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RESEARCH ARTICLE

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Misfits or misrecognition? Exploring STEMM degree students' concerns about non-completion

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Abstract

Reducing rates of degree non-completion and widening participation in STEM (Science, Technology, Engineering and Mathematics) are key international policy concerns. This paper analyzes open-ended response survey data from 1886 degree students in England, focusing on the 27% (n = 136/501) STEM and high-status medicine (STEMM) degree students and 26% (n = 367/1385) non-STEMM students who expressed concerns that they might not complete their degree. Insights are supplemented with two illustrative longitudinal case studies of young women, interviewed from age 10 to 21, who withdrew from their respective STEM degree courses. Around a quarter of both STEMM and non-STEMM students expressed concerns that they might not complete and reported similar types of concern, with academic concerns being of prime importance—but particularly so among STEMM students. The percentage of students expressing concerns varied between STEMM disciplines (from 18% of maths students to 37% of computing students) and by student demographics, with women, racially minoritized, and students from less affluent backgrounds appearing most likely to worry that they might not complete. A Bourdieusian lens is employed to interpret patterns in the findings, challenging human capital explanations of non-completion as due to individual student deficit ("misfits") with a sociostructural interpretation ("misrecognition") that draws

attention to the role of capital and symbolic violence in shaping differential risks of non-completion. Calls are made for the value of understanding STEMM student non-completion as a structural issue, not just individual "unprepared" students who do not "fit" their degree.

KEYWORDS
Bourdieu, non-completion, qualitative, STEM, students

1 | POLICY CONCERNS ABOUT (STEM) DEGREE NON-COMPLETION

In the United Kingdom, as in many international contexts, the topic of non-completion (also commonly termed "non-continuation," "withdrawal," "attrition," or "dropping out") in higher education is "rising up the political agenda" (Hillman, 2021, p. 1). This is despite the country recording relatively low levels of undergraduate non-completion compared with similar international contexts (Hillman, 2021), with c. 85% average completion rate based on 4-year degree course figures (Hillman, 2021). However, undergraduate non-completion constitutes "a considerable problem" (J. Johnes, 1997, p. 343) entailing a range of undesirable economic, social and/or emotional public and private costs (e.g., Yorke, 1999).

As Hillman (2021) notes, there is no consensus "on the best way to describe the phenomenon whereby some students enrol in higher education but then leave before completing their original target qualification" (p. 1). There are many difficulties associated with trying to define and measure student non-completion of university degrees. There is also considerable variation between international contexts in terms of how degrees are studied and how non-completion is defined and captured, making comparisons challenging (Thomas & Hovdhaugen, 2014). Indeed, even within a single national context, the task of accurately capturing non-completion is far from simple, for instance, requiring statistical disaggregation of students who withdraw from university without completing a degree course from those who change degree subject or course (but go on to complete a degree qualification, e.g., O'Keefe et al., 2011) and those who interrupt but later resume their studies (see Yorke, 1999 for discussion of definitions of non-completion).

A few commentators, such as O'Keefe et al. (2011) writing in the context of undergraduate health sciences non-completion and McCormack (2006) writing in the context of Ph.D. non-completion, suggest that university non-completion should not necessarily be interpreted as "failure" and may be part of a wider educational trajectory towards a goal more aligned with student aspirations and motivations. Some analyses also challenge the view that non-completion straightforwardly entails a negative economic impact on the chances of those who do not complete, arguing that data suggests that "some" study (even if incomplete) can relate to better economic outcomes than "no" study, as per Giani et al. (2019) study of US high school non-completion (although this view is contested by others, e.g., Hillman, 2021). For instance, J. Johnes and Taylor (1991) argue that the variability in undergraduate degree holders' economic outcomes is shaped by multiple factors, complicating the pattern whereby those who complete degrees record higher economic outcomes than those who do not. However, in general, there is a considerable concern across HE policy and practice on how to understand and address the ongoing phenomenon of undergraduate non-completion.

Particular attention has been drawn to the impact and implications of non-completion in high-priority subject areas, such as STEM. As Chen (2013, p. iii) discusses, policy-makers have argued for a strategic focus on reducing STEM degree attrition as a way to help boost the number of STEM graduates to "produce the STEM professionals that the nation needs." It has been noted that attrition is a particular concern in STEM degree fields (e.g., Gordon, 2016). In the United Kingdom, issues are particularly acute in computing degrees, which record lower enrolment and higher attrition than other STEM and non-STEM disciplines (see Chrysikos et al., 2017). In the United States,

extensive statistical analyses have been conducted on large national data sets by Chen (2013) and Rask (2010) to model and predict non-completion in STEM and thus inform efforts aimed at reducing it. In this context, STEM degree non-completion refers both to students who change from a STEM degree pathway to a non-STEM area and those who withdraw from STEM degree routes and leave university without a degree qualification. We additionally include students taking high-status medicine degrees in our focus (STEMM), recognizing that the latter constitute a "chronically understudied" population (Dou et al., 2021, p. 1) who have been found to align with STEM students on various characteristics, such as identifying with STEM (Dou et al., 2021) and, in the United Kingdom, taking science-rich courses and requiring similar subject and grade entry qualifications to STEM students.[1]

Notwithstanding the difficulty of measuring non-completion, figures suggest that undergraduate non-completion rates vary considerably between cultural contexts, universities, and subjects of study (J. Johnes, 1997) as well as between different student demographics (e.g., Rodgers, 2013; Whitcomb & Singh, 2021— although cf. Whitcomb et al., 2021). OECD (2017) data suggests that, internationally, women are more likely to complete degrees than men. In contexts such as the United Kingdom, Europe, and the United States, racially minoritized students and those from low-income families are at a higher risk of non-completion (e.g., Hillman, 2021; Müller & Klein, 2022), with some studies suggesting that attrition among racially minoritized students may be higher within STEM degrees (e.g., Morton & Parsons, 2018; Whitcomb & Singh, 2021). In the United Kingdom, more selective UK universities tend to record lower non-completion rates than less selective institutions (Hillman, 2021), but again with considerable variations between subject areas and some indication that racialized patterns in attrition are not evident when controlling for socioeconomic status (e.g., Rodgers, 2013). However, Bancroft's (2018) study of doctoral outcomes draws attention to the often-hidden ways in which racism operates to produce differentially racialized patterns of completion and "success." In this paper we seek to understand the views and experiences of UK STEM(M) degree students who perceive themselves to be at risk of non-completion, exploring whether there might be patterns between STEM disciplinary areas and student demographics.

2 | LITERATURE ON REASONS FOR NON-COMPLETION

The most influential research on student non-completion was conducted in the United States by Vincent Tinto (1993, 2012), notably his student integration theory. Tinto proposed that students who feel a sense of belonging and integration with the university—both socially and academically—are more likely to stay and complete their course. In terms of academic integration, Tinto identified the importance of both formal (e.g., academic performance) and informal (e.g., interactions with staff/faculty) factors. Similarly, he drew attention to the role of both formal (e.g., participation in extracurricular activities) and informal (e.g., peer group interactions) aspects of students' social integration. Tinto's work has been particularly helpful for drawing attention to the role of the learning environment within student non-completion—as opposed to focusing on deficits within particular students (Tinto, 1993).

Comparatively few studies have focused on the area of social integration, although those that do have drawn attention to the negative impact of experiences of social isolation and disconnect from peer groups and the impact this can have on attrition (e.g., G. Johnes and McNabb, 2004; Müller & Klein, 2022; Smith & Naylor, 2002; Yorke, 1999). Most research on non-completion has focused on academic preparedness and/or students' academic pre-entry attributes, exploring the lack of academic integration (or "mismatch") between students and the course and/or university in question (e.g., G. Johnes and McNabb, 2004)—or what others have termed the issue of student "preparedness" (e.g., Smith & Naylor, 2002; Yorke, 1999). This body of work examines both the involuntary attrition of students who are required to leave their degree course due to falling below sanctioned levels of attainment (G. Johnes and McNabb, 2004) and voluntary withdrawal due to feelings of being unable to "cope" academically (e.g., Heublein, 2014; Smith & Naylor, 2002; Yorke, 1999).

Subject-specific analyses have suggested that perceptions of mismatch between one's qualifications and attainment and the demands of the course are a particular issue within STEMM fields. For instance, J. Johnes (1997)

found that students with lower entry qualifications in the sciences were at greater risk of non-completion. Likewise, Arulampalam et al. (2004) found that in the United Kingdom, entry subject attainment constituted "the major influence on withdrawal by medical students," with lower entry qualification students being more likely to withdraw. However, Chen (2015) found that attrition from STEM degrees was also notable among high-attaining STEM students in the United States and suggested that the high demands of STEM courses play a part in this, particularly the intensity of coursework. This point was also noted by Kinnunen and Malmi (2006) in the Finnish context in relation to computer science degrees, with perceived difficulty of the course impacting on students' time and motivation to complete. Analyzing data from around 5000 students in US liberal arts college, Rask (2010) found that both absolute but also relative grades were important, that is, that harsher grading practices in STEM fields are associated with higher rates of attrition from STEM degrees. Studies have also drawn attention to the impact of students' experiences of integration and belonging (e.g., Strayhorn, 2018) versus disconnect in relation to course focus, content, and the link between the subject of study and future career aspirations (e.g., Ozga & Sukhnandan, 2002). As Seymour and Hewitt (1997) argue in their study of non-completion in science, a student's concerns about their ability to "cope" academically often play a key part in the process through which students come to leave their courses early but are not always simply reflections of actual academic attainment and can involve wider feelings of disillusionment with science and science-based careers, which lead them to question "whether getting the degree would be worth the effort and distress involved" (Seymour & Hewitt, 1997, p. 393).

While Tinto's work remains a significant and influential contribution to the field, it has also been critiqued (e.g., Hurtado and Carter, 1997; Pascarella & Terenzini, 2005). For instance, it has been argued that his ideas do not apply to all types of higher education institution (e.g., Braxton et al., 2000) and may be more applicable to students who attend full time and live on campus (e.g., Müller & Klein, 2022). In particular, the overwhelming majority of empirical evidence in support of Tinto's model hails from the United States and whether the model proves fruitful for explaining drop-out beyond the US higher education system remains an open question (Müller & Klein, 2022). Müller and Klein (2022) also noted that Tinto's model does not provide a good explanation for why working-class students in Germany experience higher rates of attrition than their more affluent peers.

A number of studies that have investigated the reasons for non-completion identify a wider range of factors than just those relating to academic and social integration—such as how personal, financial, health-related, and interpersonal difficulties can precipitate student withdrawal from their studies (e.g., Heublein, 2014; Yorke, 1999). This has led some researchers to seek to integrate additional interpretive models with Tinto's, such as Müller and Klein (2022), who found that rational choice theory better helped to account for the role of social stratification in exacerbating attrition.

In the United Kingdom, it has been argued that Tinto's work does not account for the impact of student finance on attrition (Brunsden et al., 2000; Whittaker, 2008). Moreover, an application of Tinto's model in the United Kingdom by Chrysikos et al. (2017) using data collected from 901 students found that "The quantitative data analysis outcomes indicated that Tinto's student integration theory provided a modest explanation of the student retention process in the UK university which was examined" (p. 113). In particular, it is found that the "major constructs of this theory, such as *academic integration* and *social integration*, did not differentiate significantly between those who showed persistence and those who dropped out" (Chrysikos et al., 2017, p. 113, emphasis in original). In other words, it seems that while Tinto's concepts may have relevance in the UK context, other factors also need to be considered to understand student non-completion in the United Kingdom.

In particular, Tinto's model appears to struggle to explain how and why the reasons for non-completion may vary between student demographics and/or subject areas. For instance, Ozga and Sukhnandan (2002) identified different factors shaping the likelihood of non-completion among younger versus mature students and found that personal health and finance issues are disproportionately likely to influence non-completion among mature students. Moreover, a literature review conducted by Ulriksen et al. (2010) concluded that while science, technology, and maths degree students who complete and those who do not complete degree courses face similar challenges, they tend to have different levels of resource available to them to help navigate or mitigate

these challenges. As a result, the authors argue that "it is important to shift from considering drop out as an individual problem for the student to regard it as a feature of the relationship between students and their study programmes."

In this paper, we seek to add to understanding of STEM student attrition in the United Kingdom through a qualitative exploration of students' self-reported perceptions of factors that risk their completion. In particular, we hope to see what additional insights a sociological conceptual lens might offer to understanding attrition across different STEM disciplines and in relation to key student demographics.

3 | THEORETICAL APPROACH

As discussed above, much of the existing research on undergraduate non-completion has tended to involve quantitative studies in which university data sets are modeled to predict the demographics and factors associated with non-completion, with the aim of using these insights to inform approaches and interventions to reduce or minimize non-completion. Arguably, much of this work has been conducted from a positivistic perspective and has tended to use normative and in some cases, arguably, deficit interpretations of non-completion, framing non-completion as due to a lack, deficiency or failure on behalf of the student. For instance, Yorke (1999, p. 3) describes the issue of mismatch between student and university as reflecting the student's "failure to cope satisfactorily with the higher education environment in which they found themselves." Likewise, he refers to how these students' choices of program and institution are often "unsoundly grounded" (p. 1). Within such accounts, responsibility is placed on the student to adapt to the university context, rather than recognizing any responsibility for change on behalf of the institution, as illustrated by Yorke's observation that "Entering higher education requires considerable adjustment […] Some [students] make the adjustment well, others do not" (p. 1).

In this paper, we follow the tradition of the smaller number of (primarily) qualitative studies that use a sociological lens, drawing attention to the role of structural and institutional practices and injustices in creating and sustaining particular patterns of non-completion (e.g., Barefoot, 2007; Ozga & Sukhnandan, 2002). Rather than blaming the ("nontraditional") student for their "lack of fit" with a given university or degree course, consideration is given to how patterns of non-completion may reflect wider relations on inequality by race, class, gender, and so on (e.g., Davis et al., 2004; Hurtado et al., 2010; Whitcomb & Singh, 2021).

In particular, we draw on the theoretical framework of Bourdieu (e.g., 1984). Bourdieu's work explains how a person's educational trajectory and outcomes are not simply the "fair" result of their "natural talent" and effort within a meritocratic system. Rather, as Bourdieu and Passeron (1990) explain, educational outcomes and trajectories are profoundly shaped by the uneven distribution of capital (social, economic, cultural, and symbolic resources) and the interaction of capital with habitus (socialized frameworks of disposition that shape what feels "right" for "people like me") within a given field (socio-spatial relations of power that determine the "rules of the game" and what habitus/capital are valued and able to be used to produce value). Together, these processes ensure the social reproduction of relations of privilege and subordination through education, producing unequal classed (gendered, racialized, etc.) patterns of educational outcomes and trajectories. Hence, for example, working-class students are less likely than their middle-class peers to go to university and when they do are more likely to study lower status courses at lower status institutions (e.g., Reay et al., 2021) and are more likely to be at risk of non-completion due to feeling "out of place," experiencing greater challenges and risks as a result of more precarious financial and/or academic situations (e.g., Archer et al., 2003).

As Bourdieu explains, part of the power of these processes of social reproduction rests on their ability to remain "hidden" or obscured and the results accepted as "natural"—a process that he terms "misrecognition."

> Misrecognition of the social determinants of the educational career—and therefore of the social trajectory it helps to determine—gives the educational certificate the value of a natural right and

> makes the educational system one of the fundamental agencies of the maintenance of the social order. (Bourdieu, 1984, p. 387)

In other words, misrecognition refers to the way in which "underlying processes and generating structures of fields are not consciously acknowledged in terms of the social differentiation they perpetuate" (Grenfell & James, 1998, pp. 23–24). As a result, "social classifications are transformed into academic ones" (pp. 23–24). As Bourdieu discusses, misrecognition is a powerful and effective way of maintaining domination as it does not require force, coercion, or even explicit persuasion. Rather, it operates as a form of symbolic violence ("the violence which is exercised upon a social agent with his or her complicity," see Bourdieu & Wacquant, 1992, p. 167), in which the dominated to some extent "buy into" ideas of the "natural order" (Poupeau, 2001).

Through these mechanisms, students come to "know" and accept their "place" in the social and educational hierarchy—with options that go against the grain of social reproduction being excluded as undesirable, unthinkable, or "not for me." While Bourdieu primarily focuses on the classed nature of social reproduction through education, other scholars have drawn attention to the intersectional (e.g., classed, gendered, and racialized) ways in which social hierarchies are reproduced through unmeritocratic elite HE admissions practices (Boliver, 2017), patterns of student "choice" (e.g., Reay et al., 2001) and practices within universities whereby female, racialized and classed bodies are made to feel "out of place" (e.g., Puwar, 2004).

Hence, we draw on Bourdieu's conceptual framework to inform an analysis of the views and experiences of UK STEM degree students who perceive themselves to be at risk of non-completion. We hope that focusing on those who are still on course and feel at risk of non-completion (not just those who have already withdrawn) and using an analytic lens foregrounding social inequalities and misrecognition might offer new insights into understanding and addressing the risks to non-completion. In particular, we ask:

- To what extent are STEMM degree students worried about completion, or not? Among those who are worried about not completing, are there any patterns between (i) STEMM versus non-STEMM degree areas and (ii) STEMM disciplines?
- What reasons/factors do students identify as risking their completion?
- To what extent do findings resonate, or not with existing evidence and theories of non-completion? What additional insights, if any, might a Bourdieusian interpretation offer conceptually and for STEMM policy/practice to help support more inclusive retention?

4 | METHODS

We draw on a convergent parallel, mixed methods study, the [NAME] project, a 13-year research project conducted in England, tracking young people's educational and career trajectories from age 10–23, funded by [Funder]. The study involves (i) repeated cross-sectional surveys with a representative sample of young people from the cohort of all those in England who were born between September 1, 1998 and August 31, 1999 (with waves conducted in the final year of primary school, age 10–11, throughout secondary school, at ages 12–13, 13–14, 15–16, 17–18) and the most recent wave, reported in this paper, at age 21–22 and (ii) longitudinal interviews with a sample of 50 young people and 34 of their parents, conducted at the same time points. In this paper we focus only on data from the 2245 young people in the sample on the latest survey who were currently studying for a university degree—and specifically, the open-ended responses provided in response to a question asking if students had any concerns that they might not complete. We also draw on two illustrative case studies drawn from the tracked interview sample with the two young people in this sample who had withdrawn from an undergraduate degree course (Bethany2 and Victoria).

4.1 | Open-ended survey response data

We focus on 1886 students in our sample who were currently aged 21–22 and were classified as currently studying for either "STEMM" (Science, Technology, Engineering, Mathematics or high-status Medicine) degrees or "non-STEMM" degrees. Of these students, 503 expressed one or more concerns about completion, comprising 27% (n = 136/501) STEMM degree students and 26% (n = 367/1385) non-STEMM students. This sample is drawn from the wider postal survey sample of 7635 young people, which included young people in various forms of employment and training and those who had never been to university as well as those currently studying and those who had graduated. The wider sample was recruited on the basis that they lived in England, were born between September 1, 1998 and August 31, 1999 and registered on the Open Electoral Roll. The total survey sample had over-sampled young people from underrepresented demographics (namely gender, ethnicity, and Index of Multiple Deprivation, IMD[2]), in line with the overall study interest in understanding what causes underrepresentation in STEM. For this paper, we included high-status medical degree students (e.g., Medicine, Dentistry) as part of the STEMM sample, given that course entry requires high grades in one or more advanced level science qualification and that course-content is highly science-based.

The overall questionnaire was wide-ranging and explored young people's aspirations and expectations, influences on these destinations post-18 and numerous other areas including demographic data. It builds on previous surveys, the development and validation of which have been described elsewhere (e.g., DeWitt et al., 2011). In this paper, we focus on open-ended responses from the current degree students who answered the free response question: "Do you have any worries about completing your current degree/training programme? If so, what are they?" A point of note here is that the survey only asked students about their concerns about completion, not factors supporting completion, so this may have influenced our findings. For instance, it is possible that had we asked students what they felt was helping to support their completion then issues such as social integration may have emerged more strongly (as discussed later). It is also possible that students' responses were shaped by the impact of the global pandemic and lockdowns, which impacted the students in our sample.

Coding of the open-response data was conducted by the lead author, initially using three overarching thematic areas derived from the literature (academic factors, social factors, other factors) and using an iterative, inductive and deductive approach to refine and identify any subthemes within these thematic areas. This process led to the identification of two subthemes within the academic category ("not feeling clever enough" and "hard/difficult course") and four subthemes within the "other" category (financial factors; mental and physical health and disability; impact of Covid; family caring responsibilities). Where responses indicated more than one factor, each factor was coded separately. For instance, a response of "money, stress and health concerns" was coded under both financial and health categories. Coded extracts were then categorized by student demographic and course details to enable comparison of frequencies and to identify potential (albeit tentative, due to often small numbers) trends.

4.2 | Interview sample and analysis

The analysis also draws on two illustrative case studies from the interview data, with young women (Bethany2 and Victoria) who were chosen on the basis that they were the only young people in our qualitative sample who had started, but then withdrawn from a STEM degree programme. They were drawn from the wider study sample of 50 young people and their parents who had been longitudinally interviewed from age 10–21 and were originally recruited at age 10, via a stratified sample of primary schools, selected for being broadly representative of schools nationally regarding region and key pupil demographics (gender, ethnicity, eligibility for free school meals) and inviting participation. Bethany2 and Victoria were interviewed at six time points: at the end of primary school (age 10), through compulsory secondary education (at ages 12/13, 13/14, 15/16) and at ages 17/18 and 20/21. We also

draw on interviews conducted at five time points with their respective parents (parental interviews were not conducted when children were age 13/14). Most interviews were conducted face-to-face, although all interviews at age 20–21 were conducted virtually due to the COVID-19 pandemic and national lockdowns. Parental interviews and recent young person interviews typically lasted around 1.5 h but interviews were shorter when children were younger (e.g., typically around 30 min at age 10). Interviews were recorded and professionally transcribed. Participants chose their own pseudonyms.

Bethany2 identifies as a White British young woman. Her parents both work in clerical positions after previous careers as police officer and retail manager. Her aspirations changed frequently over the years (including teacher, nurse, surgeon, architect, and scientist) but at age 17, she aspired to take a computer science degree with the idea of becoming a data programmer or working in AI. She took A levels in English, Sociology, and ICT (gaining C, C, D grades) and was offered an unconditional place to study computer science at a post-1992 university. Bethany2 started her degree but withdrew and moved home a couple of months later where she took up full-time employment in the retail store where she had previously held a part-time job (and where her mother had worked previously). She went on to complete a retail apprenticeship and moved to a new employer. At the age of 21 she remained in full-time employment, living at home, and had no plans to apply again to university.

Victoria identifies as a White British young woman. Her father works in personal security and had previously served in the forces. Victoria had a long-standing aspiration to become an engineer. She took A levels in Design Technology, Politics, and Mathematics (gaining two C and one E grades) and completed a foundation in engineering course before starting a degree in electrical engineering at a post-1992 university. She withdrew before the end of the first year of the full degree. At age 21, Victoria was working in a bank and considering applying to the police force.

Interview protocols were semistructured, and themes covered were informed by the literature and iteratively developed over the course of the study to capture the (changing) nature and range of influences on young people's educational and occupational aspirations and trajectories. Key themes included: favourite and least favourite school subjects, views and experiences of school science (generally and by disciplinary area); STEM, subject experiences, preferences/dislikes; aspirations; reasons for and influences on aspirations; educational and occupational choices and reasons for these; out-of-school interests; experiences of careers advice, guidance; experiences of outreach and work experience.

For this paper, the case studies are treated as supporting/supplemental data in relation to the open-ended response coding. Interview transcripts were thus analyzed and coded using the survey sample coding frame, to explore the extent to which they illustrated or deviated from the emergent findings from the survey sample and might provide an additional depth of understanding of the key issues raised.

5 | FINDINGS

5.1 | Who expresses concerns about non-completion?

As summarized in Table 1, on the survey, 27% of all STEMM students expressed a concern that they might not complete their degree. This figure is roughly comparable with overall UK degree completion rates which, in the most recent calculations at the time of writing was around 85%, based on 4-year course completion (Hillman, 2021). Within STEMM students, as Figure 1 shows, the percentage of students who expressed worries about completing their current degree varied between subject areas, from 18% in mathematics to 37% in computing.

Our analysis of the open-ended survey response data is constrained by the small numbers of students involved, particularly when attempting to explore trends by subgroups. However, the raw figures hint that there might be some potentially interesting indicative patterns across gender, ethnicity, and IMD—although the sample is too small

TABLE 1 Mapping of student responses by demographics and STEMM subject area.

	Gender			Ethnicity			Index of Multiple deprivation (IMD)			
	Men	Women	Nonbinary/Other/ Prefer not to say	White	Racially minoritied	Prefer not to say	IMD1 + 2	IMD3	IMD4 + 5	Total
Biology										
All	12	37	3	34	15	3	26	14	12	**52**
Expressed concerns	3 (25%)	12 (32%)	1 (33%)	9 (26%)	5 (33%)	2 (67%)	12 (46%)	2 (14%)	2 (17%)	**16 (31%)**
Chemistry										
All	26	30	0	35	21	0	20	21	15	**56**
Expressed concerns	3 (12%)	10 (33%)	0	5 (14%)	8 (38%)	0	6 (30%)	5 (24%)	2 (13%)	**13 (23%)**
Physics										
All	15	6	1	20	2	0	9	4	9	**22**
Expressed concerns	5 (33%)	0	0	5 (25%)	0	0	3 (33%)	1 (25%)	1 (11%)	**5 (23%)**
Maths										
All	25	13	2	25	13	2	18	12	10	**40**
Expressed concerns	4 (16%)	3 (23%)	0	5 (20%)	2 (15%)	0	3 (17%)	1 (8%)	3 (30%)	**7 (18%)**
Engineering										
All	62	15	2	48	30	1	31	17	31	**79**
Expressed concerns	12 (19%)	7 (47%)	0	13 (27%)	6 (20%)	0	5 (16%)	7 (41%)	7 (23%)	**19 (24%)**
Computing										
All	56	10	2	39	29	0	24	15	29	**68**
Expressed concerns	21 (38%)	4 (40%)	0	13 (33%)	12 (41%)	0	8 (33%)	6 (40%)	11 (38%)	**25 (37%)**

TABLE 1 (Continued)

	Gender			Ethnicity			Index of Multiple deprivation (IMD)			
	Men	Women	Nonbinary/Other/ Prefer not to say	White	Racially minoritied	Prefer not to say	IMD1 + 2	IMD3	IMD4 + 5	Total
High status medicine										
All	45	131	4	67	109	4	78	38	64	**180**
Expressed concerns	13 (29%)	38 (29%)	0	17 (25%)	33 (30%)	1 (25%	25 (32%)	7 (18%)	19 (30%)	**51 (28%)**
Broad STEM										
All	1	1	2	4	0	0	0	4	0	**4**
Expressed concerns	0	0	0	0	0	0	0	0	0	**0**
Total STEMM										
All	242	243	16	272	219	10	206	125	170	501
Expressed concerns	61 (25%)	74 (30%)	1 (6%)	67 (25%)	66 (30%)	3 (30%)	62 (30%)	29 (23%)	45 (26%)	136 (27%)
Total non-STEMM										
All	382	928	75	957	407	21	590	248	547	1385
Expressed concerns	92 (24%)	258 (28%)	17 (23%)	253 (26%)	112 (28%)	2 (10%)	167 (28%)	66 (27%)	134 (24%)	367 (26%)

Abbreviation: STEMM, science, technology, engineering, mathematics and high-status medicine.

TABLE 2 Number of reasons given by students for (perceived risk of) non-completion by subject area.

Degree	Academic (*not clever/hard course*)[a]	Social	Other			
			Financial	Health	Covid	Family
Biology	8 (*5/3*)	/	4	1	3	/
Chemistry	8 (*2/2*)	1	3	1	1	/
Physics	4 (*1/3*)	/	1			/
Maths	5 (*2/3*)	/	/	1	1	/
Engineering	7 (*2/5*)	1	3	1	8	/
Computing	9 (*2/7*)	/	6	4	6	/
High-status medicine	17 (*8/9*)	1	22	5	5	1
Total STEMM	58 (*22/36*)	3	39	13	24	1
Specific reason among "concerned" STEMM students ($n = 136$)	(43%) (*37.9%/62%*)	(2%)	(29%)	(10%)	(18%)	(1%)
Total non-STEMM	130 (*32/98*)	/	110	42	68	17
Specific reason among "concerned" non-STEMM students ($n = 367$)	(35%) (*24.6%/75.4%*)	(0%)	(29%)	(11%)	(19%)	(5%)

Abbreviation: STEMM, science, technology, engineering, mathematics and high-status medicine.

[a]Brackets denote number of responses coded by subcategories of (not clever/hard course).

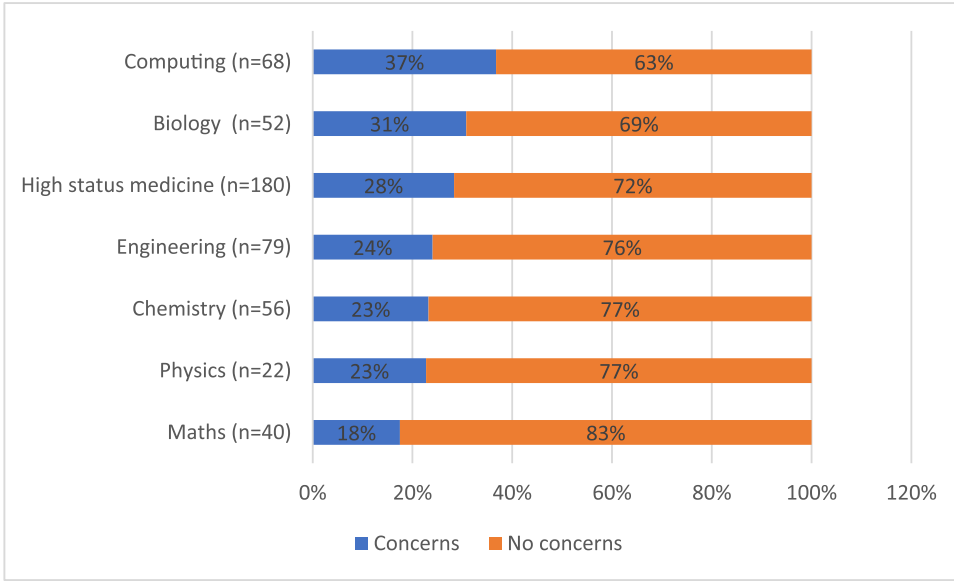

FIGURE 1 Percentage of students expressing concerns, by subject area.

to be able to investigate these with confidence. For instance, as detailed in Table 1, there appear to be some potential significant differences such as in chemistry, a higher percentage of racially minoritized students than White students worried that they might not complete and in engineering, a higher percentage of women than men expressed such concerns, and so on.

5.2 | What factors/reasons do students identify as risking their non-completion?

Table 2 summarizes the number of coded reasons given by students, broken down by subject area, STEMM, and non-STEMM. Generally, across both STEMM and non-STEMM areas, academic factors were the most frequently identified reasons for a perceived risk of non-completion (although this was not the case in high-status medicine and engineering, in which financial factors and Covid were the top cited reasons, respectively). Social reasons were given by very small number of individuals. Overall, financial issues were the next most commonly cited factor identified among both STEMM and non-STEMM students, followed by the Covid-19 pandemic, then mental and physical health concerns (including SEND and disabilities). An additional other category of family reasons (predominantly caring responsibilities for children and/or elders) was also identified predominantly in the non-STEMM student data. However, if "other" factors are grouped together, they exceed the prevalence of academic and social factors combined. We next explore more qualitatively the nature of concerns expressed by students as factors that contributed to the risk of their non-completion.

5.2.1 | Academic concerns: not feeling "clever enough" and "hard course"

Nearly half of all STEMM students identified academic issues as reasons for worrying that they might not complete. Many students expressed a concern that they might "fail" and not pass their degree. These concerns were noted across STEMM, non-STEMM, and between STEMM subject areas, for instance:

> "Yes, worried about failing" (Black woman, IMD1, computer science degree) "Worried about failing my exams" (White woman, IMD5, non-STEMM degree) "Sometimes I feel like I am struggling to reach the required academic level" (White woman, IMD3, engineering degree).

Only a very small number of individuals explicitly reported that they had low attainment, were failing, at risk of not being progressed to the next year and/or had retaken a year due to low attainment (e.g., one student wrote how he had retaken a year due to low attainment and was "on thin ice", Chinese man, IMD 5, medical degree). The majority of responses were framed as general concerns about coping with the academic demands of their course and provided no further context about current attainment.

Within students' academic concerns, we noted two related but contrasting themes on how these difficulties were articulated. The first of these comprised students who questioned their own intellectual competence and ability, as "not clever/smart enough," for instance:

> That I might not be intelligent enough or good enough. (Asian woman, IMD4, chemistry degree)
>
> Being good enough. (Other Ethnicity woman, IMD1, biology degree)
>
> Pressure—not intelligent enough. (Other ethnicity woman, IMD1, medical degree)
>
> Don't feel smart enough. (White woman, IMD3, chemistry degree)

My own ability and if I'm actually smart enough to complete it (White woman, IMD2, biological degree)

Not being smart enough (Asian woman, IMD4, non-STEM degree)

The second theme reflected the attribution of academic concerns to a "hard/difficult course," for instance:

Difficult (Asian Man, IMD4, maths degree)

It's quite stressful and a very intense course. (White woman, IMD3, engineering degree)

Stress, difficulty (Asian man, IMD2, medical degree)

Money and intensity of hard science degrees (Prefer not to say ethnicity man, IMD3, biomedical degree)

It's a very hard degree (White woman IMD3, medicine degree)

I have found my degree extremely hard, (White woman, IMD2, medicine)

While the response numbers are small, we noted that among those students expressing academic concerns, women and those from low-income backgrounds seemed to be more likely to express a concern that they are "not intelligent enough" whereas men and students from high-income backgrounds were proportionally more likely to attribute concerns to a "hard/difficult course." For instance, of those students expressing academic concerns, over 70% of men attributed these to the "hard course" whereas a similar percentage (68%) of women used the notion of being "not clever enough." Similarly, around two-thirds of low IMD students felt not clever enough, whereas almost three-quarters of high IMD students attributed academic concerns to the "hard course." Patterns in terms of ethnicity were harder to discern as they interacted with gender and class, in that white working-class women and racially minoritized women from across IMD quintiles were more likely to articulate academic concerns in terms of feeling "not clever enough." Numbers became too small to be able to identify any definitive trends in relation to subject areas.

Many students elaborated on how the demands of their "hard course" impacted on their motivation and interest. For instance, one white male student (IMD3) expressed "concern over losing motivation" as a result of the long, hard chemistry degree course that he was studying. Another student also described how the long hard course had led to him experiencing a "severe lack of interest in mathematics and fail to see useful application beyond university" (White man, IMD4, maths degree). For some students, the difficulty of their course was amplified by their lack of support—either as the first member of their family to access HE or due to the structure of the course and/or the pandemic:

Yes. I have nobody in my family to help me in my education because I am the first to be leading the university life. It is a hard course and I do try my best but I accept that even I have my limitations (Prefer not to say gender/ethnicity, IMD2, biology degree)

The lack of contact time and the lack of support by lecturers/teaching staff (White woman, IMD3, biology degree)

Overwhelming amounts of information without a great deal of one-to-one or small group teaching opportunities to ask questions about it, especially over Covid when tutors aren't in their offices (Asian woman, IMD2, chemistry degree)

5.2.2 | Social factors

We only found a very few instances of students identifying social factors and a lack of social integration as posing a risk to their completion—although as noted in the methods, this may have been due to our methodology. Only one survey response mentioned that feelings of social isolation from peers were a factor risking their non-completion:

> I also haven't made a single friend because I am very shy and barely speak. It's taking its toll on my mental health more and more through the years of being friendless (White man, IMD3, engineering degree)

However, we did also record two examples in which students (both white, working-class women) described feeling "out of place" (Puwar, 2004) in social class terms, which they gave as a factor that risked their successful completion:

> Class divide is my main worry. Coming from a working-class background, it can be very scary in middle/upper class environments (White woman, IMD3, chemistry degree)

> I feel hindered by my spoken English, I wasn't brought up to talk properly and I struggle to pronounce a lot of medical jargon. It's enough of a difference that it's been pointed out and laughed at by my peers (White woman, IMD2, medicine degree)

As these young women explain, such experiences were "very scary" and, as the second quote describes, had involved class denigration and feelings of inauthenticity and embarrassment.

Whereas Tinto's model focuses on the dangers of a lack of social integration, we also noted that a couple of survey responses hinted at the potential risk factor posed where a high degree of social integration and investment in peers and/or extra curricula sports was felt to pose a risk to academic attainment and completion. As one student explained, he was finding it "hard to balance social life with studying" (White man, IMD 3, non-STEM degree).

5.2.3 | Other concerns (i) money/finances

Over a quarter of all STEMM students identified concerns about money and finances as posing a risk to their completion—an issue that was similarly raised by non-STEMM students. Within STEMM students, only maths students did not mention this issue (although this subject also had the smallest number of students raising concerns). Financial risks were raised most frequently by students studying medicine, perhaps reflecting the long duration of medical degrees, during which time many students would accrue high levels of student debt. As illustrated by the following quotes, money issues were particularly voiced by students from lower IMD quintiles, who also explained how they had to struggle to balance paid work and study, increasing their risk of lower attainment and/or non-completion:

> Money (Black woman, IMD1, biology degree)

> Finances—very difficult (Asian woman, IMD2, medicine degree)

> Balancing paid work with studies, and my ability to achieve good grades (White woman, IMD2, medical degree)

We also found that financial concerns were voiced by those from the highest IMD quintile as an issue threatening their non-completion. For instance:

> The student loan always makes me sad due to in my mind its debt and I have seen what debt can do to people and always have wanted to avoid it since not ever been in debt before: (White man, IMD5, computer science degree)

> There are a few financial stresses as the loan does not even cover my tuition fees let alone my maintenance needs (White man, IMD5, biomedical degree)

5.2.4 | Other concerns (ii) Covid-19 pandemic

Unsurprisingly, students from across STEMM and non-STEMM subject areas and across the STEMM disciplines felt that the Covid-19 pandemic had posed risks to their progress and potential completion. This was particularly noticeable in engineering. Typical responses included:

> Covid has made the last year or two very difficult and has ruined the university experience both academically and socially (Other ethnicity woman, IMD4, engineering degree)

> Yes, remote studying sucks and has negatively impacted my learning (Middle-Eastern man, IMD2, engineering degree)

> Yeah, I've fallen so far behind during the pandemic that I might not pass (White woman, IMD4, biology degree)

While the impact of the global pandemic and the challenges of remote learning was an issue for all students and not just those taking STEM degrees, the latter drew attention to the particular problems that they had experienced as a result of missing out on laboratory, practical and inquiry-based side of their courses as well as lost placements (that are often a feature within many STEM degrees) which they felt negatively impacted both their learning and skills and future prospects:

> Missed placement time due to COVID (White man, IMD5, medicine degree)

> Exams are always a worry, especially with medical exams and covid pandemic has made it more difficult to get the same level of exposure on placement as before it (Asian Woman IMD1, medicine degree).

5.2.5 | Other concerns (iii) mental and physical health and/or disability

Mirroring trends in the wider literature, personal mental and physical health concerns were mentioned consistently albeit by a relatively smaller number of students as posing risks to their successful completion. This theme was noted across STEM and non-STEM students and across the STEM disciplines. While a small number of students drew attention to the challenges that particular physical health conditions posed to their learning, progress, and completion (e.g., the impact of a chronic health condition) the majority of concerns raised were in relation to mental health. For instance:

My main worry is that my mental health may deteriorate, and I may need to stop my degree in order to protect myself (White woman, IMD3, biology degree)

Effect on mental, physical and social heath Taking a longer than usual to complete (Asian woman, IMD5, medicine degree)

I'm currently suffering from depression/anxiety which has restricted me significantly in the field of studying, working and self-development. (White man, IMD4, engineering degree)

Money and mental health and mental capacity. (Chinese woman, IMD5, medical degree)

5.2.6 | Other concerns: (iv) family caring responsibilities

Caring responsibilities for family members were only mentioned by a relatively small proportion of students, and more often by those taking non-STEMM degrees (5% vs. 1%). However, even in this small sample, we noted that these reasons were predominantly voiced by women from lower IMD quintiles:

I have a lot of other family commitments including being my mother's carer that are making it difficult to complete my current degree (White Woman, IMD2, non-STEMM degree)

I worry because I am a student with a 1-year-old son and money is very tight as a student (White woman, IMD3, non-STEMM degree)

I have not been doing well this year due to work and family commitments (Asian woman, IMD2 2, non-STEMM degree)

"Having to support family." (White woman IMD2, medicine degree)

While the small sample size precludes drawing clear interpretations, we suggest that one potential reason for this trends could be the greater proportion of mature students taking non-STEMM degrees, compared with STEMM degrees (e.g., HESA, 2010[3]) as mature students may be more likely to have childcare and other caring responsibilities.

5.3 | Contextualizing the survey themes in relation to the two longitudinal case study students

The two case studies, of Bethany and Victoria, confirmed the importance of academic concerns that were found in the open-ended survey responses. For instance, Bethany2 described experiencing a mismatch between herself and the academic identity and demands of the computer science degree course—as she realized that she was "not a coder" and struggled to "understand it properly," evoking both an issue with the course and with her own academic capabilities:

I didn't pick the right course [Interviewer: Okay] I changed my mind about it, I knew fairly quickly that I didn't really want to do that course, so … […] Um … I think it was just kind of like … I don't think it was what I was expecting when I went. So … […] I think it's just I'm not like … I'm not a coder, so I

> don't understand it properly. And obviously computer science, that is like the main part of it, so yeah I wasn't really suited to that course after all. [...] I think it was partly because of the course and partly because I just wasn't ready to go. So I just came home.

In Victoria's case, she experienced a painful disconnect between her academic attainment and declining self-confidence and the nature, expectations, and demands of the degree course, which differed considerably from her foundation degree:

> Oh, the foundation degree, I really liked when we were learning about things that in my head applied more to everyday life. So like buildings and why this happens and why that happens. And then all of a sudden, I was doing the things that I had to do because [sponsor organization] said 'Right you either do mechanical or electrical [engineering]'. I almost feel my brain just glazed over and go 'Oh this is so boring'. [...] I feel like if I were not involved with [sponsor] when I did the foundation degree I would have gone more towards the ergonomic route [...] But I didn't, and I did the second year of electrical, and then it was all just a bit of a mess.

As Victoria explained, she found the academic demands of her electrical and electronic engineering degree highly challenging, which she attributed to not feeling that she was "clever enough":

> It was really, really hard and I didn't think I was clever enough, so I came out of that [...] I was just like 'Oh my God this is so hard! Really don't like it'—and I'm not even remotely interested in it—I can't do three years of this. If I carry on I'll fail, I'll just be in more debt—and it was a very trying time, like me and my dad had massive arguments about it. But I was still involved with [sponsor organization] at that point as well, so I was going down that route of 'how am I going to get out of that?' [...] So I just went to them and I said mentally this is getting very tough, because it's almost like going down a rabbit hole of I don't feel good enough to do it ... lik**e** clever enough to do it, so then when I try to do it and I fail ... which I was, I was failing my exams and things, but even more-so getting worried and upset and then trying and failing again and feeding into each other.

Analysis of the two case studies also similarly suggested that issues with social integration had not played any part in their attrition. Indeed, Bethany2 underlined that she had dropped out for academic, not social, reasons and described how much she had enjoyed the social side of university life and the student campus experience ("It was really fun, it was really good, I met a lot of people"). She also felt that the uneven gender balance on her degree had not been a factor ("I think in my kind of like seminar group there were three girls and about 25 guys [...] To be fair, I didn't really think about it while I was there, it was just one of those things—I knew going into it that it was quite a male-dominated subject"). Likewise, Victoria said that the gender imbalance of her engineering degree course had not been a contributory factor to her withdrawal as she was "used to it" from her previous years of studying engineering at college:

> There were 26 people on the course and there were 6 girls [...] I don't think that affected me though because it was the same at [college], so I was just used to it at that point, that 'oh, okay there's not many girls doing this'.

As these quotes indicate, both young women described being highly socially integrated with peers and emphasized that they had already experienced and prepared for the gender imbalance on their degree courses. Such views seem resonant with Cohoon et al. (2009) longitudinal analysis of women students on computer science and computer engineering courses, which found that they were less likely to attribute their experiences to sexism

and sexist behavior than women in general. We additionally note that UK degree routes are highly selective, and hence students entering them may be 'exceptional' in a range of ways, with a (e.g., see Archer et al., 2017, 2020). That is, the young women already had reasonably extensive experience of being in male-dominated courses before entering university and hence may have cultivated a gendered habitus that was already attuned to match the demands of the field, which could explain why the gendered nature of their courses may not have affected their decision to withdraw.

Financial issues were not raised at all by Bethany2 and were not given as a reason for non-completion by Victoria, although she found the process of trying to withdraw from her degree choice additionally challenging due to issues with her financial sponsorship. There were also no relevant insights from the two case study students with regard to the impact of the global pandemic on their decision to leave their courses, as both had withdrawn from their studies before the pandemic. Finally, neither Bethany2 or Victoria reported any specific mental or physical health issues that they directly attributed to their withdrawal, although both alluded to experiences of stress during their degrees and around the decision to withdraw. Finally, neither Bethany2 or Victoria had any caring responsibilities and so, perhaps unsurprisingly, this theme did not feature in their accounts.

6 | DISCUSSION: MISFITS OR MISRECOGNITION?

Our analysis of open-ended survey response data from 1886 degree students in England (supplemented with illustrative insights from two longitudinal case study young women who withdrew from their respective courses) aims to add to understanding of attrition among STEMM degree students by exploring the views of 503 students who reported a risk of non-completion (136 STEMM degree students, 367 non-STEMM degree students). Our data indicated that an equal percentage (around a quarter) of STEMM students and non-STEMM students were concerned that they might not complete. Both groupings expressed similar reasons for these concerns, with academic issues being paramount—a trend that was particularly pronounced among STEMM students. Along with academic worries, young people tended to voice multiple reasons for their concerns about non-completion, including financial concerns, health-related issues, the impact of the Covid-19 pandemic and for a small number, family caring responsibilities and/or social integration issues. While being mindful of our small subsample size, our data suggested that the percentage of concerned students varied between STEMM disciplines and demographics, with computer science students, women, racially minoritized, and students from low IMD backgrounds being generally more likely to perceive a risk to their completion compared with their peers.

Our UK findings lend further support to existing, primarily US-based evidence (e.g., G. Johnes and McNabb, 2004; Tinto, 1993) showing how a student's experience of academic mismatch is strongly associated with a perceived risk of non-completion. Our results also reinforce wider studies that identify less privileged students as being at greater risk of degree non-completion—although we found that women are more concerned about non-completion than men, which sits at odds with overall global HE trends that show that women are more likely to complete degrees than men. Our finding that a higher percentage of STEMM compared with non-STEMM students expressed academic concerns about non-completion echoes previous international studies that record higher withdrawal rates due to academic issues within STEM disciplines (e.g., Chen, 2015; Rask, 2010). However, the relatively small nature of the difference that we observed may reflect differences within the UK higher education context and/or our particular sample, which was drawn at the end of an academic year and included many students in their second, third, or fourth years of study, whereas the highest rates of attrition tend to occur in the first term/s of the first year of study (e.g., Yorke, 1999).

We found that computing students expressed the highest proportion of concerns compared with other students, which resonates with Kinnunen and Malmi (2006) finding that the perceived difficulty of the course impacted on students' time and motivation to complete computing degrees in Finland. However, we suggest that it

may be valuable to conduct further research to understand and compare attrition rates—and current students' perceived risks to completion—between different STEMM disciplines.

Our findings largely resonate with Tinto's model regarding the importance of academic integration and other factors, such as finance, health, and family issues (e.g., Tinto, 2012). However, whereas Tinto foregrounds the distinction between formal and informal aspects of academic integration, our qualitative analysis suggests that these two dimensions may overlap and be less distinct, particularly in the context of the global pandemic, where online learning blurred boundaries around "classroom learning" and made both formal and informal academic integration difficult. The apparent near absence of social integration issues within young people's concerns may, as noted earlier, have been a function of our methodology and/or the impact of the pandemic. However, as applications of Tinto's model in the UK context have noted, the model provides only a modest explanation of variance in understanding non-completion. Hence, next, we explore what additional insights our Bourdieusian conceptual framework might offer to understanding degree non-completion within our sample.

6.1 | A Bourdieusian interpretation

As detailed below, a Bourdieusian analysis of our data foregrounds two main themes which, together, challenge human capital explanations of degree attrition, namely: (i) inequalities in capital produce uneven likelihoods of degree (non) completion and (ii) symbolic violence and misrecognition hide the role of capital and structural inequalities in producing differential rates of risk of attrition and result re/produce deficit accounts that locate the "blame" for non-completion with less privileged students. These are discussed in turn and are then synthesized into an interpretative model, setting out structural ("misrecognition") versus individual ("misfits") interpretations of our findings.

6.1.1 | Inequalities in capital shape uneven patterns of non-completion

As Bourdieu (1996) explains, the potential for academic "success" is constrained by the uneven distribution of capital, which makes it harder for less privileged students to achieve as well as their privileged peers. Hence we were unsurprised that racially minoritized, women and lowest income students recorded higher rates of concern about completion than their more socially privileged peers. As research by Ortiz et al. (2019) shows in the context of Black students in the United States, student completion "is never disconnected from pre-college preparation and recruitment." That is, prior inequalities in social, cultural, and economic capital will shape students" educational experiences and trajectories into, through, and out of higher education. For instance, Ortiz et al. (2019) detail how the accrual of community-based forms of STEM-related capital can play a key part in supporting Black students' retention and completion, whereas an absence can be associated with higher risks of attrition.

The differential distribution of capital can not only increase the likelihood of less privileged students' being or feeling at greater risk of non-completion (e.g., low-income students are more likely to be disadvantaged by a lack of financial resources than high-income students) but can also increase the risks associated with particular factors. For instance, we found that both low- and high-income students expressed concerns about the costs of HE and the high levels of student debt that they would accrue. However, our conceptual lens leads us to interpret these students as differentially positioned in terms of the likely impact of financial issues on their completion, with lower-income students being at greater risk due to being less likely to have access to economic, cultural, and social resources to help mitigate this risk. In other words, differential capital produces not only different patterns of concern about completion but also shapes the likelihoods of concerns translating into differential patterns of attrition. Hence whereas both more and less privileged students across our sample may have worried about particular risks to their completion, differential distributions of capital mean that more privileged students will generally be more likely to be able to mitigate these risks.

For instance, wider work that shows how debt and financial hardship pose a risk to student completion, but particularly among lower-income students (e.g., Houle, 2014). As noted by Harris et al. (2021), the system of student loans in England impacts differentially on students, with the most negative impact experienced by those from low-income families. Despite the dominant rhetoric of the student loans system being "the same for all," it carries uneven risks and exerts a "psychological toll" for the most disadvantaged (Harris et al., 2021, p. 133). Indeed, in the United States, Williams (2018) argues that student loans are linked with sleeplessness, anger, depression, and even suicide. As per this and our own earlier work (e.g., Archer et al., 2003), we recognize that student loans impact differentially and entail disproportionate risks for working-class students. However, we also noted in our present study that financial concerns were also voiced as risks to completion by those from the highest IMD quintile, suggesting that further research might be warranted to explore the "creep" of the risks associated with loans across class boundaries.

We suggest that capital can thus be understood as offering a form of "structural resilience," in which resilience to attrition is a product of social location and capital, rather than an individual psychological "trait." For instance, the extant literature on non-completion has often drawn attention to what are termed "personal factors" (e.g., Yorke, 1999) as contributing to attrition. In our sample, health-related issues and, for a smaller number of students, caring responsibilities could be interpreted as fitting into this category. However, rather than interpreting these as "personal" issues, our Bourdieusian lens suggests a more structural interpretation, where wider inequalities and conditions create a differential likelihood of (and capacity for resilience to) experiences of stress and crisis, in which some students may experience greater risks of and from mental and physical illness—or may be more likely to experience and to have to undertake caring responsibilities. Indeed, we suggest that such an interpretation can be extended to understand the impact of the pandemic as a risk to completion— whereas all students experienced the pandemic, we would expect their differential habitus, capital, and social positionings within the field to create differential levels of risk to completion between students.

Moreover, the more structural risk (and less "support") a student experiences by virtue of their social location, the more we might expect the risk of non-completion to increase. Hence, we suggest that risks to non-completion are not straight-forward "factors" that independently exist, but are relational, complexly related and differentially experienced. In this way, we interpret the likelihood, or not, of students in our sample expressing concerns about non-completion as being patterned by the uneven distribution of capital and the interaction of capital with habitus within the field of HE.

6.1.2 | The role of symbolic violence and misrecognition in producing unequal patterns of non-completion

Our analyses highlighted some indicative trends in students' attributions of the "cause" of their academic mismatch, whereby (white and racially minoritized) women and those from low-income backgrounds were more likely to use internal attributions (e.g., describing themselves as "not clever/smart enough"), whereas men and those from high-income backgrounds were more likely to use external attributions (e.g., "hard course"). Additionally, academic concerns in general and self-blame in particular were more prevalent among STEMM compared with non-STEMM students. Using a Bourdieusian lens, we interpret such patterns about not being "clever/smart enough" as a form of symbolic violence and misrecognition that is more often experienced by less powerful communities due to dominant, oppressive associations of cleverness and intelligence with masculinity, whiteness, and middle-classness which may be particularly prevalent and amplified in STEMM subjects (e.g. Archer et al., 2007; Bourdieu, 1996). For instance, examples of the "self-blame" that is the hallmark of symbolic violence are readily apparent in both Bethany2 and Victoria's accounts, as illustrated by their attribution of non-completion to "not being clever enough" and, in Bethany2's case, not embodying the "correct" coder identity. Indeed, Victoria's feelings of guilt were clear in her opening statement during her interview at age 21 when she started the interview by saying "I feel like I've let

you down with the whole STEM path". In contrast, those from more privileged backgrounds seemed more likely to attribute academic difficulties to a "hard/difficult course."

Bourdieu (1996) argues that notions of intelligence are mobilized within classed practices of distinction, whereby intelligence is symbolically aligned with middle-classness, against which the working-classes are disparaged as "ignorant" (and thus deserving of domination and/or their inferior social positioning). While Bourdieu focuses on the classed construction of notions of intelligence, as Archer (2008) has written previously, these ideas also extend intersectionally across gender and ethnicity, with longstanding feminist and postcolonial critiques of how male and white supremacy has been justified and reproduced through the alignment of white, middle-class masculinity with intelligence (and "the mind") and women and people of color with "ignorance," "stupidity" ("the body") so that instance of high academic attainment are explained away as produced, for instance, through "plodding diligence" rather than "natural flair." This means that the likelihood of a young person being able to recognize themselves and be recognized by others as a "clever" student will be structured by relations of social class, gender, and ethnicity, such that it will be harder for less privileged students to be recognized as "clever," even if they attain highly (Archer et al., 2020).

Our findings hinted that attributions of academic mismatch being attributed to the self seemed more prevalent in STEMM compared with non-STEMM subjects and we suggest that this might be a fruitful future line of inquiry, given that existing literature has drawn attention to how STEM is a profoundly gendered, racialized, and classed field, in which the identity of the "ideal STEM student" is closely aligned with markers of privilege that are harder for Others to inhabit and achieve recognition (e.g., Archer et al., 2020; Jackson & Nyström, 2015) and STEM pedagogic practices commonly require particularly high levels of attainment and reinforce notions of the "effortlessly clever," "genius" (white, male, middle-class), scientist/engineer, so that those who do not "fit" this image may experience feelings of illegitimacy and not being "clever enough," even when they do attain highly (Archer et al., 2020). Indeed, there is extensive evidence in the wider literature showing that feeling recognized as a STEM person is associated with positive academic outcomes, among both STEM (e.g., Hazari et al., 2010) and pre-med and health-related STEMM (Dou et al., 2021) students. This is particularly important in the case of racially minoritized students, as "when racial identity operates as a protective mechanism, it can be a contributing factor to STEM persistence and matriculation" (Morton & Parsons, 2018, p. 1384).

In this way, we feel there is a strong value in further efforts to understand the intersectional nature of inequalities impacting attrition. This might help to advance understandings of issues such as the apparent disjuncture between international figures which suggest that on the whole women are more likely than men to complete a degree (OECD, 2017) and our study findings, which suggest that women were more likely to worry about completion than their male peers. For instance, we might hypothesize that women and racially minoritized students might worry more about non-completion due to sexist and racist dominant constructions of the "ideal student" and notions of "intelligence" and gendered and racialized practices within the field of higher education in general and STEMM in particular—but the extent to which these issues translate into actual non-completion may be additionally mediated by intersections of students' wider capital and social positionings (e.g., exacerbated by the intersection of more than one dimension of injustice, or mitigated by the possession of community cultural resources) and by the field in question (e.g., in the case of long, expensive courses like high-status medicine, financial concerns may carry additional weight, and so on).

6.1.3 | An alternative to human capital interpretations of non-completion

We recognize that different potential interpretations can be made of our findings, broadly reflecting what might be termed individual differences versus structural readings of the data. These are summarized and distilled in Table 3, in which the first column represents an individualized "misfit" interpretation of the factors influencing student non-completion and the second column represents a Bourdieusian "misrecognition" interpretation that foregrounds the role of structural inequalities in producing the differential likelihood of student non-completion. We suggest that

TABLE 3 Contrasting interpretations of factors influencing student non-completion.

Reasons	Misfit interpretation	Misrecognition interpretation
Lack of academic integration (formal and informal)	The student at risk of non-completion is "not clever enough," is academically unprepared, and/or lacks intelligence/skill/ability/motivation/preparation and/or information	Students from less privileged communities are at a disadvantage due to social inequalities and elite educational norms, values and practices. They will have to work harder, receive more support, and/or will need changes in the institutional cultures and practices to have an equal chance to "succeed"/complete
	Patterns in academic mismatch reflect differences in individual student ability, motivation, and so forth.	Socialization and internalization of doxa through symbolic violence lead to misrecognition, such that nondominant students are more likely to "self-blame" (e.g., as "not clever enough") and worry that they will not complete
	The student at risk of non-completion may have the "wrong identity" for the course and is not suited to it. They may have made a "wrong" or poor course choice and/or have inaccurate or unrealistic academic expectations	University degree programs tend to value and normalize socially privileged forms of habitus and capital meaning that nondominant students may be disadvantaged and/or feel that they do not "belong" and/or have the "wrong" identity. Inequalities in economic, social, and cultural capital influence students' degree choice—less privileged students may have restricted choices and/or less exchange-value capital to support their choices
Lack of social integration (formal and informal)	A lack of social integration is due to inadequacies in the student, for example, a lack of motivation, social skills, self-confidence, and so forth.	Dominant norms, values, and practices within universities and as enacted by privileged staff and students either individually or as part of disciplinary or institutional cultures exclude nondominant students, challenge social integration, and hide the role of social inequalities in creating a lack of social integration
Other (finances, mental and physical health, impact of Covid pandemic, caring responsibilities)	Some students lack the necessary financial resources to support themselves and maintain adequate progress Some students have poor/insufficient mental/physical health and/or psychological resilience to sustain their participation Some students lack the necessary time (or time management skills), energy, motivation, or resources to complete the course successfully	Universities tend to operate in ways that privilege a particular normative notion of the "ideal" or "typical" student (economically, psychologically, and demographically), which symbolically and practically disadvantages those who do not fit these ideals. Social injustices mean that students from less privileged communities will be structurally disadvantaged and not participate on a level playing field

interpretations that fall into the "misfit" column reflect individualized, deficit interpretations of student non-completion that lend themselves to policy responses that will be more likely to reinforce, rather than challenge, inequalities in student retention. The second "misrecognition" column draws explicit attention to the role of structural inequalities and dominant institutional norms and practices in producing differential likelihoods of retention and is more likely to lend to policy-responses with the capacity to challenge inequalities in student non-completion.

Our interpretations challenge human capital accounts of non-completion (which focus on deficits of the student, as a "misfit" who is insufficiently prepared, "not clever enough" and so on) and lend support to wider work that understands trends in non-completion as reflecting a mismatch between student and course that is exacerbated by social inequalities. We offer an interpretation of potential patterns whereby less privileged students and those on STEMM courses seem more likely to articulate discourses of "self-blame" for their concerns about non-completion (e.g., as "not clever enough") as exemplifying misrecognition, in which the role played by inequalities in producing differential levels of mismatch (e.g., as a result of inequalities in habitus and capital and how these interact with and are differentially shaped by practices of privileged/elite fields such as higher education) are "hidden" by the prevailing *doxa*, such as dominant notions of meritocracy and the "ideal student." For instance, while Bethany2 felt that she did not have the "right" identity and was not "clever enough" for her computing degree, an alternative interpretation could be that her course may have only valued narrow forms of habitus/identity and that if her entrance qualifications were deemed appropriate for entry then support should be provided equitably (according to need) to support all students' attainment and habitus/identity.

6.2 | Implications for research, policy, and practice

First, we suggest that our finding that around a quarter of both STEMM and non-STEMM students were concerned that they might not complete implies that the management and negotiation of non/completion is an ongoing issue for students that is not solely reducible to the act of withdrawal. Existing figures show that attrition rates tend to be highest during the first year of university study and, understandably, this time has been a primary focus of many studies. However, our findings suggested that concerns about completion are still relatively high among those in subsequent years of study, with over a quarter of students in our study expressing such concerns across both STEMM and non-STEMM fields. While not all of these concerns may translate into actual withdrawal, we suggest that they point to the value of considering non-completion as an ongoing negotiation and process that can impact students' progress and well-being in a range of ways. We thus suggest that there would be value for all UK degree courses to devote additional resource and effort to supporting student retention, not just early on in courses, but across the duration of a degree, focusing particularly on those from underrepresented communities. Indeed, if universities and STEM(M) stakeholders want to increase participation among underrepresented demographics then thoughtful consideration needs to be given not just to supporting students' access to STEM(M) but also to the practices, resources, and relations that can help increase the likelihood of *all* students completing their studies.

Second, we suggest that risks to non-completion need to be understood as multiple and inter-relating rather than as singular experiences or factors. While our analyses—ike much existing work in the field—have attempted to delineate different factors that students report as affecting their non-completion, our data underlined how often young people identified multiple, inter-relating factors that could "spiral" and mutually reinforce one another. For instance, an electrical engineering student explained how his concerns about his academic "writing ability" generated mental ill health (extreme anxiety) that was in turn exacerbated by his social isolation ("haven't made a single friend"). Likewise, biology and computer science students similarly worried about the high workload demands placed on them by their respective "hard" courses were exacerbated by financial concerns, and so on. This interplay

is similarly noticeable in medicine student's concerns about balancing economic demands, long working hours, and the need to find paid employment that is also local and "close to home."

Third, as illustrated by Table 3, we suggest that productive critical reflection could be brought to bear on the interpretative frames that are used within HE policy and practice, as these will guide different potential policy responses, entailing different notions of responsibility for action and change. For instance, individual deficit ("misfit") interpretations may support individual students but are unlikely to address the conditions that create and sustain unequal patterns of non-retention. In comparison, a socio-structural ("misrecognition") interpretation would focus on changing systems, structures, and practices. Yet, as Gale and Parker (2014, p. 30) explain, to date, this latter focus has not been extensively realized:

> Systemic or structural change to meet the needs of a diverse student population tends to be marginal. Inasmuch as institutional practices change, these are limited to devising ways to enable students to more successfully navigate pre-existing and dominant structures and practices, including knowledge structures and practices embodied in formal and informal curricula, pedagogy and assessment.

In terms of future research, we suggest that alongside retrospective analyses of (STEM) students' reasons for non-completion, there may also be useful insights to be gained from exploring current students' perceptions of risks to completion. This may also help shift emphasis away from seeing those who do not complete as "special cases" and instead recognize how risks are widely distributed across all students and endemic to the system. Hence understanding the potential risk and stresses that students face may offer useful insights for ways that systems and practices might be changed to better support all students, not just to completion but also in terms of their general experiences. As Barefoot (2007, p. 9) explains:

> Although for the last 30 years, educational researchers have studied the dropout phenomenon, research to date has tended to focus upon student characteristics or the impact of external environments. Little research exists that explores the role of the college or university environment—especially the classroom itself—on student persistence. And while college and university educators have employed a variety of programs to improve retention—for example, first-year seminars, learning communities, and Supplemental Institution—retention rates remain disappointingly static. A final frontier yet to be explored in retention research is the basic structure of higher education, especially the way instruction is designed and delivered.

We thus hope that insights from this paper can help invigorate and support further thinking about how universities and STEMM degree programs can evolve and adopt more equitable, non-deficit understandings and practices that will enable all students to thrive and achieve their goals.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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ENDNOTES

[1] For rxample, see Entry Requirements for UK Medical Schools | SI-UK (studyin-uk.com).

[2] IMD is a national categorization that is based on home postcode/zip code—respondents provided their postcode that was then matched to the national database to provide the classification, in which IMD1 represents the most deprived national quintile and 5 the least deprived national quintile of postcodes.

[3] For instance, HESA, 2010 data shows that 50.7% of students enrolling on physical science degrees were aged 20 or under and 9% were aged 30 or over, whereas on social science degrees the comparable figures were 40.5% and 24.4% (www.hesa.ac.uk).

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