)
Observations	2,543	2,601	2,582	2,544	2,505

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.131: Exploratory analysis — session 1 survey outcomes — all pupils in WM — comparison of treatment arms

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.016	−0.077	0.049	−0.191	0.308*
	(0.051)	(0.082)	(0.074)	(0.265)	(0.130)
Similarity prime	0.011	0.042	0.112	0.181	0.023
	(0.059)	(0.082)	(0.079)	(0.299)	(0.159)
Constant	3.713**	4.354**	3.649**	5.287**	−0.823**
	(0.066)	(0.141)	(0.135)	(0.434)	(0.222)
Observations	1,771	1,811	1,801	1,792	1,745

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.132: Exploratory analysis — session 1 survey outcomes — all pupils in WM — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.035	−0.011	0.151^{+}	−0.206	0.089
	(0.051)	(0.081)	(0.091)	(0.276)	(0.241)
Similarity prime	0.004	0.041	−0.035	0.193	0.126
	(0.057)	(0.109)	(0.115)	(0.328)	(0.265)
Constant	3.694**	4.140**	3.845**	5.940**	−0.938**
	(0.072)	(0.150)	(0.140)	(0.405)	(0.282)
Observations	1,700	1,740	1,728	1,695	1,686

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.133: Exploratory analysis — session 1 survey outcomes — all pupils in WM — apprenticeship role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.066^{+}	−0.002	0.044	−0.230	−0.155
	(0.038)	(0.070)	(0.059)	(0.179)	(0.127)
Similarity prime	−0.015	−0.032	0.036	−0.095	−0.014
	(0.021)	(0.038)	(0.033)	(0.110)	(0.065)
EM	0.124^{**}	0.222^{**}	0.142^{*}	−0.126	0.036
	(0.040)	(0.071)	(0.069)	(0.212)	(0.142)
S	0.036	0.105	0.083	-0.533^{*}	−0.067
	(0.039)	(0.075)	(0.059)	(0.223)	(0.133)
WM	0.129^{**}	0.257^{**}	0.161^{*}	−0.081	−0.176
	(0.040)	(0.073)	(0.064)	(0.182)	(0.132)
Any role model x EM	−0.033	0.008	−0.012	0.201	0.202
	(0.051)	(0.092)	(0.082)	(0.262)	(0.171)
Any role model x S	0.013	0.022	-0.138^{+}	0.253	0.375^{*}
	(0.048)	(0.091)	(0.075)	(0.267)	(0.158)
Any role model x WM	−0.023	−0.008	0.022	0.116	0.431^{**}
	(0.050)	(0.093)	(0.084)	(0.243)	(0.165)
Constant	3.669^{**}	3.995^{**}	3.638^{**}	5.669^{**}	-0.424^{**}
	(0.033)	(0.066)	(0.057)	(0.155)	(0.116)
Observations	10,886	11,094	11,043	10,760	10,649

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.134: Exploratory analysis — session 1 survey outcomes — all pupils by area — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.104^{*}	-0.018	0.085	-0.274	-0.215
	(0.043)	(0.089)	(0.073)	(0.237)	(0.146)
Similarity prime	-0.038	-0.039	0.032	-0.020	0.015
	(0.029)	(0.056)	(0.045)	(0.156)	(0.081)
EM	0.130^{**}	0.222^{**}	0.141^{*}	-0.130	0.032
	(0.040)	(0.072)	(0.068)	(0.212)	(0.143)
S	0.039	0.105	0.084	-0.544^{*}	-0.070
	(0.039)	(0.075)	(0.059)	(0.225)	(0.133)
WM	0.130^{**}	0.252^{**}	0.161^{*}	-0.081	-0.169
	(0.040)	(0.073)	(0.064)	(0.184)	(0.132)
University role model x EM	0.0003	0.078	-0.068	0.351	0.258
	(0.059)	(0.118)	(0.098)	(0.311)	(0.195)
University role model x S	0.009	0.022	-0.189^{*}	0.130	0.423^{*}
	(0.055)	(0.109)	(0.092)	(0.320)	(0.177)
University role model x WM	-0.063	-0.034	-0.012	0.085	0.558^{**}
	(0.059)	(0.114)	(0.096)	(0.304)	(0.181)
Constant	3.666^{**}	4.063^{**}	3.672^{**}	5.831^{**}	-0.493^{**}
	(0.036)	(0.073)	(0.062)	(0.168)	(0.123)
Observations	7,353	7,495	7,461	7,300	7,195

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.135: Exploratory analysis — session 1 survey outcomes — all pupils by area — university role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.029	0.013	0.007	−0.176	−0.095
	(0.046)	(0.076)	(0.068)	(0.204)	(0.150)
Similarity prime	0.009	−0.031	0.044	−0.177	−0.044
	(0.028)	(0.051)	(0.050)	(0.154)	(0.101)
EM	0.121**	0.213**	0.147*	−0.141	0.039
	(0.040)	(0.071)	(0.069)	(0.210)	(0.142)
S	0.033	0.101	0.083	−0.548*	−0.063
	(0.039)	(0.075)	(0.059)	(0.226)	(0.133)
WM	0.130**	0.262**	0.163*	−0.072	−0.173
	(0.040)	(0.073)	(0.063)	(0.184)	(0.132)
Apprenticeship role model x EM	−0.071	−0.057	0.034	0.047	0.144
	(0.059)	(0.101)	(0.089)	(0.297)	(0.195)
Apprenticeship role model x S	0.012	0.020	−0.092	0.369	0.329+
	(0.055)	(0.099)	(0.085)	(0.294)	(0.184)
Apprenticeship role model x WM	0.017	0.020	0.049	0.121	0.292
	(0.058)	(0.103)	(0.104)	(0.281)	(0.205)
Constant	3.681**	3.967**	3.639**	5.503**	−0.417**
	(0.035)	(0.069)	(0.062)	(0.168)	(0.122)
Observations	7,231	7,369	7,336	7,152	7,123

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control.All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the proportion of the class meeting the WWCB criteria and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.136: Exploratory analysis — session 1 survey outcomes — all pupils by area — apprenticeship role model versus control

9.36 Perception of role model by area

	University role model		*Apprenticeship role model*	
	Similar	*Example*	*Similar*	*Example*
	(1)	(2)	(3)	(4)
EM	0.420*	0.730**	0.217	0.014
	(0.204)	(0.277)	(0.231)	(0.256)
S	−0.234	−0.138	−0.233	−0.473
	(0.192)	(0.237)	(0.209)	(0.292)
WM	0.751**	0.923**	0.360+	0.259
	(0.168)	(0.220)	(0.218)	(0.257)
Constant	3.028**	3.607**	3.266**	4.048**
	(0.211)	(0.255)	(0.264)	(0.321)
Observations	422	417	428	420

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, a standardised measure of the proportion of the class meeting the WWCB criteria and whether or not the individual was in the "similarity prime" arm.

Table 9.137: Exploratory analysis — perception of role model by region — WWCB

	University role model		*Apprenticeship role model*	
	Similar	*Example*	*Similar*	*Example*
	(1)	(2)	(3)	(4)
EM	0.320+	0.510*	−0.183	−0.231
	(0.191)	(0.217)	(0.172)	(0.251)
S	−0.092	−0.047	0.125	−0.189
	(0.189)	(0.180)	(0.164)	(0.191)
WM	0.114	0.521**	0.673**	0.782**
	(0.177)	(0.187)	(0.200)	(0.239)
Constant	3.097**	4.035**	2.670**	3.695**
	(0.240)	(0.216)	(0.223)	(0.237)
Observations	436	431	399	396

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, a standardised measure of the proportion of the class meeting the WWCB criteria and whether or not the individual was in the "similarity prime" arm.

Table 9.138: Exploratory analysis — perception of role model by region — WWCG

	University role model		*Apprenticeship role model*	
	Similar	*Example*	*Similar*	*Example*
	(1)	(2)	(3)	(4)
EM	0.337**	0.484**	0.158	0.091
	(0.124)	(0.140)	(0.114)	(0.150)
S	0.001	−0.049	0.099	0.043
	(0.114)	(0.118)	(0.099)	(0.122)
WM	0.432**	0.779**	0.352**	0.460**
	(0.109)	(0.119)	(0.112)	(0.136)
Constant	3.278**	3.986**	3.042**	3.870**
	(0.117)	(0.124)	(0.119)	(0.136)
Observations	2,242	2,226	2,273	2,255

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, a standardised measure of the proportion of the class meeting the WWCB criteria and whether or not the individual was in the "similarity prime" arm.

Table 9.139: Exploratory analysis — perception of role model by region — all pupils

9.36.1 Considering the role of distance

As there seem to be some differences in the effect of the role models by region, I turn to examine the role that distance might play in driving these differences. Due to the nature of school recruitment, the distance between schools and role models was not equal in each project area. Table 9.140 shows the mean distance between the participating schools and the role models (by type), This distance was calculated as the distance between the school postcode and the centre of the city/town each role model was based in (as stated in their video). In the East Midlands, South and West Midlands, the university role model and apprenticeship role model were based in the same location whereas in the East of England, they were from slightly different locations (but the distance only differed by two miles). Schools in East Midlands and the West Midlands were, on average, closer to the role model locations than schools in the South and East of England.

Area	University role model	Apprenticeship role model
EE	82	80
EM	26	26
S	73	73
WM	36	36

Notes: Mean distance of pupils to role model, defined as the distance from the school postcode to the centre of the city the role model was reported to be based in (in video). Distance measured in kilometres.

Table 9.140: Average distance of role model to school by region (in miles)

It is plausible that more local role models were perceived more positively by pupils. Therefore, in Tables 9.141-9.146 I present exploratory analysis which regresses the school-role model distance, and the survey scores which seek to measure perceived similarity ("Similar") and the extent to which pupils see the role model as setting an example they would look up to ("Example") on the ISQ score and lottery outcomes. I repeat this analysis for WWCB, WWCG and all pupils.

I first examine the relationship between school-role model distance and the ISQ score (column 1). I find a negative association between these variables which is not significant for WWCBs or WWCGs on their own, but it is for all pupils. When

I add my “Similar” and “Example” variables to the models, both are significantly and positively associated with the outcome, both individually (columns 2-3) and in combination (column 4).

When repeating this analysis for the lottery outcome I see a similar pattern. The role model perception measures are a significantly associated with lottery entry, although when adding these to the full model in column 4, both variables only remain significantly associated with the outcome in the case where we retain the full sample of pupils (possibly because of the larger sample size). However, the association between distance and lottery entry is not significant for either of the subgroups or the full sample.

	ISQ score			
	(1)	(2)	(3)	(4)
Similar		0.115**		0.060**
		(0.019)		(0.022)
Example			0.116**	0.085**
			(0.019)	(0.021)
Distance	0.0001	0.001	0.001	0.001
	(0.001)	(0.049)	(0.050)	(0.049)
University role model	0.056	0.073**	0.070	0.073
	(0.037)	(0.001)	(0.050)	(0.050)
Constant	3.522**	3.102**	3.039**	2.973**
	(0.075)	(0.155)	(0.123)	(0.125)
Observations	1,785	637	625	622

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, the proportion of the class meeting the WWCB criteria and region.

Table 9.141: Exploratory analysis — considering whether perception of role models mediates the effect of distance on ISQ score — WWCBs only

	ISQ score			
	(1)	(2)	(3)	(4)
Similar		0.116^{**}		0.051^{**}
		(0.016)		(0.019)
Example			0.131^{**}	0.103^{**}
			(0.017)	(0.020)
Distance	-0.001^{+}	-0.001	-0.001	-0.001
	(0.001)	(0.050)	(0.052)	(0.052)
University role model	0.071^{+}	0.074^{**}	0.051	0.059
	(0.036)	(0.001)	(0.050)	(0.050)
Constant	3.813^{**}	3.406^{**}	3.210^{**}	3.184^{**}
	(0.071)	(0.137)	(0.109)	(0.110)
Observations	1,689	597	595	592

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.

Table 9.142: Exploratory analysis — considering whether perception of role models mediates the effect of distance on ISQ score — WWCGs only

	ISQ score			
	(1)	(2)	(3)	(4)
Similar		0.111**		0.047**
		(0.008)		(0.010)
Example			0.124**	0.096**
			(0.008)	(0.009)
Distance	−0.001*	−0.0002	−0.0004	−0.0004
	(0.0004)	(0.024)	(0.024)	(0.024)
University role model	0.069**	0.063**	0.058*	0.060*
	(0.020)	(0.001)	(0.024)	(0.024)
Constant	3.730**	3.335**	3.217**	3.175**
	(0.043)	(0.073)	(0.056)	(0.057)
Observations	8,834	3,315	3,292	3,278

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.

Table 9.143: Exploratory analysis — considering whether perception of role models mediates the effect of distance on ISQ score — all pupils

	Lottery			
	(1)	(2)	(3)	(4)
Similar		0.115*		−0.039
		(0.057)		(0.077)
Example			0.205**	0.226**
			(0.055)	(0.074)
Distance	0.001	−0.001	−0.001	−0.001
	(0.002)	(0.168)	(0.171)	(0.171)
University role model	0.191+	0.092**	0.073	0.086
	(0.111)	(0.004)	(0.173)	(0.173)
Constant	−0.529*	−0.858+	−1.274**	−1.250**
	(0.247)	(0.495)	(0.369)	(0.374)
Observations	1,743	624	614	611

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.

Table 9.144: Exploratory analysis — considering whether perception of role models mediates the effect of distance on lottery entry — WWCBs only

	Lottery			
	(1)	(2)	(3)	(4)
Similar		0.230**		0.178*
		(0.067)		(0.083)
Example			0.176**	0.075
			(0.065)	(0.080)
Distance	0.001	0.003	0.003	0.003
	(0.002)	(0.187)	(0.193)	(0.194)
University role model	0.009	0.024**	0.016	0.023
	(0.120)	(0.004)	(0.187)	(0.189)
Constant	−0.602*	−1.155*	−1.164**	−1.290**
	(0.263)	(0.490)	(0.389)	(0.398)
Observations	1,647	587	585	582

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.

Table 9.145: Exploratory analysis — considering whether perception of role models mediates the effect of distance on lottery entry — WWCGs only

	Lottery			
	(1)	(2)	(3)	(4)
Similar		0.194^{**}		0.095^{**}
		(0.025)		(0.033)
Example			0.196^{**}	0.143^{**}
			(0.024)	(0.032)
Distance	0.001	0.002	0.002	0.002
	(0.001)	(0.087)	(0.086)	(0.087)
University role model	0.062	-0.015^{**}	-0.037	-0.025
	(0.057)	(0.002)	(0.088)	(0.088)
Constant	-0.625^{**}	-1.292^{**}	-1.423^{**}	-1.519^{**}
	(0.125)	(0.227)	(0.190)	(0.192)
Observations	8,621	3,249	3,228	3,214

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group, the proportion of the class meeting the WWCB criteria and a school dummy variable.

Table 9.146: Exploratory analysis — considering whether perception of role models mediates the effect of distance on lottery entry — all pupils

9.36.2 Mediation analysis

We can take the results presented in Tables 9.141-9.143 as a basis for conducting mediation analysis (Baron, 1986). Because the effect of distance drops out of significance when we include the role model perception variables, I conduct further analysis using the full sample of pupils to understand whether the effect of distance on ISQ scores is mediated by these variables. Because there is no direct relationship between distance and lottery entry I do not conduct further analysis on this outcome.

For the purpose of mediation analysis I used Structural Equation Modelling functionality in the Lavaan package in R statistical software (Rosseel, 2012). My analysis suggests that effect of distance on ISQ score was not mediated by the perceived similarity of the role model and the extent to which they were perceived as setting an example the pupil would like to live-up to. Even if this mediation effect had been significant, it is necessary to consider whether some other factor may be behind the patterns we observe. Confounding is a problem when there is some other variable that is related to two or more of the variables in the mediational model (Valente et al., 2017).

It is important to remember that classes were randomly allocated to different trial arms but that the distance between a role model and a pupil is entirely a function of the school in which they are based. There was no random allocation of pupils to observe more or less local role models. Therefore, the effect of distance is intimately tied-up with the effect of being in a particular school and there is a risk that we inadvertently attribute some effect to distance when in fact it is the case that the schools which were more distant had some characteristics which influenced the variables in our model.

To investigate in a little more detail, I consider the characteristics of the schools in my trial and how they vary by distance to the role model. Because the sample of schools is small, I do not conduct statistical analysis but inspect the data visually instead. The graphs below plot the proportion of school pupils who are FSM-eligible, and white British, versus the school-role model distance. Neither graph presents a strong pattern but there appears to be a slight tendency for more distant schools to have a higher proportion of FSM-eligible pupils. Further analysis shows that there is not a direct relationship between the proportion of the school who are FSM-eligible and my outcomes. Nonetheless, it is not possible to untangle the effect of "distance" in my data from other school-level factors which I have not captured. To address this issue robustly, further research which uses a randomised design to remove the issue of confounding variables would be be needed (Valente et al., 2017).

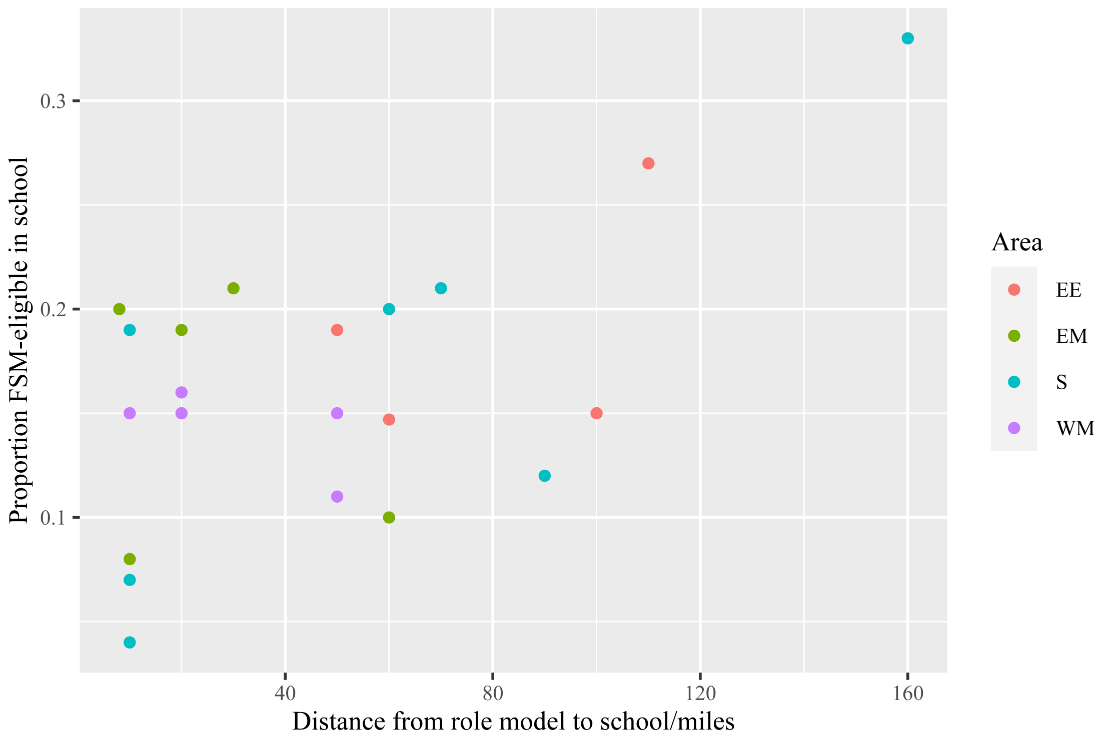


Figure 9.10: Plot of the proportion of school pupils who are FSM-eligible versus the school-role model distance. Restricted to schools present in the session 2 data (in which the "Similar" and "Example" variables are present).

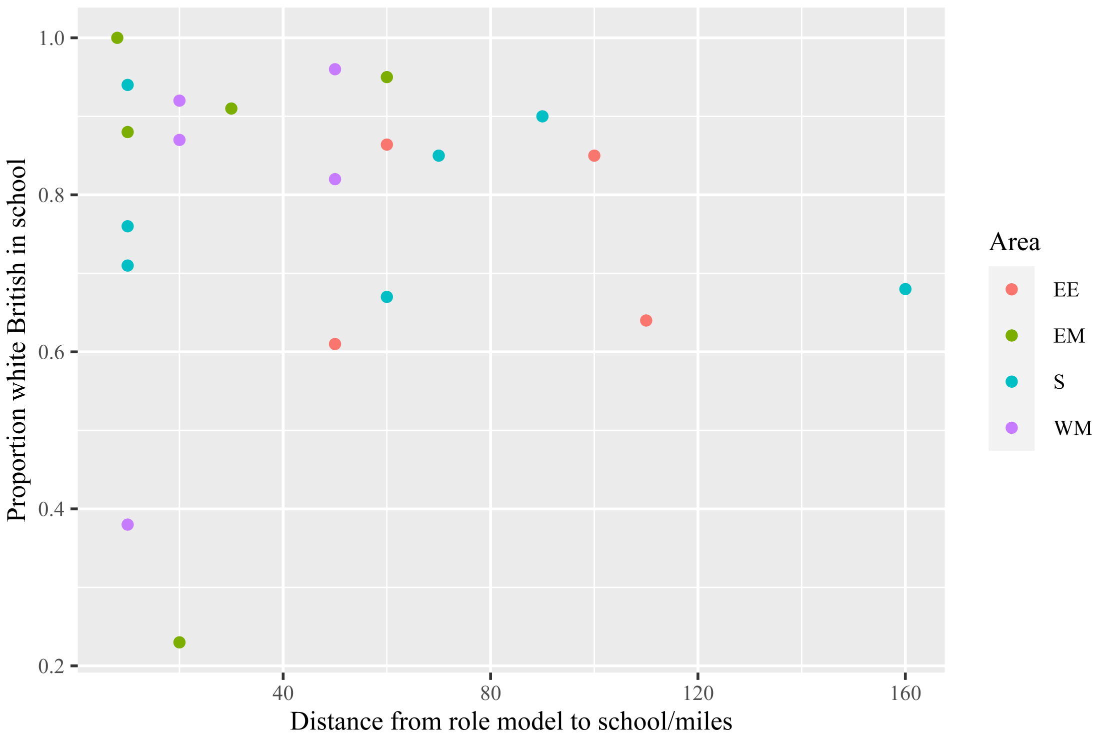


Figure 9.11: Plot of the proportion of school pupils who are white British versus the school-role model distance. Restricted to schools present in the session 2 data (in which the "Similar" and "Example" variables are present).

9.37 Exploratory analysis — all pupils

Over the following pages I present my analysis of outcomes for all pupils. I first present my secondary analysis of survey outcomes collected during the first session, immediately after the intervention was delivered. I then my secondary analysis of survey outcomes collected during the second session, three weeks after the intervention was delivered. Finally, I present my secondary analysis of effort and attendance outcomes. I analyse the full data set as an intention to treat analysis (labelled "ITT") and a restricted dataset which only contains rows where a survey was also received as average treatment effect analysis (labelled "ATE").

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.050**	0.050**	−0.005	−0.002	0.009	0.011	−0.116	−0.109	0.082	0.081
	(0.019)	(0.019)	(0.033)	(0.033)	(0.032)	(0.032)	(0.107)	(0.106)	(0.068)	(0.068)
Similarity prime	−0.012	−0.012	−0.020	−0.020	0.033	0.033	−0.043	−0.043	0.019	0.019
	(0.019)	(0.019)	(0.034)	(0.034)	(0.032)	(0.032)	(0.105)	(0.105)	(0.063)	(0.063)
Proportion WWCB	−0.017	−0.012	−0.038+	−0.061*	0.049*	0.031	−0.067	−0.146+	0.037	0.044
	(0.011)	(0.015)	(0.022)	(0.029)	(0.021)	(0.026)	(0.059)	(0.083)	(0.038)	(0.057)
Any role model x Proportion WWCB		−0.007		0.034		0.028		0.118		−0.011
		(0.016)		(0.031)		(0.027)		(0.094)		(0.059)
Constant	3.686**	3.686**	4.194**	4.195**	3.860**	3.861**	5.433**	5.439**	−0.547**	−0.547**
	(0.041)	(0.041)	(0.107)	(0.106)	(0.085)	(0.085)	(0.276)	(0.271)	(0.151)	(0.151)
Observations	10,886	10,886	11,094	11,094	11,043	11,043	10,760	10,760	10,649	10,649

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.147: Exploratory analysis — session 1 survey outcomes — all pupils — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.065^{*}	-0.030	-0.004	-0.096	-0.009
	(0.027)	(0.046)	(0.045)	(0.149)	(0.097)
Similarity prime	0.009	-0.026	0.031	-0.131	-0.022
	(0.026)	(0.047)	(0.047)	(0.147)	(0.095)
University role model x Similarity prime	-0.039	0.015	-0.002	0.159	0.089
	(0.038)	(0.068)	(0.064)	(0.205)	(0.124)
Constant	3.700^{**}	4.157^{**}	3.894^{**}	5.206^{**}	-0.393^{+}
	(0.064)	(0.144)	(0.106)	(0.366)	(0.218)
Observations	7,188	7,324	7,289	7,068	6,980

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.148: Exploratory analysis — session 1 survey outcomes — all pupils — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.084**	0.084**	−0.010	−0.005	0.007	0.009	−0.154	−0.142	0.082	0.080
	(0.023)	(0.022)	(0.040)	(0.040)	(0.038)	(0.038)	(0.127)	(0.127)	(0.076)	(0.076)
Similarity prime	−0.034	−0.034	−0.023	−0.025	0.030	0.029	0.027	0.022	0.056	0.057
	(0.028)	(0.028)	(0.049)	(0.049)	(0.043)	(0.043)	(0.148)	(0.147)	(0.081)	(0.081)
Proportion WWCB	−0.009	−0.012	−0.016	−0.046	0.048*	0.038	−0.049	−0.117	0.014	0.027
	(0.013)	(0.015)	(0.026)	(0.030)	(0.023)	(0.027)	(0.071)	(0.087)	(0.045)	(0.057)
University role model x Proportion WWCB		0.006		0.058		0.019		0.129		−0.024
		(0.019)		(0.037)		(0.032)		(0.103)		(0.064)
Constant	3.666**	3.666**	4.223**	4.221**	3.803**	3.802**	5.528**	5.523**	−0.477**	−0.477**
	(0.046)	(0.046)	(0.120)	(0.119)	(0.093)	(0.093)	(0.318)	(0.311)	(0.157)	(0.158)
Observations	7,353	7,353	7,495	7,495	7,461	7,461	7,300	7,300	7,195	7,195

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.Lottery entry is binary and analysed using binary logistic regression.

Table 9.149: Exploratory analysis — session 1 survey outcomes — all pupils — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	0.017	0.015	0.005	0.005	0.007	0.011	−0.073	−0.066	0.067	0.067
	(0.023)	(0.023)	(0.040)	(0.040)	(0.041)	(0.041)	(0.133)	(0.133)	(0.091)	(0.091)
Similarity prime	0.007	0.006	−0.027	−0.027	0.041	0.043	−0.127	−0.122	−0.013	−0.013
	(0.026)	(0.026)	(0.048)	(0.048)	(0.047)	(0.047)	(0.148)	(0.148)	(0.096)	(0.096)
Proportion WWCB	-0.024^{+}	−0.014	-0.067^{**}	-0.069^{*}	0.057^{*}	0.037	-0.136^{+}	-0.175^{*}	0.060	0.062
	(0.013)	(0.015)	(0.025)	(0.030)	(0.026)	(0.029)	(0.073)	(0.088)	(0.048)	(0.060)
Apprenticeship role model x Proportion WWCB		−0.021		0.004		0.042		0.082		−0.004
		(0.019)		(0.035)		(0.031)		(0.114)		(0.069)
Constant	3.705^{**}	3.701^{**}	4.208^{**}	4.209^{**}	3.903^{**}	3.909^{**}	5.509^{**}	5.523^{**}	-0.711^{**}	-0.711^{**}
	(0.044)	(0.044)	(0.128)	(0.128)	(0.106)	(0.105)	(0.316)	(0.310)	(0.167)	(0.168)
Observations	7,231	7,231	7,369	7,369	7,336	7,336	7,152	7,152	7,123	7,123

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.150: Exploratory analysis — session 1 survey outcomes — all pupils — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	−0.013	−0.013	−0.084*	−0.084*	0.034	0.034	0.098	0.098
	(0.020)	(0.020)	(0.036)	(0.036)	(0.035)	(0.035)	(0.079)	(0.079)
Similarity prime	0.009	0.009	0.063+	0.062+	−0.004	−0.005	0.010	0.009
	(0.021)	(0.021)	(0.036)	(0.036)	(0.036)	(0.035)	(0.072)	(0.072)
Proportion WWCB	−0.023+	−0.029	−0.002	−0.043	0.062**	0.036	−0.034	−0.040
	(0.013)	(0.018)	(0.024)	(0.033)	(0.024)	(0.030)	(0.044)	(0.069)
Any role model x Proportion WWCB		0.008		0.059+		0.037		0.008
		(0.019)		(0.033)		(0.032)		(0.072)
Constant	3.673**	3.674**	4.235**	4.242**	3.808**	3.813**	−0.694**	−0.693**
	(0.041)	(0.041)	(0.107)	(0.106)	(0.114)	(0.114)	(0.198)	(0.198)
Observations	8,845	8,845	8,995	8,995	8,968	8,968	7,243	7,243

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.151: Exploratory analysis — session 2 survey outcomes — all pupils — any role model versus control

	ISQ score	*University interest*	*Apprenticeship interest*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	0.036	-0.088^{+}	-0.004	-0.002
	(0.029)	(0.052)	(0.051)	(0.107)
Similarity prime	0.016	-0.018	-0.014	-0.014
	(0.029)	(0.052)	(0.052)	(0.100)
University role model x Similarity prime	-0.005	0.160^{*}	0.014	0.055
	(0.041)	(0.071)	(0.070)	(0.141)
Constant	3.635^{**}	4.198^{**}	3.852^{**}	-0.483^{*}
	(0.060)	(0.138)	(0.145)	(0.242)
Observations	5,873	5,976	5,959	4,851

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.152: Exploratory analysis — session 2 survey outcomes — all pupils — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.008	0.008	−0.118**	−0.116**	0.032	0.033	0.097	0.097
	(0.024)	(0.024)	(0.044)	(0.044)	(0.042)	(0.042)	(0.097)	(0.097)
Similarity prime	−0.0002	−0.001	0.129**	0.128**	−0.003	−0.004	0.033	0.033
	(0.029)	(0.029)	(0.049)	(0.048)	(0.048)	(0.048)	(0.102)	(0.102)
Proportion WWCB	−0.011	−0.030	0.027	−0.023	0.053*	0.038	−0.063	−0.074
	(0.015)	(0.019)	(0.028)	(0.034)	(0.027)	(0.032)	(0.056)	(0.073)
University role model x Proportion WWCB		0.035+		0.089*		0.027		0.020
		(0.021)		(0.037)		(0.036)		(0.080)
Constant	3.664**	3.668**	4.252**	4.263**	3.751**	3.754**	−0.514*	−0.512*
	(0.043)	(0.042)	(0.125)	(0.125)	(0.138)	(0.140)	(0.228)	(0.227)
Observations	5,938	5,938	6,048	6,048	6,033	6,033	4,841	4,841

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.153: Exploratory analysis — session 2 survey outcomes — all pupils — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	−0.035	−0.036	−0.049	−0.048	0.027	0.029	0.095	0.096
	(0.025)	(0.025)	(0.044)	(0.044)	(0.044)	(0.044)	(0.094)	(0.094)
Similarity prime	0.011	0.012	−0.017	−0.017	−0.002	−0.003	−0.010	−0.010
	(0.029)	(0.029)	(0.052)	(0.052)	(0.051)	(0.050)	(0.100)	(0.100)
Proportion WWCB	−0.046**	−0.033+	−0.048	−0.058	0.055+	0.026	−0.061	−0.061
	(0.015)	(0.019)	(0.029)	(0.036)	(0.029)	(0.032)	(0.053)	(0.071)
Apprenticeship role model x Proportion WWCB		−0.024		0.020		0.057		0.001
		(0.021)		(0.040)		(0.036)		(0.081)
Constant	3.693**	3.690**	4.242**	4.245**	3.868**	3.875**	−0.987**	−0.987**
	(0.049)	(0.051)	(0.118)	(0.117)	(0.132)	(0.130)	(0.234)	(0.234)
Observations	5,879	5,879	5,966	5,966	5,944	5,944	4,794	4,794

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.154: Exploratory analysis — session 2 survey outcomes — all pupils — apprenticeship role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Any role model	0.005	0.005	0.007	0.011	−0.073	−0.066	0.067	0.067
	(0.040)	(0.040)	(0.041)	(0.041)	(0.133)	(0.133)	(0.091)	(0.091)
Similarity prime	−0.027	−0.027	0.041	0.043	−0.127	−0.122	−0.013	−0.013
	(0.048)	(0.048)	(0.047)	(0.047)	(0.148)	(0.148)	(0.096)	(0.096)
Proportion WWCB	−0.067**	−0.069*	0.057*	0.037	−0.136^{+}	−0.175*	0.060	0.062
	(0.025)	(0.030)	(0.026)	(0.029)	(0.073)	(0.088)	(0.048)	(0.060)
Any role model x Proportion WWCB		0.004		0.042		0.082		−0.004
		(0.035)		(0.031)		(0.114)		(0.069)
Constant	4.208**	4.209**	3.903**	3.909**	5.509**	5.523**	−0.711**	−0.711**
	(0.128)	(0.128)	(0.106)	(0.105)	(0.316)	(0.310)	(0.167)	(0.168)
Observations	7,369	7,369	7,336	7,336	7,152	7,152	7,123	7,123

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.155: Exploratory analysis — effort and attendance — all pupils — any role model versus control

	Effort		*Attendance*	
	ITT	ATE	ITT	ATE
	1	2	3	4
University role model	0.005	0.005	0.009	0.007
	(0.040)	(0.040)	(0.040)	(0.041)
Similarity prime	−0.027	−0.027	−0.051	0.041
	(0.048)	(0.048)	(0.047)	(0.047)
University role model x Similarity prime	4.208^{**}	4.209^{**}	4.189^{**}	3.903^{**}
	(0.128)	(0.128)	(0.127)	(0.106)
Observations	7,369	7,369	7,369	7,336

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.156: Exploratory analysis — effort and attendance — all pupils — comparison of treatment arms

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
University role model	0.005	0.005	0.007	0.011	−0.073	−0.066	0.067	0.067
	(0.040)	(0.040)	(0.041)	(0.041)	(0.133)	(0.133)	(0.091)	(0.091)
Similarity prime	−0.027	−0.027	0.041	0.043	−0.127	−0.122	−0.013	−0.013
	(0.048)	(0.048)	(0.047)	(0.047)	(0.148)	(0.148)	(0.096)	(0.096)
Proportion WWCB	-0.067^{**}	-0.069^{*}	0.057^{*}	0.037	-0.136^{+}	-0.175^{*}	0.060	0.062
	(0.025)	(0.030)	(0.026)	(0.029)	(0.073)	(0.088)	(0.048)	(0.060)
University role model x Proportion WWCB		0.004		0.042		0.082		−0.004
		(0.035)		(0.031)		(0.114)		(0.069)
Constant	4.208^{**}	4.209^{**}	3.903^{**}	3.909^{**}	5.509^{**}	5.523^{**}	-0.711^{**}	-0.711^{**}
	(0.128)	(0.128)	(0.106)	(0.105)	(0.316)	(0.310)	(0.167)	(0.168)
Observations	7,369	7,369	7,336	7,336	7,152	7,152	7,123	7,123

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.157: Exploratory analysis — effort and attendance — all pupils — university role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Apprenticeship role model	0.005	0.005	0.007	0.011	−0.073	−0.066	0.067	0.067
	(0.040)	(0.040)	(0.041)	(0.041)	(0.133)	(0.133)	(0.091)	(0.091)
Similarity prime	−0.027	−0.027	0.041	0.043	−0.127	−0.122	−0.013	−0.013
	(0.048)	(0.048)	(0.047)	(0.047)	(0.148)	(0.148)	(0.096)	(0.096)
Proportion WWCB	-0.067^{**}	-0.069^{*}	0.057^{*}	0.037	-0.136^{+}	-0.175^{*}	0.060	0.062
	(0.025)	(0.030)	(0.026)	(0.029)	(0.073)	(0.088)	(0.048)	(0.060)
Apprenticeship role model x Proportion WWCB		0.004		0.042		0.082		−0.004
		(0.035)		(0.031)		(0.114)		(0.069)
Constant	4.208^{**}	4.209^{**}	3.903^{**}	3.909^{**}	5.509^{**}	5.523^{**}	-0.711^{**}	-0.711^{**}
	(0.128)	(0.128)	(0.106)	(0.105)	(0.316)	(0.310)	(0.167)	(0.168)
Observations	7,369	7,369	7,336	7,336	7,152	7,152	7,123	7,123

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), gender, whether a pupil is white British, SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.158: Exploratory analysis — effort and attendance — all pupils — apprenticeship role model versus control

9.38 Exploratory analysis — non white working-class boys

Over the following pages I present my analysis of outcomes for boys who do not meet my "white working-classs" criteria. I first present my secondary analysis of survey outcomes collected during the first session, immediately after the intervention was delivered. I then my secondary analysis of survey outcomes collected during the second session, three weeks after the intervention was delivered. Finally, I present my secondary analysis of effort and attendance outcomes. I analyse the full data set as an intention to treat analysis (labelled "ITT") and a restricted dataset which only contains rows where a survey was also received as average treatment effect analysis (labelled "ATE").

	ISQ total		University interest		Apprenticeship interest		Maths test		Lottery	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.039	0.028	−0.078	-0.097^{+}	0.002	0.017	-0.237^{+}	-0.256^{+}	0.275^{**}	0.302^{**}
	(0.030)	(0.031)	(0.050)	(0.053)	(0.047)	(0.050)	(0.141)	(0.142)	(0.096)	(0.098)
Similarity prime	−0.032	−0.032	−0.018	−0.018	0.048	0.047	0.026	0.026	−0.069	−0.069
	(0.029)	(0.029)	(0.054)	(0.054)	(0.050)	(0.050)	(0.136)	(0.136)	(0.092)	(0.092)
Proportion WWCB	−0.008	0.014	−0.050	−0.011	0.060^{+}	0.030	−0.008	0.032	0.078	0.023
	(0.018)	(0.028)	(0.035)	(0.051)	(0.033)	(0.046)	(0.080)	(0.120)	(0.061)	(0.096)
Any role model x Proportion WWCB		−0.032		−0.057		0.044		−0.058		0.082
		(0.030)		(0.054)		(0.051)		(0.134)		(0.103)
Constant	3.671^{**}	3.673^{**}	4.298^{**}	4.303^{**}	3.591^{**}	3.587^{**}	5.559^{**}	5.562^{**}	-0.555^{*}	-0.563^{*}
	(0.076)	(0.075)	(0.148)	(0.146)	(0.165)	(0.163)	(0.318)	(0.317)	(0.233)	(0.231)
Observations	3,639	3,639	3,720	3,720	3,701	3,701	3,622	3,622	3,559	3,559

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.159: Exploratory analysis — session 1 survey outcomes — non-WWC boys — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.062^{+}	−0.107^{+}	−0.004	−0.151	0.195^{+}
	(0.034)	(0.058)	(0.054)	(0.168)	(0.113)
Similarity prime	0.008	−0.063	0.082	−0.171	0.162
	(0.031)	(0.055)	(0.054)	(0.145)	(0.098)
University role model x Similarity prime	−0.074	0.065	−0.067	0.238	−0.290^{+}
	(0.052)	(0.099)	(0.092)	(0.243)	(0.169)
Constant	3.676**	4.283**	3.592**	5.474**	−0.463*
	(0.075)	(0.148)	(0.164)	(0.319)	(0.234)
Observations	3,639	3,720	3,701	3,622	3,559

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.160: Exploratory analysis — session 1 survey outcomes — non-WWC boys — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.069+	0.062+	−0.101	−0.107+	−0.004	0.004	−0.223	−0.210	0.284*	0.328**
	(0.036)	(0.037)	(0.062)	(0.064)	(0.055)	(0.060)	(0.176)	(0.180)	(0.120)	(0.122)
Similarity prime	−0.066	−0.065	−0.009	−0.009	0.014	0.013	0.070	0.068	−0.123	−0.128
	(0.042)	(0.042)	(0.083)	(0.083)	(0.074)	(0.074)	(0.195)	(0.195)	(0.138)	(0.137)
Proportion WWCB	0.009	0.018	−0.003	0.005	0.024	0.013	0.057	0.039	0.132+	0.068
	(0.023)	(0.030)	(0.045)	(0.055)	(0.038)	(0.048)	(0.094)	(0.123)	(0.077)	(0.102)
University role model x Proportion WWCB		−0.018		−0.014		0.022		0.035		0.123
		(0.034)		(0.063)		(0.057)		(0.152)		(0.118)
Constant	3.682**	3.683**	4.397**	4.399**	3.531**	3.529**	5.670**	5.667**	−0.710**	−0.725**
	(0.087)	(0.086)	(0.165)	(0.164)	(0.187)	(0.186)	(0.394)	(0.396)	(0.273)	(0.266)
Observations	2,385	2,385	2,439	2,439	2,426	2,426	2,376	2,376	2,333	2,333

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.161: Exploratory analysis — session 1 survey outcomes — non-WWC boys — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	0.014	−0.002	−0.047	−0.084	0.011	0.039	−0.238	-0.299^{+}	0.236^{*}	0.244^{*}
	(0.037)	(0.039)	(0.061)	(0.063)	(0.060)	(0.062)	(0.171)	(0.171)	(0.117)	(0.119)
Similarity prime	−0.003	−0.005	−0.037	−0.041	0.077	0.080	−0.033	−0.041	0.014	0.015
	(0.040)	(0.039)	(0.068)	(0.068)	(0.068)	(0.067)	(0.187)	(0.188)	(0.125)	(0.126)
Proportion WWCB	−0.012	0.010	-0.082^{*}	−0.030	0.097^{*}	0.058	−0.103	−0.015	0.063	0.051
	(0.023)	(0.030)	(0.040)	(0.053)	(0.041)	(0.050)	(0.101)	(0.125)	(0.075)	(0.096)
Apprenticeship role model x Proportion WWCB		−0.044		-0.105^{+}		0.078		−0.175		0.023
		(0.035)		(0.059)		(0.059)		(0.156)		(0.119)
Constant	3.753^{**}	3.750^{**}	4.366^{**}	4.360^{**}	3.437^{**}	3.441^{**}	5.863^{**}	5.847^{**}	-0.763^{**}	-0.762^{**}
	(0.085)	(0.082)	(0.171)	(0.164)	(0.203)	(0.200)	(0.327)	(0.330)	(0.285)	(0.285)
Observations	2,437	2,437	2,490	2,490	2,478	2,478	2,429	2,429	2,405	2,405

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.162: Exploratory analysis — session 1 survey outcomes — non-WWC boys — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	−0.047	−0.049	−0.183**	−0.176**	0.047	0.060	0.217+	0.226+
	(0.033)	(0.033)	(0.057)	(0.057)	(0.058)	(0.060)	(0.113)	(0.117)
Similarity prime	−0.023	−0.023	0.113*	0.113*	0.029	0.029	0.029	0.029
	(0.034)	(0.034)	(0.057)	(0.057)	(0.062)	(0.062)	(0.113)	(0.113)
Proportion WWCB	−0.046*	−0.043	−0.030	−0.047	0.086*	0.054	0.037	0.011
	(0.022)	(0.033)	(0.037)	(0.055)	(0.039)	(0.050)	(0.072)	(0.109)
Any role model x Proportion WWCB		−0.004		0.026		0.047		0.037
		(0.033)		(0.058)		(0.059)		(0.111)
Constant	3.613**	3.612**	4.257**	4.259**	3.460**	3.463**	−1.065**	−1.063**
	(0.092)	(0.092)	(0.167)	(0.169)	(0.197)	(0.196)	(0.283)	(0.281)
Observations	2,891	2,891	2,952	2,952	2,946	2,946	2,359	2,359

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.163: Exploratory analysis — session 2 survey outcomes — non-WWC boys — any role model versus control

	ISQ score	*University interest*	*Apprenticeship interest*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	−0.015	−0.179**	0.037	0.278*
	(0.039)	(0.064)	(0.068)	(0.139)
Similarity prime	−0.054	−0.068	0.140*	0.227*
	(0.037)	(0.062)	(0.069)	(0.108)
University role model x Similarity prime	0.023	0.273**	−0.196+	−0.329
	(0.063)	(0.099)	(0.110)	(0.208)
Constant	3.592**	4.212**	3.468**	−1.026**
	(0.095)	(0.166)	(0.198)	(0.276)
Observations	2,891	2,952	2,946	2,359

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.164: Exploratory analysis — session 2 survey outcomes — non-WWC boys — comparison of treatment arms

	ISQ total		University interest		Apprenticeship interest		Lottery	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	−0.029	−0.020	−0.203**	−0.169*	0.054	0.074	0.322*	0.350*
	(0.043)	(0.043)	(0.067)	(0.069)	(0.071)	(0.076)	(0.149)	(0.154)
Similarity prime	−0.035	−0.035	0.193*	0.192*	−0.056	−0.057	−0.103	−0.103
	(0.051)	(0.051)	(0.078)	(0.077)	(0.085)	(0.085)	(0.179)	(0.178)
Proportion WWCB	−0.031	−0.044	0.011	−0.043	0.070	0.039	0.022	−0.030
	(0.027)	(0.034)	(0.043)	(0.056)	(0.045)	(0.053)	(0.093)	(0.118)
University role model x Proportion WWCB		0.026		0.107+		0.062		0.097
		(0.038)		(0.064)		(0.069)		(0.130)
Constant	3.560**	3.563**	4.249**	4.262**	3.536**	3.543**	−1.072**	−1.067**
	(0.115)	(0.117)	(0.193)	(0.203)	(0.258)	(0.256)	(0.357)	(0.351)
Observations	1,877	1,877	1,924	1,924	1,918	1,918	1,522	1,522

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control.All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.165: Exploratory analysis — session 2 survey outcomes — non-WWC boys — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	−0.062	−0.073^{+}	−0.160*	−0.179*	0.028	0.039	0.097	0.081
	(0.038)	(0.038)	(0.070)	(0.071)	(0.072)	(0.071)	(0.130)	(0.133)
Similarity prime	−0.015	−0.015	0.036	0.037	0.111	0.111	0.163	0.163
	(0.044)	(0.044)	(0.079)	(0.079)	(0.086)	(0.086)	(0.134)	(0.134)
Proportion WWCB	−0.060*	−0.041	−0.086^{+}	−0.053	0.084^{+}	0.065	−0.038	−0.009
	(0.027)	(0.034)	(0.047)	(0.060)	(0.049)	(0.054)	(0.080)	(0.109)
Apprenticeship role model x Proportion WWCB		−0.036		−0.063		0.036		−0.052
		(0.037)		(0.066)		(0.071)		(0.122)
Constant	3.738**	3.732**	4.489**	4.480**	3.192**	3.197**	−1.215**	−1.223**
	(0.083)	(0.082)	(0.177)	(0.173)	(0.208)	(0.207)	(0.346)	(0.348)
Observations	1,930	1,930	1,972	1,972	1,969	1,969	1,585	1,585

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.166: Exploratory analysis — session 2 survey outcomes — non-WWC boys — apprenticeship role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Any role model	−0.142**	−0.151**	−0.136**	−0.148**	−0.213	−0.177	−0.288	−0.149
	(0.054)	(0.056)	(0.052)	(0.056)	(0.374)	(0.404)	(0.273)	(0.296)
Similarity prime	0.022	0.023	0.006	0.008	−0.085	−0.085	−0.393	−0.393
	(0.048)	(0.048)	(0.047)	(0.047)	(0.326)	(0.326)	(0.275)	(0.275)
Proportion WWCB	−0.012	0.018	−0.019	0.018	−0.414	−0.480	−0.339+	−0.605*
	(0.031)	(0.051)	(0.032)	(0.053)	(0.295)	(0.337)	(0.182)	(0.288)
Any role model x Proportion WWCB		−0.044		−0.052		0.097		0.397
		(0.053)		(0.054)		(0.408)		(0.303)
Constant	−0.075	−0.079	−0.116	−0.118	96.653**	96.650**	97.181**	97.158**
	(0.129)	(0.128)	(0.135)	(0.132)	(0.986)	(0.989)	(1.117)	(1.120)
Observations	2,261	2,261	2,123	2,123	3,583	3,583	3,224	3,224

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth (coded from 1 to 12), year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.167: Exploratory analysis— effort and attendance— non-WWC boys— any role model versus control

	Effort		*Attendance*	
	ITT	ATE	ITT	ATE
	1	2	3	4
University role model	0.013	0.015	−0.786	−0.283
	(0.065)	(0.062)	(0.500)	(0.410)
Similarity prime	0.055	0.041	−0.691^{+}	−0.615^{+}
	(0.062)	(0.059)	(0.411)	(0.355)
University role model x Similarity prime	−0.057	−0.058	1.184^{+}	0.427
	(0.099)	(0.096)	(0.663)	(0.573)
Constant	−0.260	−0.399*	97.915**	98.020**
	(0.185)	(0.169)	(0.698)	(0.770)
Observations	1,568	1,463	2,477	2,218

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.168: Exploratory analysis— effort and attendance— non-WWC boys— comparison of treatment arms

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
University role model	-0.119^{+}	-0.124^{+}	-0.118^{+}	-0.130^{+}	−0.664	−0.675	-0.461^{+}	−0.293
	(0.065)	(0.069)	(0.066)	(0.071)	(0.501)	(0.584)	(0.273)	(0.410)
Similarity prime	−0.023	−0.021	−0.033	−0.029	0.574	0.575	−0.164	−0.183
	(0.076)	(0.077)	(0.077)	(0.078)	(0.514)	(0.517)	(0.275)	(0.434)
Proportion WWCB	0.019	0.028	0.003	0.026	−0.643	-0.629^{+}	-0.387^{*}	-0.608^{*}
	(0.042)	(0.055)	(0.043)	(0.058)	(0.400)	(0.360)	(0.182)	(0.299)
University role model x Proportion WWCB		−0.016		−0.043		−0.028		0.434
		(0.059)		(0.060)		(0.534)		(0.344)
Constant	−0.115	−0.116	−0.130	−0.131	96.041^{**}	96.042^{**}	96.559^{**}	96.533^{**}
	(0.162)	(0.162)	(0.173)	(0.171)	(1.241)	(1.245)	(1.117)	(1.443)
Observations	1,448	1,448	1,362	1,362	2,345	2,345	2,108	2,108

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.169: Exploratory analysis— effort and attendance— non-WWC boys— university role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Apprenticeship role model	−0.143*	−0.159*	−0.133*	−0.148*	0.207	0.284	−0.137	−0.029
	(0.063)	(0.065)	(0.060)	(0.063)	(0.384)	(0.368)	(0.273)	(0.303)
Similarity prime	0.044	0.040	0.025	0.022	−0.684^{+}	−0.678^{+}	−0.604*	−0.589^{+}
	(0.064)	(0.064)	(0.061)	(0.061)	(0.405)	(0.404)	(0.275)	(0.353)
Proportion WWCB	−0.016	0.023	−0.012	0.023	−0.125	−0.225	−0.359*	−0.511^{+}
	(0.039)	(0.053)	(0.040)	(0.055)	(0.237)	(0.329)	(0.182)	(0.303)
Apprenticeship role model x Proportion WWCB		−0.075		−0.066		0.198		0.301
		(0.058)		(0.059)		(0.385)		(0.333)
Constant	−0.044	−0.061	−0.018	−0.028	96.287**	96.312**	96.978**	97.002**
	(0.124)	(0.119)	(0.131)	(0.126)	(1.341)	(1.326)	(1.117)	(1.494)
Observations	1,506	1,506	1,421	1,421	2,344	2,344	2,122	2,122

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.170: Exploratory analysis— effort and attendance— non-WWC boys— apprenticeship role model versus control

9.39 Exploratory analysis — non white working-class girls

Over the following pages I present my analysis of outcomes for girls who do not meet my “white working-classs” criteria. I first present my secondary analysis of survey outcomes collected during the first session, immediately after the intervention was delivered. I then my secondary analysis of survey outcomes collected during the second session, three weeks after the intervention was delivered. Finally, I present my secondary analysis of effort and attendance outcomes. I analyse the full data set as an intention to treat analysis (labelled “ITT”) and a restricted dataset which only contains rows where a survey was also received as average treatment effect analysis (labelled “ATE”).

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any role model	0.079**	0.078*	0.082	0.091	−0.025	−0.015	−0.115	−0.123	−0.043	−0.071
	(0.030)	(0.030)	(0.058)	(0.061)	(0.058)	(0.061)	(0.144)	(0.145)	(0.114)	(0.116)
Similarity prime	−0.023	−0.023	−0.048	−0.047	−0.016	−0.015	−0.137	−0.138	0.172	0.171
	(0.030)	(0.030)	(0.057)	(0.057)	(0.062)	(0.062)	(0.149)	(0.149)	(0.113)	(0.113)
Proportion WWCB	−0.015	−0.013	−0.052	−0.074	0.037	0.013	−0.058	−0.041	0.103	0.166
	(0.019)	(0.024)	(0.038)	(0.050)	(0.039)	(0.053)	(0.085)	(0.125)	(0.073)	(0.105)
Any role model x Proportion WWCB		−0.003		0.031		0.035		−0.025		−0.094
		(0.027)		(0.053)		(0.055)		(0.138)		(0.111)
Constant	3.760**	3.761**	4.239**	4.234**	3.728**	3.723**	4.859**	4.862**	0.014	0.026
	(0.083)	(0.083)	(0.186)	(0.185)	(0.147)	(0.148)	(0.412)	(0.413)	(0.304)	(0.305)
Observations	3,015	3,015	3,083	3,083	3,068	3,068	3,009	3,009	2,955	2,955

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.171: Exploratory analysis — session 1 survey outcomes — non-WWC girls — any role model versus control

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.078*	0.028	−0.048	0.002	−0.064
	(0.035)	(0.065)	(0.066)	(0.159)	(0.126)
Similarity prime	0.023	0.057	−0.092	−0.265	0.026
	(0.036)	(0.069)	(0.072)	(0.179)	(0.128)
University role model x Similarity prime	−0.049	−0.140	0.149	0.134	0.274
	(0.055)	(0.104)	(0.112)	(0.269)	(0.198)
Constant	3.781**	4.285**	3.726**	4.779**	0.007
	(0.083)	(0.186)	(0.143)	(0.409)	(0.294)
Observations	3,015	3,083	3,068	3,009	2,955

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.172: Exploratory analysis — session 1 survey outcomes — non-WWC girls — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
University role model	0.098**	0.097*	0.054	0.056	−0.047	−0.042	−0.063	−0.067	−0.060	−0.127
	(0.036)	(0.038)	(0.068)	(0.072)	(0.072)	(0.075)	(0.169)	(0.170)	(0.128)	(0.131)
Similarity prime	−0.027	−0.027	−0.076	−0.077	0.052	0.052	−0.113	−0.113	0.278+	0.282+
	(0.041)	(0.041)	(0.076)	(0.076)	(0.086)	(0.086)	(0.202)	(0.202)	(0.149)	(0.148)
Proportion WWCB	−0.014	−0.013	−0.061	−0.065	0.052	0.045	−0.007	−0.0001	0.009	0.112
	(0.021)	(0.025)	(0.047)	(0.055)	(0.044)	(0.057)	(0.103)	(0.132)	(0.090)	(0.110)
University role model x Proportion WWCB		−0.002		0.008		0.014		−0.013		−0.198
Constant	3.710**	3.710**	4.191**	4.189**	3.744**	3.741**	4.879**	4.881**	0.165	0.194
	(0.103)	(0.103)	(0.211)	(0.211)	(0.178)	(0.178)	(0.447)	(0.447)	(0.314)	(0.318)
Observations	2,045	2,045	2,093	2,093	2,086	2,086	2,056	2,056	2,018	2,018

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.173: Exploratory analysis — session 1 survey outcomes — non-WWC girls — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Maths test*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apprenticeship role model	0.065+	0.066+	0.120+	0.132+	−0.011	0.006	−0.152	−0.169	−0.020	−0.011
	(0.036)	(0.037)	(0.071)	(0.074)	(0.072)	(0.075)	(0.182)	(0.184)	(0.147)	(0.150)
Similarity prime	−0.021	−0.021	−0.023	−0.020	−0.081	−0.076	−0.163	−0.168	0.056	0.058
	(0.043)	(0.043)	(0.085)	(0.085)	(0.088)	(0.088)	(0.218)	(0.218)	(0.163)	(0.163)
Proportion WWCB	−0.012	−0.013	−0.054	−0.074	0.024	−0.005	−0.129	−0.100	0.170+	0.155
	(0.025)	(0.027)	(0.047)	(0.055)	(0.050)	(0.056)	(0.102)	(0.128)	(0.089)	(0.111)
Apprenticeship role model x Proportion WWCB		0.002		0.041		0.058		−0.059		0.030
		(0.033)		(0.064)		(0.064)		(0.166)		(0.128)
Constant	3.750**	3.750**	4.350**	4.349**	3.942**	3.941**	5.016**	5.015**	−0.085	−0.085
	(0.096)	(0.096)	(0.213)	(0.211)	(0.174)	(0.176)	(0.519)	(0.523)	(0.412)	(0.411)
Observations	1,995	1,995	2,035	2,035	2,025	2,025	1,984	1,984	1,949	1,949

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.174: Exploratory analysis — session 1 survey outcomes — non-WWC girls — apprenticeship role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any role model	0.016	0.014	0.026	0.039	−0.046	−0.025	0.099	0.111
	(0.032)	(0.032)	(0.062)	(0.065)	(0.063)	(0.064)	(0.128)	(0.130)
Similarity prime	0.011	0.011	−0.007	−0.007	−0.027	−0.028	0.099	0.099
	(0.032)	(0.032)	(0.061)	(0.061)	(0.069)	(0.069)	(0.126)	(0.126)
Proportion WWCB	−0.007	−0.003	0.018	−0.018	0.073^{+}	0.015	−0.041	−0.081
	(0.022)	(0.031)	(0.042)	(0.061)	(0.044)	(0.060)	(0.082)	(0.126)
Any role model x Proportion WWCB		−0.006		0.051		0.081		0.054
		(0.031)		(0.063)		(0.059)		(0.126)
Constant	3.731^{**}	3.731^{**}	4.305^{**}	4.303^{**}	3.660^{**}	3.656^{**}	−0.154	−0.158
	(0.082)	(0.083)	(0.215)	(0.213)	(0.175)	(0.173)	(0.315)	(0.314)
Observations	2,484	2,484	2,521	2,521	2,511	2,511	2,028	2,028

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.175: Exploratory analysis — session 2 survey outcomes — non-WWC girls — any role model versus control

	ISQ score	*University interest*	*Apprsenticeship interest*	*Lottery*
	(1)	(2)	(3)	(4)
University role model	0.032	−0.031	−0.025	−0.018
	(0.038)	(0.072)	(0.070)	(0.141)
Similarity prime	0.025	−0.045	-0.148^{+}	0.088
	(0.041)	(0.081)	(0.076)	(0.153)
University role model x Similarity prime	−0.028	0.116	0.206^{+}	0.128
	(0.059)	(0.114)	(0.121)	(0.221)
Constant	3.729^{**}	4.338^{**}	3.639^{**}	−0.079
	(0.082)	(0.214)	(0.171)	(0.307)
Observations	2,484	2,521	2,511	2,028

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to (“university” versus ”apprenticeship”) and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.176: Exploratory analysis — session 2 survey outcomes — non-WWC girls — comparison of treatment arms

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
University role model	0.026	0.033	−0.027	−0.014	−0.051	−0.040	0.026	0.029
	(0.040)	(0.041)	(0.073)	(0.076)	(0.076)	(0.076)	(0.149)	(0.151)
Similarity prime	−0.003	−0.003	0.065	0.065	0.066	0.065	0.202	0.202
	(0.042)	(0.042)	(0.076)	(0.076)	(0.096)	(0.095)	(0.162)	(0.162)
Proportion WWCB	−0.007	−0.020	0.033	0.008	0.068	0.046	−0.091	−0.097
	(0.025)	(0.032)	(0.054)	(0.064)	(0.052)	(0.066)	(0.108)	(0.136)
University role model x Proportion WWCB		0.024		0.046		0.040		0.011
		(0.035)		(0.071)		(0.063)		(0.140)
Constant	3.697**	3.697**	4.265**	4.266**	3.768**	3.768**	0.069	0.069
	(0.091)	(0.090)	(0.243)	(0.242)	(0.207)	(0.206)	(0.359)	(0.359)
Observations	1,676	1,676	1,700	1,700	1,695	1,695	1,349	1,349

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.177: Exploratory analysis — session 2 survey outcomes — non-WWC girls — university role model versus control

	ISQ total		*University interest*		*Apprenticeship interest*		*Lottery*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apprenticeship role model	0.0003	−0.008	0.072	0.084	−0.075	−0.038	0.165	0.196
	(0.036)	(0.037)	(0.076)	(0.081)	(0.081)	(0.082)	(0.160)	(0.160)
Similarity prime	0.023	0.023	−0.091	−0.090	−0.105	−0.104	−0.011	−0.009
	(0.045)	(0.045)	(0.096)	(0.096)	(0.095)	(0.094)	(0.186)	(0.185)
Proportion WWCB	−0.016	−0.001	−0.019	−0.044	0.043	−0.030	−0.058	−0.133
	(0.031)	(0.035)	(0.054)	(0.067)	(0.057)	(0.063)	(0.099)	(0.134)
Apprenticeship role model x Proportion WWCB		−0.028		0.046		0.132^{+}		0.129
		(0.035)		(0.075)		(0.071)		(0.142)
Constant	3.789^{**}	3.789^{**}	4.330^{**}	4.329^{**}	3.743^{**}	3.740^{**}	−0.481	−0.489
	(0.109)	(0.111)	(0.281)	(0.278)	(0.255)	(0.252)	(0.442)	(0.441)
Observations	1,636	1,636	1,656	1,656	1,648	1,648	1,336	1,336

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria. Lottery entry is binary and analysed using binary logistic regression.

Table 9.178: Exploratory analysis — session 2 survey outcomes — non-WWC girls — apprenticeship role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
AnyAny role model	0.030	0.030	0.010	0.009	0.577	0.478	0.664^{+}	0.655
	(0.071)	(0.071)	(0.071)	(0.071)	(0.391)	(0.423)	(0.376)	(0.407)
Similarity prime	−0.025	−0.025	0.044	0.044	−0.130	−0.135	−0.203	−0.204
	(0.065)	(0.065)	(0.069)	(0.069)	(0.384)	(0.384)	(0.362)	(0.362)
Proportion WWCB	−0.033	−0.033	−0.026	−0.020	-0.459^{+}	−0.251	−0.263	−0.242
	(0.041)	(0.064)	(0.043)	(0.069)	(0.248)	(0.348)	(0.240)	(0.358)
Any role model x Proportion WWCB		−0.0003		−0.007		−0.308		−0.031
		(0.063)		(0.068)		(0.357)		(0.349)
Constant	0.381^{*}	0.381^{*}	0.478^{**}	0.477^{**}	94.320^{**}	94.359^{**}	93.289^{**}	93.292^{**}
	(0.152)	(0.152)	(0.172)	(0.171)	(1.265)	(1.294)	(1.466)	(1.479)
Observations	1,688	1,688	1,499	1,499	2,999	2,999	2,611	2,611

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.179: Exploratory analysis — effort and attendance — non-WWC girls — any role model versus control

	Effort		*Attendance*	
	ITT	ATE	ITT	ATE
	1	2	3	4
University role model	−0.010	0.016	−0.148	−0.171
	(0.084)	(0.086)	(0.518)	(0.454)
Similarity prime	−0.039	0.034	0.135	0.216
	(0.085)	(0.089)	(0.495)	(0.438)
University role model x Similarity prime	0.040	0.016	−0.487	−0.720
	(0.122)	(0.130)	(0.734)	(0.678)
Constant	0.326^{+}	0.299	97.687^{**}	97.153^{**}
	(0.176)	(0.223)	(0.811)	(0.822)
Observations	1,149	1,012	2,012	1,745

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis is restricted to only the treatment arms and includes dummy terms for both the type of role model pupils were exposed to ("university" versus "apprenticeship") and the similarity prime intervention. The reference category is pupils exposed to the apprenticeship role model who were not exposed to the similarity prime intervention. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.180: Exploratory analysis — effort and attendance — non-WWC girls — comparison of treatment arms

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
University role model	0.026	0.023	0.014	0.010	0.512	0.316	0.577	0.527
	(0.088)	(0.090)	(0.091)	(0.093)	(0.472)	(0.506)	(0.376)	(0.480)
Similarity prime	−0.009	−0.008	0.056	0.057	−0.317	−0.306	−0.555	−0.550
	(0.093)	(0.092)	(0.101)	(0.100)	(0.565)	(0.564)	(0.362)	(0.552)
Proportion WWCB	−0.037	−0.031	−0.033	−0.025	−0.573^{+}	−0.288	−0.399^{+}	−0.328
	(0.056)	(0.068)	(0.059)	(0.073)	(0.304)	(0.382)	(0.240)	(0.389)
University role model x Proportion WWCB		−0.012		−0.013		−0.555		−0.142
		(0.076)		(0.083)		(0.398)		(0.387)
Constant	0.471**	0.472**	0.621**	0.621**	93.946**	94.048**	92.690**	92.706**
	(0.174)	(0.174)	(0.194)	(0.193)	(1.567)	(1.620)	(1.466)	(1.905)
Observations	1,119	1,119	986	986	2,017	2,017	1,757	1,757

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the university role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. “Proportion WWCB” is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.181: Exploratory analysis — effort and attendance — non-WWC girls — university role model versus control

	Effort				*Attendance*			
	ITT	ITT	ATE	ATE	ITT	ITT	ATE	ATE
	1	2	3	4	5	6	7	8
Apprenticeship role model	0.043	0.046	0.013	0.014	0.638	0.610	0.806^{*}	0.834^{+}
	(0.075)	(0.075)	(0.073)	(0.074)	(0.463)	(0.491)	(0.376)	(0.465)
Similarity prime	−0.047	−0.046	0.035	0.036	0.154	0.148	0.119	0.129
	(0.087)	(0.086)	(0.090)	(0.089)	(0.498)	(0.499)	(0.362)	(0.452)
Proportion WWCB	−0.028	−0.037	−0.021	−0.024	−0.230	−0.187	−0.095	−0.147
	(0.047)	(0.068)	(0.050)	(0.074)	(0.296)	(0.353)	(0.240)	(0.357)
Apprenticeship role model x Proportion WWCB		0.016		0.006		−0.085		0.103
		(0.064)		(0.068)		(0.393)		(0.365)
Constant	0.375^{*}	0.378^{*}	0.508^{**}	0.509^{**}	91.567^{**}	91.560^{**}	90.683^{**}	90.687^{**}
	(0.189)	(0.189)	(0.193)	(0.193)	(1.910)	(1.908)	(1.466)	(2.018)
Observations	1,108	1,108	1,000	1,000	1,969	1,969	1,720	1,720

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. This analysis compares pupils in the apprenticeship role model condition to control. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group and a school dummy variable. "Proportion WWCB" is a standardised measure of the proportion of the class meeting the WWCB criteria.

Table 9.182: Exploratory analysis — effort and attendance — non-WWC girls — apprenticeship role model versus control

9.40 Balance checks — all pupils

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
Female	0.47	0.48	0.46	0.46	0.48	0.99
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
White British	0.75	0.74	0.72	0.71	0.77	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
FSM	0.27	0.24	0.26	0.27	0.26	0.33
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
SEN	0.16	0.15	0.14	0.15	0.14	0.22
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.52	0.50	0.51	0.53	0.51	0.66
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Year group	1.50	1.54	1.56	1.33	1.46	0.07
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths score	0.02	0.06	0.09	0.03	0.05	0.15
	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths level	0.36	0.29	0.35	0.31	0.38	0.99
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths unified	0.33	0.32	0.36	0.32	0.35	0.26
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Area (overall)	-	-	-	-	-	0.25
- EE	0.20	0.22	0.23	0.21	0.22	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- EM	0.24	0.24	0.24	0.24	0.22	0.94
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- S	0.32	0.33	0.31	0.33	0.31	0.65
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- WM	0.25	0.22	0.22	0.21	0.24	0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Observations	2,065	2,000	2,032	1,927	4,119	12,143

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.183: Balance checks for all pupils in session 1 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
Female	0.48	0.49	0.46	0.45	0.47	0.32
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
White British	0.72	0.73	0.70	0.67	0.77	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
FSM	0.28	0.25	0.26	0.27	0.26	0.40
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
SEN	0.13	0.14	0.13	0.13	0.14	0.49
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.53	0.51	0.53	0.52	0.52	0.87
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Year group	1.35	1.39	1.42	1.31	1.41	0.10
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths score	0.05	0.09	0.11	0.02	0.08	0.26
	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	
Maths level	0.39	0.30	0.39	0.32	0.42	0.93
	(0.03)	(0.04)	(0.03)	(0.04)	(0.02)	
Maths unified	0.35	0.35	0.38	0.32	0.37	0.35
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Area (overall)	-	-	-	-	-	0.00
- EE	0.19	0.19	0.23	0.17	0.22	0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- EM	0.26	0.25	0.22	0.24	0.21	0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- S	0.34	0.34	0.32	0.36	0.33	0.43
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- WM	0.21	0.22	0.23	0.23	0.24	0.30
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Observations	1,560	1,534	1,539	1,485	3,084	9,192

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.184: Balance checks for all pupils in session 2 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
Female	0.43	0.46	0.43	0.44	0.45	0.71
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	
White British	0.75	0.75	0.71	0.71	0.78	0.10
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
FSM	0.28	0.26	0.24	0.27	0.25	0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
SEN	0.14	0.16	0.13	0.14	0.13	0.74
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.48	0.49	0.49	0.52	0.49	0.77
	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	
Year	1.51	1.48	1.55	1.34	1.48	0.44
	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths score	0.20	0.11	0.16	0.10	0.16	0.61
	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	
Maths level	0.50	0.35	0.42	0.40	0.43	0.08
	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	
Maths unified	0.47	0.37	0.42	0.39	0.42	0.16
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	
Area (overall)	-	-	-	-	-	0.53
- EE	0.25	0.26	0.27	0.22	0.25	0.36
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- EM	0.02	0.10	0.05	0.09	0.04	0.00
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	
- S	0.40	0.41	0.43	0.43	0.41	0.16
	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	
- WM	0.32	0.24	0.25	0.26	0.31	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Observations	1,061	1,128	1,077	1,194	2,092	6,552

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.185: Balance checks for all pupils in effort data

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
Female	0.47	0.47	0.46	0.45	0.48	0.65
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
White British	0.73	0.73	0.70	0.68	0.75	0.32
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
FSM	0.28	0.24	0.25	0.27	0.27	0.07
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
SEN	0.14	0.15	0.13	0.13	0.13	0.56
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.54	0.51	0.52	0.55	0.53	0.22
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Year	1.46	1.55	1.54	1.46	1.53	0.03
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths score	0.04	0.06	0.11	0.04	0.09	0.18
	(0.04)	(0.04)	(0.03)	(0.03)	(0.02)	
Maths level	0.40	0.27	0.38	0.33	0.39	0.62
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Maths unified	0.36	0.32	0.38	0.32	0.37	0.49
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Area (overall)	-	-	-	-	-	0.76
- EE	0.14	0.15	0.16	0.15	0.14	0.06
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- EM	0.30	0.29	0.29	0.29	0.29	0.53
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- S	0.26	0.28	0.28	0.28	0.27	0.05
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- WM	0.30	0.27	0.26	0.28	0.30	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Observations	1,896	1,901	1,780	1,837	3,638	11,052

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.186: Balance checks for all pupils in attendance data

9.41 Balance checks — non white working-class boys

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
White British	0.55	0.58	0.52	0.50	0.56	0.70
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
FSM	0.16	0.11	0.13	0.16	0.13	0.09
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
SEN	0.16	0.13	0.13	0.13	0.13	0.16
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.24	0.22	0.28	0.28	0.24	0.07
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year group	1.54	1.56	1.56	1.32	1.48	0.72
	(0.04)	(0.05)	(0.05)	(0.05)	(0.03)	
Maths score	0.20	0.14	0.20	0.18	0.26	0.98
	(0.07)	(0.06)	(0.05)	(0.05)	(0.04)	
Maths level	0.48	0.45	0.45	0.46	0.56	0.71
	(0.04)	(0.05)	(0.05)	(0.06)	(0.03)	
Maths unified	0.47	0.41	0.45	0.44	0.50	0.61
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
Area (overall)	-	-	-	-	-	0.93
- EE	0.17	0.19	0.19	0.20	0.18	0.48
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	
- EM	0.23	0.24	0.21	0.22	0.22	0.57
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- S	0.32	0.35	0.32	0.36	0.33	0.99
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- WM	0.28	0.23	0.27	0.22	0.27	0.95
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Observations	677	649	721	663	1,277	3,987

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.187: Balance checks for non-WWC boys in session 1 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
White British	0.50	0.54	0.49	0.46	0.56	0.17
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
FSM	0.18	0.13	0.13	0.17	0.15	0.03
	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	
SEN	0.14	0.15	0.12	0.12	0.11	0.59
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.26	0.25	0.29	0.30	0.26	0.21
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year group	1.43	1.33	1.43	1.30	1.48	0.98
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	
Maths score	0.23	0.10	0.27	0.20	0.29	0.67
	(0.07)	(0.07)	(0.06)	(0.06)	(0.05)	
Maths level	0.49	0.46	0.48	0.46	0.58	0.86
	(0.05)	(0.07)	(0.06)	(0.07)	(0.04)	
Maths unified	0.49	0.41	0.48	0.45	0.52	0.90
	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	
Area (overall)	-	-	-	-	-	0.02
- EE	0.16	0.15	0.18	0.14	0.18	0.53
	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	
- EM	0.25	0.25	0.21	0.23	0.19	0.14
	(0.03)	(0.02)	(0.02)	(0.03)	(0.01)	
- S	0.33	0.37	0.32	0.38	0.34	0.62
	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)	
- WM	0.26	0.23	0.29	0.24	0.29	0.16
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Observations	517	488	531	528	960	3,024

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.188: Balance checks for non-WWC boys in session 2 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
White British	0.55	0.56	0.49	0.48	0.58	0.99
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	
FSM	0.17	0.12	0.12	0.16	0.14	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
SEN	0.14	0.16	0.14	0.13	0.11	0.96
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
ACORN4/5	0.22	0.23	0.28	0.27	0.23	0.06
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Year	1.56	1.51	1.50	1.34	1.51	0.50
	(0.06)	(0.06)	(0.05)	(0.06)	(0.04)	
Maths score	0.32	0.18	0.30	0.30	0.44	0.85
	(0.09)	(0.07)	(0.07)	(0.07)	(0.05)	
Maths level	0.62	0.49	0.51	0.51	0.59	0.17
	(0.05)	(0.06)	(0.06)	(0.07)	(0.04)	
Maths unified	0.60	0.46	0.50	0.52	0.60	0.09
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	
Area (overall)	-	-	-	-	-	0.54
- EE	0.19	0.19	0.17	0.18	0.16	0.43
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- EM	0.01	0.09	0.04	0.06	0.04	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- S	0.41	0.46	0.45	0.46	0.44	0.24
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	
- WM	0.38	0.26	0.33	0.30	0.36	0.12
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Observations	380	380	405	422	695	2,282

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a “disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.189: Balance checks for non-WWC boys in effort data

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
White British	0.50	0.55	0.49	0.45	0.53	0.97
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
FSM	0.18	0.12	0.12	0.18	0.13	0.01
	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	
SEN	0.14	0.14	0.12	0.11	0.12	0.18
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.27	0.24	0.30	0.32	0.26	0.38
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year	1.50	1.54	1.52	1.46	1.57	0.76
	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	
Maths score	0.22	0.11	0.25	0.18	0.29	0.75
	(0.07)	(0.06)	(0.05)	(0.06)	(0.05)	
Maths level	0.55	0.45	0.48	0.44	0.56	0.31
	(0.04)	(0.06)	(0.05)	(0.05)	(0.03)	
Maths unified	0.51	0.40	0.47	0.43	0.52	0.38
	(0.04)	(0.03)	(0.03)	(0.04)	(0.02)	
Area (overall)	-	-	-	-	-	0.75
- EE	0.12	0.12	0.11	0.12	0.10	0.78
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
- EM	0.29	0.29	0.26	0.28	0.30	0.23
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- S	0.26	0.32	0.30	0.32	0.28	0.13
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- WM	0.33	0.27	0.32	0.28	0.32	0.92
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Observations	623	621	616	636	1,108	3,604

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.190: Balance checks for non-WWC boys in attendance data

9.42 Balance checks — non white working-class girls

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
White British	0.61	0.58	0.58	0.57	0.65	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
FSM	0.14	0.13	0.12	0.15	0.11	0.45
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	
SEN	0.08	0.08	0.06	0.10	0.07	0.28
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.26	0.25	0.26	0.29	0.23	0.98
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year group	1.56	1.53	1.54	1.27	1.52	0.76
	(0.05)	(0.05)	(0.06)	(0.05)	(0.04)	
Maths score	0.05	0.23	0.12	0.01	0.16	0.50
	(0.07)	(0.06)	(0.06)	(0.06)	(0.04)	
Maths level	0.35	0.20	0.39	0.38	0.40	0.58
	(0.05)	(0.06)	(0.05)	(0.06)	(0.04)	
Maths unified	0.33	0.37	0.38	0.32	0.40	0.29
	(0.04)	(0.04)	(0.03)	(0.04)	(0.02)	
Area (overall)	-	-	-	-	-	0.89
- EE	0.20	0.18	0.21	0.18	0.23	0.74
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- EM	0.24	0.27	0.29	0.25	0.23	0.10
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- S	0.35	0.37	0.35	0.39	0.35	0.85
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- WM	0.21	0.19	0.16	0.17	0.19	0.05
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Observations	543	583	546	518	1,130	3,320

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.191: Balance checks for non-WWC girls in session 1 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
White British	0.57	0.57	0.55	0.53	0.65	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
FSM	0.15	0.14	0.14	0.17	0.11	0.57
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
SEN	0.07	0.09	0.06	0.07	0.08	0.53
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.27	0.27	0.28	0.30	0.23	0.91
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year group	1.40	1.30	1.36	1.25	1.51	0.62
	(0.05)	(0.05)	(0.06)	(0.05)	(0.04)	
Maths score	0.09	0.24	0.09	-0.03	0.20	0.97
	(0.07)	(0.07)	(0.06)	(0.07)	(0.05)	
Maths level	0.41	0.17	0.39	0.38	0.46	0.82
	(0.06)	(0.07)	(0.07)	(0.07)	(0.04)	
Maths unified	0.37	0.38	0.37	0.30	0.45	0.94
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	
Area (overall)	-	-	-	-	-	0.03
- EE	0.18	0.15	0.21	0.16	0.23	0.31
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- EM	0.28	0.27	0.26	0.24	0.23	0.65
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- S	0.37	0.39	0.35	0.41	0.35	0.71
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
- WM	0.18	0.18	0.18	0.18	0.19	0.96
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Observations	424	455	416	421	853	2,569

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.192: Balance checks for non-WWC girls in session 2 data

	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	p-value
White British	0.64	0.62	0.62	0.57	0.69	0.13
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
FSM	0.13	0.12	0.13	0.14	0.10	0.99
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
SEN	0.06	0.08	0.04	0.07	0.07	0.40
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	
ACORN4/5	0.21	0.21	0.22	0.27	0.19	0.80
	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	
Year	1.49	1.38	1.48	1.26	1.55	0.90
	(0.07)	(0.06)	(0.06)	(0.07)	(0.05)	
Maths score	0.29	0.30	0.20	0.16	0.32	0.52
	(0.10)	(0.08)	(0.08)	(0.08)	(0.06)	
Maths level	0.51	0.38	0.50	0.58	0.44	0.89
	(0.07)	(0.09)	(0.06)	(0.08)	(0.05)	
Maths unified	0.50	0.48	0.46	0.47	0.48	0.55
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	
Area (overall)	-	-	-	-	-	0.34
- EE	0.21	0.20	0.24	0.20	0.24	0.39
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	
- EM	0.01	0.09	0.06	0.11	0.03	0.00
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	
- S	0.56	0.53	0.55	0.56	0.54	0.87
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	
- WM	0.22	0.18	0.15	0.13	0.18	0.03
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	
Observations	273	313	280	299	547	1,712

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a“disadvantaged” ACORN postcode) are all binary. Year group and all maths scores are continuous. “Maths score” is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; “maths level” relates to higher year groups. The “maths unified” metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.193: Balance checks for non-WWC girls in effort data

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Arm 5**	**p-value**
White British	0.58	0.58	0.56	0.51	0.60	0.74
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
FSM	0.14	0.11	0.11	0.17	0.12	0.11
	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	
SEN	0.06	0.08	0.06	0.08	0.06	0.72
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
ACORN4/5	0.28	0.25	0.27	0.33	0.26	0.62
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Year	1.50	1.55	1.55	1.40	1.67	0.50
	(0.05)	(0.06)	(0.06)	(0.05)	(0.04)	
Maths score	0.09	0.25	0.11	-0.01	0.16	0.81
	(0.08)	(0.06)	(0.06)	(0.07)	(0.05)	
Maths level	0.42	0.19	0.43	0.40	0.43	0.96
	(0.05)	(0.07)	(0.06)	(0.06)	(0.04)	
Maths unified	0.37	0.38	0.39	0.33	0.42	0.74
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	
Area (overall)	-	-	-	-	-	0.34
- EE	0.12	0.12	0.14	0.12	0.13	0.37
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	
- EM	0.32	0.32	0.34	0.31	0.33	0.49
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- S	0.29	0.32	0.33	0.34	0.31	0.09
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
- WM	0.27	0.24	0.19	0.22	0.23	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	
Observations	491	545	496	496	995	3,023

Notes: Clustered standard errors are in parentheses and p-values are from a robust regression of the characteristic on treatment dummy variables. FSM-eligibility, SEN status and ACORN 4/5 (living in a "disadvantaged" ACORN postcode) are all binary. Year group and all maths scores are continuous. "Maths score" is a standardised measure of Key Stage 2 attainment for Year 8 and 9 pupils; "maths level" relates to higher year groups. The "maths unified" metric is a marker which combines the Key Stage 2 scores and levels into a comparable measure of maths ability across all year groups.

Table 9.194: Balance checks for non-WWC girls in attendance data

9.43 Interaction of treatment with “white British” marker

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.063^{+}	−0.022	−0.045	−0.125	0.145
	(0.034)	(0.056)	(0.060)	(0.170)	(0.105)
Similarity prime	−0.006	−0.022	0.056	−0.078	−0.048
	(0.020)	(0.037)	(0.035)	(0.110)	(0.067)
White British	-0.073^{*}	-0.584^{**}	0.032	−0.049	−0.124
	(0.031)	(0.053)	(0.056)	(0.125)	(0.093)
Any role model x White British	−0.010	0.052	0.039	0.004	−0.037
	(0.036)	(0.062)	(0.066)	(0.165)	(0.114)
Constant	3.780^{**}	3.861^{**}	3.697^{**}	3.221^{**}	-0.717^{**}
	(0.053)	(0.094)	(0.095)	(0.359)	(0.182)
Observations	8,834	8,996	8,947	8,731	8,621

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.All models also control for FSM eligibility (binary), gender, SEN status (binary), month of birth, year group, the “maths unified” measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.195: Exploratory analysis — session 1 survey outcomes — all pupils — any role model versus control — interaction with “white British”

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.104**	−0.024	−0.009	−0.026	0.154
	(0.039)	(0.073)	(0.065)	(0.190)	(0.122)
Similarity prime	−0.015	−0.013	0.051	−0.057	−0.022
	(0.030)	(0.053)	(0.047)	(0.156)	(0.085)
White British	−0.076*	−0.576**	0.056	−0.048	−0.092
	(0.032)	(0.055)	(0.057)	(0.120)	(0.093)
University role model x White British	−0.019	0.042	−0.006	−0.144	−0.066
	(0.042)	(0.079)	(0.072)	(0.181)	(0.129)
Constant	3.757**	3.844**	3.677**	3.119**	−0.621**
	(0.062)	(0.107)	(0.112)	(0.386)	(0.189)
Observations	5,888	6,001	5,969	5,847	5,744

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), gender, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.196: Exploratory analysis — session 1 survey outcomes — all pupils — university role model versus control — interaction with "white British"

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.025	−0.016	−0.088	−0.204	0.110
	(0.038)	(0.063)	(0.071)	(0.208)	(0.124)
Similarity prime	−0.001	−0.038	0.060	−0.115	−0.063
	(0.027)	(0.050)	(0.051)	(0.153)	(0.102)
White British	-0.071^{*}	-0.590^{**}	0.014	−0.018	−0.143
	(0.031)	(0.055)	(0.058)	(0.121)	(0.095)
Apprenticeship role model x White British	−0.0003	0.061	0.086	0.152	0.002
	(0.040)	(0.069)	(0.078)	(0.198)	(0.134)
Constant	3.784^{**}	3.798^{**}	3.739^{**}	3.092^{**}	-0.920^{**}
	(0.047)	(0.113)	(0.111)	(0.450)	(0.216)
Observations	5,925	6,035	6,004	5,857	5,832

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.All models also control for FSM eligibility (binary), gender, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.197: Exploratory analysis — session 1 survey outcomes — all pupils — apprenticeship role model versus control — interaction with "white British"

9.44 Interaction of treatment with FSM eligibility

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.045^{*}	0.013	−0.040	−0.147	0.136^{+}
	(0.022)	(0.040)	(0.039)	(0.115)	(0.083)
Similarity prime	−0.006	−0.022	0.055	−0.078	−0.048
	(0.020)	(0.037)	(0.035)	(0.110)	(0.067)
FSM	-0.084^{**}	-0.111^{*}	−0.051	-0.373^{**}	0.060
	(0.026)	(0.055)	(0.047)	(0.100)	(0.086)
Any role model x FSM	0.043	0.017	0.094	0.101	−0.075
	(0.032)	(0.068)	(0.058)	(0.123)	(0.110)
Constant	3.794^{**}	3.835^{**}	3.693^{**}	3.238^{**}	-0.711^{**}
	(0.047)	(0.090)	(0.090)	(0.354)	(0.171)
Observations	8,834	8,996	8,947	8,731	8,621

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the “maths unified” measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.198: Exploratory analysis — session 1 survey outcomes — all pupils — any role model versus control — interaction with FSM

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.078**	−0.0004	−0.039	−0.135	0.120
	(0.026)	(0.047)	(0.044)	(0.139)	(0.091)
Similarity prime	−0.016	−0.013	0.049	−0.056	−0.021
	(0.030)	(0.053)	(0.047)	(0.156)	(0.084)
FSM	−0.085**	−0.100+	−0.050	−0.379**	0.050
	(0.027)	(0.055)	(0.047)	(0.100)	(0.086)
University role model x FSM	0.050	0.034	0.100	−0.001	−0.065
	(0.035)	(0.080)	(0.069)	(0.144)	(0.130)
Constant	3.772**	3.832**	3.696**	3.178**	−0.604**
	(0.059)	(0.105)	(0.109)	(0.380)	(0.182)
Observations	5,888	6,001	5,969	5,847	5,744

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.199: Exploratory analysis — session 1 survey outcomes — all pupils — university role model versus control — interaction with FSM

	ISQ total	University interest	Apprenticeship interest	Maths test	Lottery
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.016	0.031	−0.046	−0.143	0.136
	(0.027)	(0.047)	(0.049)	(0.143)	(0.108)
Similarity prime	−0.001	−0.038	0.061	−0.113	−0.064
	(0.027)	(0.050)	(0.051)	(0.154)	(0.102)
FSM	−0.083**	−0.109*	−0.050	−0.373**	0.068
	(0.027)	(0.055)	(0.047)	(0.098)	(0.086)
Apprenticeship role model x FSM	0.035	−0.007	0.086	0.201	−0.094
	(0.037)	(0.078)	(0.066)	(0.136)	(0.130)
Constant	3.790**	3.768**	3.710**	3.047**	−0.935**
	(0.041)	(0.109)	(0.107)	(0.451)	(0.206)
Observations	5,925	6,035	6,004	5,857	5,832

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for gender, whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.200: Exploratory analysis — session 1 survey outcomes — all pupils — apprenticeship role model versus control — interaction with FSM

9.45 Interaction of treatment with "female" marker

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.067**	0.001	0.013	−0.127	0.229**
	(0.025)	(0.043)	(0.041)	(0.122)	(0.085)
Similarity prime	−0.006	−0.022	0.056	−0.078	−0.048
	(0.020)	(0.037)	(0.035)	(0.110)	(0.067)
Female	0.105**	0.426**	−0.215**	−0.130	0.346**
	(0.024)	(0.050)	(0.046)	(0.081)	(0.089)
Any role model x Female	−0.024	0.035	−0.062	0.011	−0.235*
	(0.029)	(0.060)	(0.056)	(0.102)	(0.108)
Constant	3.777**	3.843**	3.654**	3.222**	−0.775**
	(0.048)	(0.091)	(0.091)	(0.352)	(0.173)
Observations	8,834	8,996	8,947	8,731	8,621

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.201: Exploratory analysis — session 1 survey outcomes — all pupils — any role model versus control — interaction with gender

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.093**	−0.001	0.001	−0.131	0.197*
	(0.029)	(0.051)	(0.048)	(0.149)	(0.098)
Similarity prime	−0.015	−0.013	0.051	−0.056	−0.022
	(0.030)	(0.053)	(0.047)	(0.156)	(0.084)
Female	0.107**	0.433**	−0.210**	−0.114	0.344**
	(0.024)	(0.051)	(0.046)	(0.081)	(0.090)
University role model x Female	−0.006	0.019	−0.031	−0.008	−0.192
	(0.034)	(0.069)	(0.065)	(0.118)	(0.129)
Constant	3.763**	3.831**	3.672**	3.176**	−0.639**
	(0.059)	(0.105)	(0.109)	(0.379)	(0.183)
Observations	5,888	6,001	5,969	5,847	5,744

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.202: Exploratory analysis — session 1 survey outcomes — all pupils — university role model versus control — interaction with gender

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.046	0.007	0.020	−0.107	0.244*
	(0.031)	(0.053)	(0.052)	(0.153)	(0.107)
Similarity prime	−0.001	−0.038	0.060	−0.114	−0.063
	(0.027)	(0.050)	(0.051)	(0.154)	(0.102)
Female	0.107**	0.426**	−0.219**	−0.137+	0.343**
	(0.024)	(0.051)	(0.046)	(0.080)	(0.089)
Apprenticeship role model x Female	−0.045	0.047	−0.095	0.032	−0.281*
	(0.034)	(0.068)	(0.065)	(0.121)	(0.122)
Constant	3.773**	3.781**	3.673**	3.027**	−0.999**
	(0.042)	(0.110)	(0.109)	(0.448)	(0.209)
Observations	5,925	6,035	6,004	5,857	5,832

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), whether a pupil is white British, SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.203: Exploratory analysis — session 1 survey outcomes — all pupils — apprenticeship role model versus control — interaction with gender

9.46 Interaction of treatment with WWCB marker

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Any role model	0.050*	0.027	−0.032	−0.141	0.088
	(0.022)	(0.039)	(0.038)	(0.115)	(0.079)
Similarity prime	−0.007	−0.029	0.056	−0.079	−0.050
	(0.020)	(0.037)	(0.035)	(0.110)	(0.066)
WWCB	−0.147**	−0.530**	0.096+	−0.136	−0.282**
	(0.029)	(0.056)	(0.054)	(0.096)	(0.101)
Any role model x WWCB	0.037	0.012	0.090	0.116	0.155
	(0.034)	(0.071)	(0.067)	(0.125)	(0.122)
Constant	3.786**	3.725**	3.544**	3.028**	−0.638**
	(0.043)	(0.084)	(0.081)	(0.349)	(0.164)
Observations	8,834	8,996	8,947	8,731	8,621

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the “maths unified” measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.204: Exploratory analysis — session 1 survey outcomes — all pupils — any role model versus control — interaction with WWCB marker

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
University role model	0.086**	−0.010	−0.036	−0.137	0.065
	(0.026)	(0.047)	(0.044)	(0.138)	(0.088)
Similarity prime	−0.015	−0.010	0.048	−0.058	−0.020
	(0.030)	(0.053)	(0.047)	(0.157)	(0.084)
WWCB	−0.144**	−0.529**	0.113*	−0.050	−0.296**
	(0.029)	(0.058)	(0.055)	(0.098)	(0.103)
University role model x WWCB	0.024	0.114	0.119	0.028	0.196
	(0.039)	(0.083)	(0.077)	(0.148)	(0.138)
Constant	3.779**	3.705**	3.562**	2.996**	−0.490**
	(0.054)	(0.096)	(0.097)	(0.378)	(0.171)
Observations	5,888	6,001	5,969	5,847	5,744

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses. All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the "maths unified" measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.205: Exploratory analysis — session 1 survey outcomes — all pupils — university role model versus control — interaction with WWCB marker

	ISQ total	*University interest*	*Apprenticeship interest*	*Maths test*	*Lottery*
	(1)	(2)	(3)	(4)	(5)
Apprenticeship role model	0.017	0.069	−0.034	−0.131	0.092
	(0.027)	(0.046)	(0.047)	(0.142)	(0.101)
Similarity prime	−0.004	−0.055	0.064	−0.111	−0.067
	(0.027)	(0.049)	(0.051)	(0.153)	(0.101)
WWCB	−0.138**	−0.533**	0.103+	−0.066	−0.305**
	(0.028)	(0.057)	(0.055)	(0.097)	(0.103)
Apprenticeship role model x WWCB	0.049	−0.095	0.062	0.190	0.114
	(0.040)	(0.083)	(0.080)	(0.145)	(0.142)
Constant	3.800**	3.644**	3.568**	3.012**	−0.865**
	(0.035)	(0.103)	(0.094)	(0.444)	(0.198)
Observations	5,925	6,035	6,004	5,857	5,832

Notes: +p <0.1; *p <0.05, **p <0.01, cluster robust standard errors in parentheses.All models also control for FSM eligibility (binary), SEN status (binary), month of birth, year group, the “maths unified” measures of attainment, the proportion of the class meeting the WWCB criteria, and a school dummy variable. Lottery entry is binary and analysed using binary logistic regression.

Table 9.206: Exploratory analysis — session 1 survey outcomes — all pupils — apprenticeship role model versus control — interaction with WWCB marker

9.47 Qualitative interview guide

SOMEONE LIKE ME

Working with schools to test the power of role models

Interview guide (Summer 2019)

Before the interview

- Create an ID number for the interview and write this number on the consent form.

Introduction

- I'll tell you a little bit about the project first. Then, I'll ask you to read the information sheet and sign if you are happy to take part.
- My name is Eliza and I am a researcher at a university called University College London.
- I am interested in how young people feel about education and the choices that they make after they leave school.
- You are one of [insert number] pupils at your school who have been chosen to take part in an interview.
- I would like to ask you some questions about how you feel about school, what you think you might do after you leave school.
- I will also show you a couple of short video clips and ask for your opinion on the videos.
- This interview will take around 20-25 minutes. There are no right or wrong answers. If you don't understand a question, just let me know. You can also stop the interview at any time without giving me a reason.
- I would like to record the interview so I can type it out later, but I will not share it anyone before taking out all information that would make you identifiable (such as your name). Your answers will not be linked back to you by anyone, so feel free to speak openly.
- Please sign the consent form if you are happy to take part.

Interview

[Turn on the recorder and state the id number]

Can you tell me a little bit about yourself?

- How old are you and where are you from?

Now I'm going to show you two short videos

For each video:

- How is X similar to you?
- How is X different to you?
- How much would you like to end up doing what they are doing?
- How likely do you think it is that you could end up doing what they are doing if you wanted to?
- How successful would you say X is?

Now I'm going to ask you a couple of questions about yourself

- What would you like to do when you leave school?
    - Why?
- What does 'success' mean to you?
    - Imagine you are 30 years old. What would you like your life to look like?

Now I would like you to compare the videos

- How similar are X and Y and him on a scale of 1-10?
    - How are they similar?
    - How are they different?
- Whose advice is more useful for students in your school?
- Whose advice is more useful for you?

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