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# Is pupil attainment higher in well-managed schools?

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## ABSTRACT

Linking the Workplace Employment Relations Surveys 2004 and 2011 to administrative data on pupil attainment in England we examine whether secondary and primary schools who deploy more intensive human resource management (HRM) practices have higher pupil attainment. We find intensive use of HRM practices is positively and significantly correlated with higher labour productivity and quality of provision, and with better financial performance, most notably in primary schools, but it is not associated with higher pupil attainment as indicated by assessment scores at Key Stage 2, Key Stage 4 and value-added measures based on assessments at these points.

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## 1. Introduction

The last decade or so has seen very substantial innovations in the way education is delivered in England's schools, perhaps on a scale not seen since the introduction of comprehensives in the 1960s and 1970s. Those reforms have included releasing many schools from local authority control via the Academies system (Eyles and Machin 2015) and, in schools remaining within local authority control, extending Head Teachers' control over operations within the school. The approach, which has been dubbed the 'self-improving school-led system' (Greany and Higham 2018), is premised on the idea that schools are more likely to prosper when managerial decisions are based on local knowledge of a school's circumstances and pupils.

The idea that the quality of leadership in schools should and does matter for school performance is generally accepted and appears uncontentious (Ahn and Vigdor 2014), just as it is in other organizational settings.<sup>1</sup> The value of good management practices in schools is less well-understood, partly because the literature is recent and less extensive. In a recent addition to that literature we established positive statistically significant partial correlations between the intensive use of human resource management (HRM) practices and managerial subjective assessments of schools' financial performance, labour productivity and quality of provision. The associations with financial performance and labour productivity were also apparent in first difference models based on a two-wave panel of schools over the period 2004–2011 (Bryson, Stokes, and Wilkinson 2020). However, those analyses did not include measures of pupil attainment.

In this paper we examine the links between pupil attainment at school level and intensive HRM which, we argue below, is an indicator of a school being well-managed. Doing so requires us to link the workplace surveys (the 2004 and 2011 Workplace Employment Relations Surveys)<sup>2</sup> we

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used previously the school-level measures of pupil attainment available from the Department for Education Performance Tables. Whereas the latter are comprehensive for maintained sector schools in England, WERS is a relatively small survey. Consequently, our estimation samples are fairly modest which, in turn, means we rely on fairly parsimonious models to identify associations between HRM and school performance. Nevertheless, the models contain features of schools one would wish to control for in seeking to isolate the association between HRM and school performance including the nature of the pupils at the school, school size and location, and union density at the school.

Our data contain a range of pupil attainment outcomes, including levels of attainment at Key Stage 4 and value-added measures for secondary schools and levels of attainment at Key Stage 2 and progress indicators for primary schools. In most cases, due to changes in the way performance is measured, those pupil attainment outcomes are not comparable across 2004 and 2011. Consequently, most of the analyses we run are separate regressions for primary and secondary schools in 2004 and 2011. There is one pupil attainment measure that is common across both years, allowing us to make direct comparisons in terms of pupil attainment at Key Stage 4 for schools in 2004 and 2011.

The purpose of this study is three-fold. First, we wish to establish the correlation between managers' subjective evaluations of their schools' performance and pupil attainment measures. Positive significant correlations between the subjective measures and pupil attainment might be taken as validation of the subjective measures. That said, the subjective measures are, as we show below, requesting managerial assessments of their school's performance relative to their notion of a school average, rather than making judgements about their absolute performance. They are also asked to rate their schools on financial performance, labour productivity and quality of service which, while potentially linked to pupil attainment, are not necessarily highly correlated with it. For these reasons we might not necessarily anticipate the correlations between subjective and pupil attainment measures of performance to be very strong.<sup>3</sup>

Second, we seek to replicate findings from our earlier paper in which we established partial correlations between managers' subjective assessments of their school's relative workplace performance – its financial performance, labour productivity and quality of service – and the intensity with which it deployed HRM. The samples in this paper are smaller which, other things equal, might make it difficult to obtain a precise estimate of any positive association with HRM. Furthermore, although the models condition on fewer variables than the earlier study, those variables include controls for the nature of the pupils in the school which we did not previously observe, thus permitting us to recover any HRM association over and above that which might be correlated with the characteristics of the pupils attending the school.

Third, we extend the earlier paper by looking at links between HRM intensity and pupil attainment. This is important since many analysts and policy-makers consider the education of children to measurable academic standards to be the primary aim of the schooling system. They are certainly the primary indicator by which the government judges schools' performance.

We found managers' subjective assessments of their schools' performance to be positively and statistically significantly associated with pupil attainment in both primary and secondary schools, although this varied depending on the measure and year. We were also able to replicate the statistically significant partial correlations between HRM intensity and managers' subjective assessments of schools' performance. However, HRM intensity was not associated with pupil attainment levels or value-added. The findings raise some important questions about the value of HRM investments for schools, particularly if schools are primarily judged and resource allocations made on the basis of schools' positions in pupil attainment league tables. A case for HRM investments would be easier to make if policy-makers and parents placed at least some weight on the productivity of school staff and the quality of its output.<sup>4</sup>

The remainder of the paper is organized as follows. Section 2 briefly reviews the literature on school performance and the role played by HRM. In Section 3 we present our linked WERS-pupil

attainment data and discuss estimation issues before presenting our results in Section 4 and concluding in Section 5.

## 2. Literature and hypothesis

In the past the literature on the role of management practices in school performance has been limited by the absence of data on practices in schools. This began to change in the United States with growing interest in what appeared to be the relative success of Charter Schools which operate under a charter outside the usual public school governance structures. Like Academies in England, Charter Schools' governance arrangements gave Head Teachers and their governing boards the scope to experiment with managerial practices which some thought might be of benefit in public schools. In a series of field experiments Fryer (2014, 2017) found value-added in traditional public schools in Houston rose following the adoption of five managerial practices that were common in high-achieving Charter Schools (namely increased instructional time, a more rigorous approach to building human capital of teachers and administrators, high-dosage tutoring, frequent use of data to inform instruction, and a culture of high expectations) (Fryer 2014). In a second field experiment involving 58 schools in Houston Fryer (2017) found intensive school principal training in relation to instructional planning, data-driven instruction, and observation and coaching raised school value-added at a low marginal cost to schools.

These field experiments provide plausibly causal evidence of the value of particular management practices in schools in the United States. Although random assignment of educational interventions is increasingly common in schools in England due to the work of the Education Endowment Foundation, to our knowledge there are no studies to date replicating the random assignment of management practices that are akin to those conducted by Fryer in the United States. However, there is evidence of a partial correlation between management practices and school performance in a study by Bloom et al. (2015) which focuses on high schools in eight countries including England. They find substantial variance in management practices across and within countries, with the latter determined in large part by differences in school governance (particularly accountability for performance) and school leadership. They confirm that management practices are linked to higher school value-added. They focus on twenty practices falling into one of four domains: operations, monitoring, target setting and people management (which relates largely to the management and incentivising of talent). They find a linear association between management practice intensity and pupil attainment.

The Bloom et al. (2015) study is particularly notable because, although their inventory of management practices was tailored for a school setting, they broadly conform to management practices that they found positively associated with a range of economic outcomes such as higher profitability, improved labour productivity and lower closure rates in the for-profit sector (Bloom et al. 2017). In a similar vein, Bryson, Stokes, and Wilkinson (2020) found HRM intensity was positively associated with managers' perceptions of school performance in much the same way as it was associated with managers' perceptions of performance amongst 'like' workplaces outside the schools' sector. The implication is that the intensity with which HRM is implemented can be beneficial for organizations of different types and that, perhaps, the literature which argues that the success of management practices is contingent on the degree to which they 'fit' with other internal features of the organization, or 'external' factors such as the market it operates in (Delery and Doty 1996), may not be well-founded.

A related literature examines the relationship between HRM and employee job attitudes such as job satisfaction and organizational commitment. The effects of HRM on these attitudes are sometimes thought to be the mechanism by which HRM induces improvements on organizational performance. However, a recent study examining factors influencing the job satisfaction and organizational commitment of school employees found job quality was the salient factor. Satisfaction and commitment were not associated with HRM intensity (Bryson, Stokes, and Wilkinson 2019). HRM intensity may nevertheless improve school performance by raising organizational

efficiency, as envisaged by Bloom et al. (2017), who conceive of HRM as a managerial technology designed to improve efficiency, a mechanism that can improve performance without affecting employee attitudes to their job or their employer.

In the light of this literature we hypothesize that pupil attainment will be higher in schools that deploy HRM more intensively. This should be the case in both primary and secondary schools and in 2004 and 2011.

### 3. Methods

In this section we introduce our data, present the key measures used in our analyses, and describe our estimation strategy.

#### 3.1. Data

We link survey data from the schools in the Workplace Employment Relations Surveys (WERS) in 2004 and 2011 to school-level pupil attainment data from the Department for Education Performance Tables.<sup>5</sup>

Appropriately weighted, WERS is a nationally representative survey of workplaces in Britain with 5 or more employees covering all sectors of the economy except agriculture and mining (Van Wanrooy et al. 2013). Survey weights have been devised for each element of WERS to account for sample selection probabilities and observable non-response biases (Van Wanrooy et al. 2013, 212–213). However, we present unweighted analyses because our schools-only data set which is confined to workplaces sampled in WERS which we can link with the performance tables is unlikely to be representative of schools in general, even when survey-weighted. Our analyses should therefore be treated as within-sample estimates, rather than estimates that might be extrapolated to the

**Table 1.** Attainment measures: descriptive statistics, analysis sample and full school population.

		Mean	Standard deviation	<i>N</i>
<b>KS4, 2011:</b>				
% pupils achieving 5 or more GCSEs at grades A*-C, including English and Maths	Sample	61.2	16.5	49
	Population	62.4	19.3	3963
Best 8 value added	Sample	1002.6	19.5	49
	Population	999.5	21.9	3044
% pupils achieving 5 or more GCSEs at grades A*-C	Sample	85.5	11.8	49
	Population	84.1	14.6	3963
<b>KS2, 2011:</b>				
% pupils achieving Level 4 or above, maths	Sample	84.3	10.6	73
	Population	85.0	11.9	14,606
% pupils achieving Level 4 or above, English	Sample	84.6	10.5	73
	Population	86.5	10.9	14,586
% pupils making at least 2 levels of progress, maths	Sample	84.7	16.5	76
	Population	87.3	12.7	14,692
% pupils making at least 2 levels of progress, English	Sample	87.3	19.5	77
	Population	90.0	11.4	14,684
<b>KS2, 2004:</b>				
English	Sample	78.9	13.5	54
	Population	79.9	13.6	13,565
Maths	Sample	74.8	15.7	54
	Population	76.1	14.6	13,564
Science	Sample	86.2	11.8	54
	Population	87.4	11.4	13,566

Notes: For KS4, schools where 0% of pupils achieved 5 or more GCSEs at grades A\*-C including English and maths are excluded. For KS2, schools where 0% of pupils achieved the relevant threshold are excluded. Attainment data are taken from the Department for Education Performance Tables, 2004/2005 and 2011/2012.

population of schools as a whole.<sup>6</sup> For information, Table 1 presents descriptive statistics of our pupil attainment measures both for the schools in our sample as well as for all schools.

The WERS data are cross-sectional, based on management interviews conducted face-to-face with the most senior workplace manager responsible for employee relations. The 2011 survey interviews were conducted between March 2011 and June 2012 (Van Wanrooy et al. 2013) and the 2004 survey interviews were conducted between February 2004 and April 2005 (Kersley et al. 2006). Schools are identified in the survey using their five-digit Standard Industrial Classification. We distinguish between primary schools and secondary schools.<sup>7</sup>

There are 406 schools in the pooled cross-sectional data, over half of which are primary schools (Appendix Table A1). However, we lose a large proportion of these when we link the data to the pupil attainment data. This happens for a number of reasons, which we discuss in further detail in the appendix. First, not all respondents in WERS give permission for their data to be linked to other sources. Second, some of the 406 schools in WERS are private sector and our focus is on the maintained sector (and for which we have data on attainment and school characteristics). Third, our pupil attainment data are only available for schools in England so that those in Scotland and Wales drop out of the analysis. Fourth, the pupil attainment variables are generally only available for primary and secondary schools, not the technical and vocational education workplaces which also appear in WERS. Finally, the matching procedure relies on fuzzy matching using postcode data because there is no unique numeric identifier in both data sets which would allow us to construct a clean match. The postcodes of workplaces participating in WERS are available on the secure access version of the WERS data made available through the UK Data Service Secure Lab, and so we use these to match to school postcodes, which are publicly available (using the postcodes available on the performance data files). In many cases, there is just one school located at each postcode, and so we can be fairly confident in the accuracy of this match. In some cases, more than one school was identified at a particular postcode, and there were a few schools identified in WERS where there was no exact postcode match in the school data. We discuss this process further in the appendix and check the robustness of our results to excluding schools where we were unable to obtain a direct postcode match. The final matched data unweighted samples are shown in Appendix Table A2.

*Pupil attainment:* Our analysis uses a range of pupil attainment measures taken from the Department for Education Performance Tables. In 2011, for secondary schools, we use the percentage of pupils achieving 5 or more GCSEs at grades A\*-C including English and Maths, which was the headline measure of school performance used at the time. We also explore results for the indicator of value-added, 'Best 8', between KS2 and KS4. For primary schools in 2011, we use the percentage achieving Level 4 in English and Maths, as well as the percentage achieving at least two levels of progress in English and Maths. For primary schools in 2004, we use the percentage of pupils achieving the specified levels (Level 4) in English, maths and science (note that these are different to the KS2 measures available in 2011, due to changes in the way in which KS2 has been assessed over time). For 2004, the sample of secondary schools for which we have pupil attainment data is too small to analyse as a separate group. However, in both 2004 and 2011, the percentage of pupils achieving 5 or more GCSEs at grades A\*-C is available, and we use this in a model which pools both years.

*Subjective school performance:* our measure of school performance combines the manager's subjective assessment on three separate measures.<sup>8</sup> We follow Bryson, Forth, and Stokes (2017) in the construction of the dependent variable. It is an additive scale combining managers' responses to three questions: 'Compared to other workplaces in the same industry how would you assess your workplace's ... financial performance; labour productivity; quality of product or service'. Responses are recorded on a 5-point Likert scale from 'a lot better than average' to 'a lot below average'. The 'a lot below average' and 'below average' codes are collapsed (as few workplaces record performing 'a lot below average') and scales scored from 0 to 3 where 3 = 'a lot above average'. Summing them gives a scale of 0 ('below average' performance on all three items) to 9 (performance 'a lot better than average' on all 3 items). Factor analysis identifies a single factor with an eigen value of 2.14, and an alpha reliability coefficient for the composite performance scale is 0.79.

We supplement the analysis of the additive workplace performance measure with analyses of its three components (financial performance, labour productivity and quality of service).

*Human resource management:* Following Bloom et al. (2017) we construct a single HRM index based on binary (0, 1) indicators identifying the presence or absence of specific HRM practices.<sup>9</sup> The 48 items available are drawn from 8 HRM domains, as indicated in Table 2. These domains include five that are commonly the focus in the ‘high performance work systems’ literature, namely teams, training, participation, selection, and incentives, together with target setting and record keeping – emphasized in the work of Bloom et al. (2014, 2017) – and total quality management (TQM) which is often identified as key to lean production. The Kuder–Richardson coefficients of reliability are presented in the last column of Table 2. They range from 0.47 for the TQM indicators to 0.85 for the eleven targets. The KR20 for all 48 items together is 0.88. As a sensitivity analysis, we also construct an alternative HRM index based solely on the three domains of incentives, target-setting and record keeping, in the spirit of the Bloom et al. (2014, 2017) work.

*Controls:* all models control for the size of the school using the number of employees at the school; region (a London dummy variable); and the percentage of employees belonging to a trade union.<sup>10</sup> In addition to these controls taken from the WERS data we use data from the Department for Education Performance Tables to control for the total number of pupils in the school and pupil composition. The pupil composition variables available differ between 2004 and 2011. In 2004, in addition to the total number of pupils, we can account for the number of pupils with special educational needs (SEN). In 2011, in addition to the 2004 pupil variables we are also able to control for the percentage of pupils for whom English is an additional language; the percentage eligible for free school meals, and the percentage of boys in the school. For some analyses of KS4 attainment we condition on KS2 attainment for the same pupil cohort by introducing this as a control variable, so that the results provide a value-added estimate.

In Appendix Tables A3 and A4, we present means and standard deviations for our analysis samples.

### 3.2. Estimation

We run simple OLS estimates for all dependent variables described above. Initially we run models which contain the HRM index without controls to establish the bivariate relationship between

**Table 2.** Management practices.

HRM domain:	HRM measures for each domain:	KR20
Incentives (0, 4)	Any performance pay; managers appraised; 100% non-managers appraised; non-manager appraisal linked to pay	0.50
Records (0, 9)	Sales, costs, profits, labour costs, productivity, quality, turnover, absence, training	0.77
Targets (0, 11)	Volume, costs, profits, ULCs, productivity, quality, turnover absence, training, employee job satisfaction, customer/client satisfaction	0.85
Teams (0, 4)	100% largest non-managerial occupation in teams; teams depend on each other to perform work; team responsible for products and services; team jointly decides how to do the work	0.63
Training (0, 5)	80% largest non-managerial occupation had on-job training lasts 12 months; workplace has strategic plan with employee focus; Investors in People Award; standard induction programme for new staff in largest non-managerial occupation; number of different types of training provided is above population median	0.57
TQM (0, 3)	Quality circles; benchmarking; formal strategic plan for improving quality	0.47
Participation (0, 5)	Formal survey of employee views in last 2 years; management-employee consultation committee; workforce meetings with time for questions; team briefings with time for questions; employee involvement initiative introduced in last 2 years	0.55
Selection (0, 7)	References used in recruitment; recruitment criteria include skills; recruitment criteria include motivation; recruitment criteria include qualifications; recruitment criteria include experience; recruitment includes personality or aptitude test; recruitment includes competence or performance test	0.51

Note: KR20 is the Kuder–Richardson coefficient of reliability used for dichotomous items.

HRM intensity and school performance. Then we introduce a vector of controls so that the OLS estimates take the following form:

$$p_i = \alpha + \beta hrm_i + \pi X_i + \varepsilon_i \quad (1)$$

where performance  $p$  of workplace  $i$  is a function of  $hrm$ , and a vector of controls  $X$  discussed above. The Greek letters are parameters to be estimated. Separate models are run by year and school type (primary school or secondary school). One of the pupil attainment metrics (the percentage of pupils achieving 5+ GCSEs at A\*-C (or equivalent)) is available in 2004 and 2011, allowing us to pool secondary schools from both years. This model also includes a year dummy.

We test the sensitivity of our baseline results to a number of changes in model specification in addition to the use of an HRM score akin to Bloom et al.'s noted above. These include the inclusion of additional controls to account for the nature of the HR managerial respondent; extending the region controls; interacting the HRM measure with Academy status; and checking associations between the HRM score and a new additive points educational attainment metric. In our final set of estimates we examine whether HRM has an indirect effect on pupil attainment through workplace performance.

#### 4. Results

Our first aim is to establish whether the outcome measures are correlated with one another. [Table 3](#) presents correlations for primary school performance in 2004. It is apparent that the WERS metrics are strongly and significantly correlated with one another, as are the pupil attainment scores taken from the Department for Education Performance Tables. The WERS performance metrics are not correlated with pupil attainment measures. [Table 4](#) presents equivalent correlations for primary school performance in 2011. Here we do observe some positive and statistically significant correlations between the measures of pupil attainment and the WERS performance metrics, at least when attainment is considered in terms of the percentage of pupils achieving Level 4 in English and Maths. However, measures of progress are not correlated with the WERS performance metrics. For secondary schools in 2011 ([Table 5](#)), we also see positive and statistically significant correlations between the measures of pupil attainment and the WERS metrics. This includes a positive correlation

**Table 3.** Correlations between performance measures, unweighted. Primary schools, KS2, 2004.

	KS2 English	KS2 Maths	KS2 Science	Additive scale	Financial performance	Labour productivity	Quality of service
KS2 English	1 (54)						
KS2 Maths	0.812** (54)	1 (54)					
KS2 Science	0.800** (54)	0.864** (54)	1 (54)				
Additive performance scale	0.050 (40)	0.138 (40)	0.079 (40)	1 (40)			
Financial performance	-0.045 (49)	-0.119 (49)	-0.127 (49)	0.701** (40)	1 (49)		
Labour productivity	0.094 (41)	0.293 (41)	0.209 (41)	0.827** (40)	0.307* (40)	1 (41)	
Quality of service	0.116 (52)	0.176 (52)	0.053 (52)	0.745** (40)	0.242 (49)	0.543** (41)	1 (52)

Notes: Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $N$  observations in parentheses. The additive scale combines managers' responses to the three questions: 'Compared to other workplaces in the same industry how would you assess your workplace's ... financial performance; labour productivity; quality of product or service'. Responses are recorded on a 5-point Likert scale from 'a lot better than average' to 'a lot below average'. The 'a lot below average' and 'below average' codes are collapsed and scales scored from 0 to 3 where 3 = 'a lot above average'. The additive scale is formed from summing these, ranging from 0 ('below average' performance on all three items) to 9 (performance 'a lot better than average' on all 3 items).



**Table 4.** Correlations between performance measures, unweighted. Primary schools, KS2, 2011.

	KS2 Maths	KS2 English	KS2 English – progress	KS2 Maths – progress	Additive scale	Financial performance	Labour productivity	Quality of service
KS2 Maths	1 (73)							
KS2 English	0.809** (73)	1 (73)						
KS2 English – progress	0.210 (73)	0.352** (73)	1 (77)					
KS2 Maths – progress	0.723** (73)	0.575** (73)	0.884** (77)	1 (77)				
Additive performance scale	0.311** (63)	0.338** (63)	0.037 (67)	0.113 (67)	1 (67)			
Financial performance	0.255* (71)	0.300** (71)	0.085 (75)	0.128 (75)	0.793** (67)	1 (75)		
Labour productivity	0.277* (64)	0.271* (64)	0.126 (68)	0.153 (68)	0.863** (67)	0.500** (67)	1 (68)	
Quality of service/product	0.294** (70)	0.283* (70)	–0.125 (74)	–0.026 (74)	0.888** (67)	0.542** (73)	0.685** (68)	1 (74)

Notes: Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $N$  observations in parentheses. See Table 3 for details of the construction of the additive performance scale (which combines the financial performance, labour productivity and quality of service measures).

**Table 5.** Correlations between performance measures, unweighted. Secondary schools, KS4, 2011.

	KS4 (5EM)	Best 8	KS4 (5AC)	Additive scale	Financial performance	Labour productivity	Quality of service
KS4 (5EM)	1 (49)						
Best 8	0.524** (49)	1 (49)					
KS4 (5AC)	0.584** (49)	0.764** (49)	1 (49)				
Additive performance scale	0.458** (46)	0.273 (46)	0.456** (46)	1 (46)			
Financial performance	0.192 (49)	0.152 (49)	0.304* (49)	0.789** (46)	1 (49)		
Labour productivity	0.330* (47)	0.246 (46)	0.372** (47)	0.895** (47)	0.581** (47)	1 (47)	
Quality of service/product	0.663** (48)	0.359** (48)	0.569** (48)	0.850** (46)	0.472** (48)	0.682** (48)	1 (48)

Notes: Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $N$  observations in parentheses. See Table 3 for details of the construction of the additive performance scale (which combines the financial performance, labour productivity and quality of service measures).

between value-added and quality of service, although here no significant correlation was apparent for the other WERS performance measures.<sup>11</sup>

In Tables 6 and 7 we turn to the correlation between the linear HRM index and performance outcomes in primary schools in 2004 and 2011 respectively. In 2004 the HRM index is positively and significantly correlated with managers' subjective assessments of the school's performance, driven by its positive correlation with financial performance and labour productivity. There is no association with subjective assessments of the quality of service. The positive correlation with financial performance and labour productivity is robust to the inclusion of control variables listed in Table 6. Indeed, the HRM coefficient for labour productivity rises a little and is more precisely estimated when controls are included. In contrast, the association between HRM and the three metrics for pupil attainment at Key Stage 2 are all non-significant. This result is unaffected by the addition of control variables. While these associations are non-significant, it is also useful to note that their magnitude is also small; for example, an increase of 1 unit on the HRM score is associated with an increase of 0.13 pp in pupils achieving the threshold level in KS2 maths (in our raw model). This equates to a 1

**Table 6.** Regression results, performance and HRM score, KS2, 2004, OLS. Primary Schools, unweighted.

	KS2 English	KS2 Maths	KS2 Science	Additive scale	Financial performance	Labour productivity	Quality of service
<b>(1) Raw</b>							
hrmscore	−0.053 (−0.13)	0.133 (0.28)	0.127 (0.36)	0.135* (2.14)	0.059* (2.52)	0.058 (1.92)	−0.009 (−0.43)
N	54	54	54	40	49	41	52
r2	0.000	0.002	0.002	0.108	0.119	0.086	0.004
r2_a	−0.019	−0.018	−0.017	0.084	0.100	0.063	−0.016
<b>(2) Controls</b>							
hrmscore	0.095 (0.23)	0.247 (0.51)	0.176 (0.49)	0.138* (2.00)	0.054* (2.31)	0.067* (2.02)	−0.003 (−0.15)
N	54	54	54	40	49	41	52
r2	0.086	0.094	0.097	0.165	0.263	0.131	0.051
r2_a	−0.031	−0.022	−0.019	0.013	0.158	−0.023	−0.076

Notes: Controls are number of pupils in the school; percentage of pupils with SEN; number of employees in the school; dummy for London location; percentage of employees who are union members. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses. See Table 3 for details of the construction of the additive performance scale (which combines the financial performance, labour productivity and quality of service measures).

**Table 7.** Regression results, performance and HRM score, KS2, 2011, OLS. Primary Schools, unweighted.

	KS2 Maths (% pupils achieving Level 4 or above)	KS2 English (% pupils achieving Level 4 or above)	% pupils making at least 2 levels of progress – English	% pupils making at least 2 levels of progress – Maths	Additive scale	Financial performance	Labour productivity	Quality of service
<b>(1) Raw</b>								
hrmscore	0.134 (0.54)	0.318 (1.32)	0.122 (0.29)	−0.009 (−0.02)	0.152** (3.18)	0.044** (2.71)	0.060** (3.20)	0.044* (2.29)
N	73	73	77	77	67	75	68	74
r2	0.004	0.024	0.001	0.000	0.135	0.091	0.134	0.068
r2_a	−0.010	0.010	−0.012	−0.013	0.121	0.079	0.121	0.055
<b>(2) Controls</b>								
hrmscore	0.094 (0.38)	0.217 (0.96)	0.192 (1.06)	0.054 (0.26)	0.179** (3.29)	0.049** (2.71)	0.073** (3.42)	0.057** (2.67)
N	64	64	68	68	58	66	59	65
r2	0.352	0.443	0.894	0.850	0.263	0.245	0.264	0.220
r2_a	0.244	0.350	0.878	0.826	0.124	0.124	0.129	0.093

Notes: Controls are: number of pupils in school; percentage free school meals; percentage SEN; percentage EAL; percentage boys; number of employees; dummy for London location; percentage of employees who are union members. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses. See Table 3 for details of the construction of the additive performance scale (which combines the financial performance, labour productivity and quality of service measures).

standard deviation increase in the HRM score being associated with a roughly 0.6 pp increase on the KS2 maths measure (around 0.04 standard deviations). In comparison, a one standard deviation increase in the HRM score is associated with an increase of around 0.4 standard deviations on the workplace performance scale.

Table 7 runs similar estimates for primary schools, but for 2011. As in 2004, the HRM index and subjective school performance are positively and significantly correlated. The association is stronger in 2011 than in 2004, as indicated by the size of the coefficients, and there is a statistically significant correlation with quality of service which was not apparent in 2004. Again, the coefficients are a little larger and more precisely estimated controlling for the variables identified at the bottom of the table.

As noted above, a more extensive array of pupil attainment metrics is available in 2011 than in 2004. But in all cases the correlation between the HRM index and pupil attainment is not statistically significant, either raw or conditioning on other variables.

**Table 8.** Regression results, performance and HRM score, KS4, 2011, OLS. Secondary Schools, unweighted.

	KS4 5EM	5+ GCSEs at A*-C	Best 8 value-added	Additive scale	Financial performance	Labour productivity	Quality of service
(1) Raw							
hrmscore	0.303 (0.59)	0.635 (1.80)	0.595 (0.99)	0.129 (1.86)	0.048 (1.90)	0.041 (1.55)	0.059* (2.00)
N	49	49	49	46	49	47	48
r2	0.007	0.064	0.021	0.073	0.071	0.051	0.080
r2_a	-0.014	0.045	0.000	0.052	0.052	0.030	0.060
(2) Controls							
hrmscore	0.212 (0.63)	0.385 (0.90)	0.302 (0.37)	0.103 (1.17)	0.063 (1.86)	0.008 (0.23)	0.052 (1.76)
KS2 APS	8.757** (7.57)	5.207** (3.51)	-	0.648* (2.22)	0.165 (1.40)	0.096 (0.82)	0.411** (4.08)
N	44	44	44	41	44	42	43
r2	0.827	0.414	0.195	0.383	0.299	0.259	0.613
r2_a	0.774	0.237	-0.018	0.178	0.087	0.019	0.493

Notes: Controls are: number of pupils in school; percentage free school meals; percentage SEN; percentage EAL; percentage boys; number of employees; dummy for London location; union density. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses. The models for Best 8 value-added do not include the average points score attained at KS2. See Table 3 for details of the construction of the additive performance scale (which combines the financial performance, labour productivity and quality of service measures).

Table 8 presents results for secondary schools in 2011. The upper row in Table 8 presents raw correlations between the HRM index and school performance in 2011. The associations are relatively weak: only the association with quality of service is positive and statistically significant at conventional levels, although the associations with workplace performance and financial performance are positive and significant at a 10% confidence interval. The effects remain weak and similar in magnitude when conditioning on control variables, including lagged pupil attainment which is itself statistically significant for subsequent pupil attainment, workplace performance and quality of service. The HRM index is not significantly associated with Key Stage 4 pupil attainment (regardless of the measure used), either with or without controls.<sup>12</sup>

There are too few secondary schools in our 2004 data to present secondary school models for 2004 only, so instead we combine them with the schools in 2011 in a pooled model which also contains a year dummy (Table 9). The results for these pooled models are not substantively different from those presented in Table 8 for 2011 only.

**Table 9.** Regression results, performance and HRM score, KS4, 2004 and 2011 pooled, OLS. Secondary Schools, unweighted.

	5+ GCSEs at A*-C	Additive scale	Financial performance	Labour productivity	Quality of service
(1) Raw					
hrmscore	0.828* (2.09)	0.090 (1.61)	0.038 (1.75)	0.033 (1.61)	0.034 (1.40)
2011	30.93** (7.12)	.0923 (0.15)	-0.101 (-0.41)	-0.086 (-0.36)	0.158 (0.61)
N	70	61	65	62	66
r2	0.454	0.043	0.052	0.045	0.034
r2_a	0.438	0.010	0.021	0.013	0.003
(2) Controls					
hrmscore	0.647 (1.41)	0.036 (0.58)	0.039 (1.53)	0.005 (0.23)	0.011 (0.41)
2011	32.20** (7.03)	-0.084 (-0.13)	-0.121 (-0.46)	-0.181 (-0.78)	0.142 (0.55)
N	66	57	61	58	62
r2	0.501	0.148	0.108	0.127	0.152
r2_a	0.450	0.046	0.009	0.024	0.060

Notes: Controls are: number of pupils in school; number of employees; dummy for London location; union density. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses. See Table 3 for details of the construction of the additive performance scale (which combines the financial performance, labour productivity and quality of service measures).

We undertake a number of robustness checks. Firstly, we present results from using an alternative HRM index based on the three items of incentives, targets and record-keeping only (results are presented in Appendix Tables A6a, A7a, A8a and A9a with the table numbering mirroring the baseline models presented in Tables 6–9, so there is no Appendix Table A5a). While the magnitude of the coefficient on the HRM score is sometimes altered as a result, there is no substantive impact on our main findings. For KS2 results in 2004, we no longer see a statistically significant association between the HRM index and the subjective performance measures, but this is not the case in 2011 where this relationship remains evident. The alternative HRM index does not affect the results in terms of the relationship with the pupil attainment metrics, which remain not statistically significant.

We also extend our original models to include a further set of variables relating to the HR manager, specifically, their gender, years in their role,<sup>13</sup> and whether they have a formal personnel qualification, with the aim of capturing some aspect of managerial quality (results are presented in Appendix Tables A6b, A7b, A8b, A9b). Again, the inclusion of these variables does not substantively alter our findings.<sup>14</sup> The most notable change is for the KS4 models in 2011, where with the inclusion of these additional controls, the association between the HRM index and some of the subjective performance measures becomes statistically significant. Of the HR manager characteristics included here, it is tenure which shows a statistically significant association with some performance measures, although only in some specifications (and not for the attainment measures).

For KS2 in 2004 and 2011, and for KS4 in 2011, we also run models where our dependent variable is an average point score, rather than the threshold variables of attainment presented so far (Table 10). There are no statistically significant associations with the HRM index for any of these point score variables.

Finally, we also explored whether there may be an indirect effect of HRM on pupil attainment via its impact on workplace performance. Here we regress our pupil attainment measures on the HRM score as well as the additive workplace performance measure. In 2011, we see a positive and statistically significant association between workplace performance and the percentage of pupils reaching the required standard in English and Maths at KS2 in our models without controls (Table 11, upper panel). However, this is not apparent for measures of progress, or for any of the threshold measures in 2004. Furthermore, once we include our control variables none of these associations are statistically significant. At KS4, in 2011, and in our pooled 2004 and 2011 model, we again see a positive association with workplace performance when performance is measured in terms of the threshold measures, which remains after the inclusion of controls (Table 12). This is not apparent in terms of Best 8 value added. While this may be indicative of an indirect effect of HRM on pupil attainment,

**Table 10.** Regression results, average point scores, KS2 2004 and 2011, KS4 2011 only, OLS, unweighted.

	KS2		KS4 2011		
	2004 average point score	2011 average point score	Average capped point score	Average capped point score (GCSEs only)	Average point score
(1) Raw					
hrmscore	−0.003 (−0.06)	−0.005 (−0.07)	0.808 (0.84)	0.065 (0.03)	−1.135 (−0.49)
N	54	77	49	49	49
r2	0.000	0.000	0.015	0.000	0.005
r2_a	−0.019	−0.013	−0.006	−0.021	−0.016
(2) Controls					
hrmscore	0.012 (0.21)	0.004 (0.15)	0.395 (0.52)	−1.205 (−1.17)	−2.077 (−0.78)
KS2_APS	–	–	17.97** (6.84)	28.80** (8.09)	33.77** (3.65)
N	54	68	44	44	44
r2	0.103	0.900	0.757	0.902	0.473
r2_a	−0.011	0.885	0.683	0.872	0.313

Notes: Controls for 2004 are as listed in Table 6; for KS2 in 2011 as listed in Table 7, and for KS4 in 2011 as listed in Table 8. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses.

**Table 11.** Regression results, pupil attainment measures regressed on hrmscore and workplace performance, KS2, 2004 and 2011.

	2004 KS2			2011 KS2			
	KS2 English	KS2 Maths	KS2 Science	KS2 Maths	KS2 English	English progress	Maths progress
(1) Raw							
hrmscore	0.148 (0.26)	0.214 (0.31)	0.442 (0.84)	0.062 (0.21)	0.348 (1.28)	0.224 (0.41)	0.017 (0.03)
wpperf	0.282 (0.20)	1.187 (0.70)	0.235 (0.18)	1.521* (2.32)	1.379* (2.22)	0.162 (0.12)	1.073 (0.83)
N	40	40	40	63	63	67	67
r2	0.004	0.021	0.025	0.098	0.138	0.004	0.013
r2_a	-0.050	-0.032	-0.028	0.067	0.109	-0.027	-0.018
(2) Controls							
hrmscore	0.128 (0.21)	0.174 (0.24)	0.311 (0.58)	-0.103 (-0.35)	0.186 (0.71)	0.276 (1.20)	0.126 (0.46)
wpperf	0.850 (0.58)	2.064 (1.17)	0.999 (0.78)	1.011 (1.47)	0.726 (1.18)	0.12 (0.22)	0.535 (0.81)
N	40	40	40	54	54	58	58
r2	0.116	0.154	0.212	0.428	0.52	0.91	0.862
r2_a	-0.078	-0.031	0.040	0.296	0.409	0.891	0.833

Notes: 2004 controls are as listed in Table 6; 2011 controls are as listed in Table 7. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses. 'wpperf' is our additive workplace performance measure.

**Table 12.** Regression results, pupil attainment measures regressed on hrmscore and workplace performance, KS4 2011 and KS4 pooled.

	2011 KS4			Pooled KS4, 04 and 11
	KS4 5EM	5+ GCSEs at A*-C	Best 8 value-added	5+ GCSEs at A*-C
(1) Raw				
hrmscore	-0.391 (-0.78)	0.279 (0.83)	0.205 (0.33)	0.344 (0.81)
wpperf	3.632** (3.49)	2.119** (3.04)	2.224 (1.70)	3.161** (3.23)
2011				28.606*** (6.04)
N	46	46	46	61
r2	0.221	0.221	0.077	0.463
r2_a	0.185	0.185	0.034	0.435
(2) Controls				
hrmscore	-0.179 (-0.55)	-0.134 (-0.33)	-0.266 (-0.33)	0.167 (0.33)
wpperf	1.643* (2.48)	2.121* (2.57)	1.724 (1.05)	2.858* (2.50)
2011				29.381*** (5.66)
N	41	41	41	57
r2	0.866	0.504	0.341	0.483
r2_a	0.815	0.316	0.091	0.409

Notes: 2011 controls are as listed in Table 8; controls for pooled 2004 and 2011 model are as listed in Table 9. Statistical significance \* $p < .05$ , \*\* $p < .01$ .  $t$ -Statistics in parentheses. 'wpperf' is our additive workplace performance measure.

at least for KS4, caution should be exercised in interpreting these results as this may simply reflect that the subjective measures are to some extent reflecting pupil attainment (as evidenced by the correlations reported earlier).

## 5. Discussion and conclusions

Empirical studies for both the UK and the United States have identified positive associations between the use of good management practices, captured in an HRM index, and school performance, usually

measured in terms of pupil attainment. Plausibly causal evidence exists for the United States. The findings should come as no surprise because there is a much broader literature linking good management practices with improvements in workplace and firm performance.

In an earlier paper using the British Workplace Employment Relations Survey (WERS) we found HRM was positively correlated with managerial perceptions of school performance relative to the average in the sector (Bryson, Stokes, and Wilkinson 2020). The associations were apparent for school financial performance and labour productivity and were confirmed in a two-wave panel showing both financial performance and labour productivity rose as schools undertook more intensive HRM. However, pupil attainment data were not available in that study, leaving open the question as to whether HRM intensity would also be linked to higher pupil attainment. In this paper we answer that question by linking the WERS schools' data to information from the Department for Education Performance Tables. This permits us to analyse the association between HRM intensity and school performance in secondary and primary schools in 2004 and 2011 using a fuller array of performance metrics.

The new analyses differ from those presented in the earlier paper in two additional ways. First, the data matching results in smaller sample sizes. Second, we are now able to condition on pupil characteristics which are known to be correlated with pupil attainment, thus conditioning out potentially confounding variables we were previously unable to account for. Notwithstanding these differences, we are able to broadly replicate our earlier finding that the HRM index was positively correlated with workplace performance, though the association was stronger in primary schools. The association was robust to the addition of controls for pupil composition and characteristics of the school such as its size and location. However, HRM was not positively and significantly associated with pupil attainment or pupil value-added in any of our models.

We find managers' subjective assessments of their schools' performance to be positively and statistically significantly associated with pupil attainment in both primary and secondary schools, although this varied depending on the measure and year. There are many reasons as to why the correlations are not stronger and more consistent. First, the subjective metrics are ordinal scales in which the workplace manager is asked to compare the school's performance with the average performance of other schools, whereas the pupil attainment metrics are absolute measures of pupil performance. Second, school managers are asked to rate the financial performance, labour productivity and quality of service offered by the school. Although potentially linked to pupil attainment, these metrics are conceptually different to pupil attainment, so one might expect their associations with HRM practices to differ. Third, it is possible that managerial assessments of school performance are unreliable and, as such, should be jettisoned in favour of pupil attainment metrics.

We would caution against this third interpretation. Earlier studies have indicated that these subjective metrics are predictive of performance-related outcomes, such as workplace closure, suggesting they contain meaningful information about workplace performance (Machin 1995). Instead, given the recent debate over whether value-added metrics capture teacher impacts on student performance (Chetty, Friedman, and Rockoff 2016) it seems sensible to assess school performance using a broad set of metrics. This seems all the more important when those metrics capture financial performance of schools at a time when school resources are under strain.

Because our analyses are cross-sectional we cannot rule out the possibility that HRM intensity and good school performance are jointly determined by a third factor that we do not observe. For example, high HRM scores may simply capture unobserved managerial quality if 'better' managers introduce 'better' practices. There might also be a reverse causal link between highly rated schools and HRM intensity if, for example, more financially secure schools and those with higher labour productivity are prepared to invest more in HRM. Similarly, better teachers may be attracted by more intensive HRM.

Notwithstanding these caveats, the findings in this paper, coupled with earlier studies for the United States and Britain, suggest schools may benefit from more intensive investment in HRM. Although there appear to be no immediate returns from those investments in terms of pupil

attainment, it may take time for those returns to emerge. This time element, coupled with the need to identify causal linkages between HRM and school performance, point to the value of future research based on longitudinal data linking school management practices to school performance.

## Notes

1. For some time, economists have argued that the CEOs of listed firms can have a substantial impact on their performance, for better or for worse, not only because CEOs will vary in their own productivity and ability, but because those differences will have spill-over effects on those lower down the corporate hierarchy (Rosen 1990). It is for this reason that firms spend so much money and effort designing compensation structures and recruiting top executives. Similar claims have been made in other settings, such as the impact of Head Coaches on the fortunes of professional football teams (Bryson et al. 2021). However, it has proven difficult establishing causal linkages between who leads the organization and its performance.
2. Advisory, Conciliation and Arbitration Service, Department for Business, Innovation and Skills, National Institute of Economic and Social Research (2018).
3. Forth and McNabb (2008) conducted a similar analysis for the for-profit sector comparing WERS metrics with accounting metrics of performance from the Annual Business Inquiry. In general, they found positive and statistically significant correlations.
4. There is limited information about the weight parents attach to schools' relative ranking in pupil attainment because direct information on parental choice is not available. However, Allen, Burgess, and McKenna (2014) estimate that between 5% and 10% of secondary and primary school students could have attended a higher-performing school with spare capacity in their local area.
5. Available at: <https://www.gov.uk/school-performance-tables>.
6. We also ran our analyses survey-weighted. The results were not substantively different from those presented here. They are available on request.
7. Under the SIC 2003 classification the codes identifying schools are 80100, 80210, 80220. Under the SIC 2007 classification the relevant codes are 85100, 85200, 85310, and 85320. Primary schools are coded 80100 under SIC 2003 and 85100 or 85200 in SIC 2007. Secondary schools are coded 80210 in SIC 2003 and 85310 in SIC 2007. Our secondary schools also include some Technical and Vocational schools which are coded 80220 in SIC 2003 and 85320 in SIC 2007.
8. These measures are frequently used in the HRM and economics literatures. For a recent example see Wu et al. (2015).
9. This is standard in the literature. As Becker and Huselid (1998, 63) say: 'The overwhelming preference in the literature has been for a unitary index that contains a set (though not always the same set) of theoretically appropriate HRM policies derived from prior work'.
10. A large literature indicates that unionisation is often linked to workplace financial performance and labour productivity, including studies using WERS data. See, for example, Blanchflower and Bryson (2009).
11. There are only 20 observations for secondary schools in the 2004 WERS that can be linked to attainment outcomes, so these are not presented.
12. For the sample of secondary schools in 2011, we also checked for any differing effects according to whether schools were academies. This is the only sample where we have a sufficient number of academy schools in order to be able to conduct this analysis, with 19 academy schools out of the total of 49 schools in this sample. However, there were no statistically significant interactions between our HRM index and academy status for any of our performance measures. Furthermore, there was no statistically significant difference in the mean score on the HRM index, standing at 30 for academies and 31 for non-academies. There are no academy schools within our 2004 sample.
13. Our models include a continuous variable for years in the role. We also experimented with a banded version to capture potential non-linear effects. In some specifications this suggested a positive and statistically significant association between being in the role for ten years or more and the subjective measures of workplace performance, however, this was not present across all measures and had no sizeable impact on the coefficient on the HRM score variable.
14. In a further specification, we also checked the sensitivity of our results to replacing the London dummy with a slightly broader categorisation of North and Yorkshire; Midlands; London and South. This had no substantive impact on the results.

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