

# Do management practices matter in further education?

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## Abstract

Further education and sixth form colleges are key institutions for facilitating skill acquisition among 16–19 year olds in the UK. They enrol half a school cohort after completion of their lower secondary education, and this includes a disproportionate number from low-income backgrounds. Yet little is known about what could improve performance in these institutions. We conduct the world's first management practices survey in such institutions, and match this to administrative longitudinal data on over 40,000 students. Value-added regressions with rich controls suggest that structured management matters for educational outcomes, especially for students from low-income backgrounds. For this group, in a hypothetical scenario where an individual is moved from a college at the 10th percentile of management practices to the 90th, this would be associated with 8% higher probability of achieving a good high school qualification, nearly half of the educational gap between those from poor and non-poor backgrounds. Hence improving management practices may be an important channel for reducing inequalities.

## 1 | INTRODUCTION

In the UK, as in other countries, despite the increase in graduates, there are too many people with low levels of skill and too few with intermediate and higher-level technical skills.<sup>1</sup> About half of every school-leaving cohort enters sixth form or further education (FE) colleges that have the provision of such skills as a core mission. A disproportionate number of students from poorer families enter these institutions, hence they also provide an important route for improving social mobility. Yet we know relatively little about what mechanisms improve efficacy in colleges at the post-secondary or tertiary level, in the UK or elsewhere.

We evaluate the role of management practices in FE colleges in England, contributing to an understanding of what influences educational outcomes at this level of education as well as to the broader debate on the role of management practices for improving performance in the public sector. This is the first study to evaluate management practices in colleges<sup>2</sup>—and although

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its findings are inevitably specific to the institutional context of the UK, it also has relevance to institutions with similar aims in other countries (such as community colleges in the USA). Furthermore, we examine explicitly, and within FE colleges, whether better management practices help students from disadvantaged backgrounds. The school resources literature suggests that reductions in class size and increases in school expenditure tend to help those from low socioeconomic background disproportionately (e.g. see the review by Gibbons and McNally 2013). We investigate whether this may be the case here. As FE colleges disproportionately enrol those from such backgrounds (and therefore have scope to affect social mobility), this is a very pertinent issue.

The FE sector has been described as the ‘Cinderella sector’ in England, because it is so often overlooked in public debate about education.<sup>3</sup> This is related to its focus on vocational education and skills, which tend to be treated with less interest in the media than universities or schools; and it is reflected in a funding squeeze over recent years (Britton *et al.* 2019), which has been more severe than in schools or universities, giving rise to additional challenges for leaders of these institutions. Yet the FE sector is a vital part of the national and local infrastructure for education and skills, which in turn has an important part to play for increasing productivity growth and improving social mobility (Besley and Van Reenen 2013). FE and sixth form colleges<sup>4</sup> enrol about half of every cohort after they complete their compulsory full-time education at age 16. The share of those from disadvantaged families enrolling is about twice what it is in other educational settings.<sup>5</sup> Overall, these students are much less likely to enrol in higher education.<sup>6</sup> FE colleges also cater for individuals at all levels and ages who wish to gain vocational qualifications and are thus important for adults who wish to train and reskill as well as for young people engaged post-compulsory education. They have similarities to two-year community colleges in the USA—with one difference being that they typically enrol young people at the beginning of their upper secondary education (at age 16) rather than at the end.

In this paper, we investigate whether management practices in FE colleges are an important correlate of performance, measured principally by student performance and progression, but also using other institutional-level outcomes. We collect our own data using the methodology of the World Management Survey (WMS) (Bloom and Van Reenen 2007), and link this survey to administrative data for outcomes and other important characteristics of these institutions and the people who attend them. The WMS was first applied to the manufacturing sector in a handful of countries, and has now been carried out across 35 countries worldwide and in a variety of sectors, including schools (Bloom *et al.* 2015a), universities (McCormack *et al.* 2014) and healthcare (Bloom *et al.* 2015b).<sup>7</sup> Across these different settings, management practices have been found to be a key driver of performance. As discussed by Hwa and Leaver (2021), the WMS is increasingly seen as the gold standard for standardized comparisons of school management, with the instrument (and associated data) being used dozens of times since its inception in 2009. However, this is the first time that the WMS has been conducted and analysed in the context of FE colleges (or, to the best of our knowledge, any similar institutions in other countries).

In general, much less is known about what influences performance within FE institutions compared to schools and universities, and one of our contributions is to shed light on this issue. Students pursuing vocational education are often overlooked in Anglo-Saxon countries compared to those who are younger (in schools) or of high enough attainment to enter university. This leaves a gap in the middle, and the lack of knowledge of how to improve attainment and progression is an important omission given the widely held view that it is important to foster intermediate and higher technical skills to improve economic growth (Besley and Van Reenen 2013). To some extent, lack of knowledge is also driven by the paucity of data available for this sector (Augar Review 2019), at least up until recently. Aucejo *et al.* (2023) investigate the value-added of FE colleges. They find that although the institution attended does influence progression and

earnings, overall variation is relatively modest compared to returns to field of study. Nonetheless, the authors find that a one standard deviation increase in college value-added leads to an increase in daily earnings after college attendance of around 3% for young learners. Ruiz-Valenzuela *et al.* (2017) is among the few studies to investigate what influences performance within FE colleges. The authors investigate the role of principals and find that while particular principals appear to affect educational outcomes of the students in their colleges,<sup>8</sup> this cannot be explained by observable characteristics of the principals themselves. We attempt to get inside the ‘black box’ of what happens in these institutions by collecting detailed and standardized data on organizational processes in operations, targeting, monitoring and people management, together with institutional details and information on college leadership, which we then relate to the performance of these institutions. In line with the broader literature using the WMS, we develop an international management index for FE institutions in England. We use double-blind telephone interviews with principals to collect information on management practices for 79 colleges (25% of the survey population) in 2018–19.

Given that the focus of this study is on 16–19 education, our WMS has been modelled closely on that used for schools (Bloom *et al.* 2015a), and has been adapted for the FE sector with the help of experts and practitioners. Bloom *et al.* (2015a) find a strong correlation between management practices and school performance, which is driven largely by the strength of governance (i.e. strong accountability to an outside body) and the degree of school leadership (i.e. developing a long-term strategy for the school). Their findings are supported by studies of school practices in the USA, such as Dobbie and Fryer (2013) and Angrist *et al.* (2013). More recently, Fryer (2017) has conducted a randomized control trial of management practices in Texas schools. Specifically, he investigates the effect of principal management training on school productivity, where this consists of 300 hours of training on lesson planning, data-driven instruction, and teacher observation and coaching. He finds effects that are driven by principals who implement the training well and who do not subsequently leave the school.

Although our setting has some similarities with schools, they are very different in important respects, and outcome measures are also very different. FE colleges are much larger and have a broader mission that encompasses 16–19 education (vocational and academic), large-scale provision for unemployed people, and English for speakers of other languages, and adult training at all levels. As in schools, there is a rigorous accountability framework in place, but FE colleges have had additional challenges in recent years, with more severe funding cuts and many policy changes affecting aspects of their work.<sup>9</sup> The outcomes of relevance are whether individuals are able to achieve qualifications at various levels and whether they are able to progress to university. Unlike for schools, there is no relevant test score in this context (hence it is difficult to compare our results to Bloom *et al.* (2015a) for schools). The outcomes of interest here are important for success in the labour market, and we can contextualize the magnitude by comparing ‘effects’ to the value-added of FE colleges on the same outcome measures (Aucejo *et al.* 2023).

We contribute to the literature in the following ways. First, we investigate to what extent management practices influence institutional and individual outcomes in the FE sector in England. As discussed, the importance of this sector is increasingly recognized for its role in improving the skills base in England and for social mobility (Augar Review 2019). But we know much less about what influences performance in this sector compared to schools or universities. Second, because we can link the survey to individual-level (administrative) data on educational histories, we can estimate value-added regressions (wherein we evaluate the association between management practices and outcomes after controlling for individuals’ prior educational attainment). It is unusual to be able to estimate value-added regressions in the literature about management practices. Although our estimates are still correlational, the fact that we can control for many obvious confounders in our individual-level analysis brings us closer to a causal estimate of the effect of management practices on an individual’s future

achievement and progression. Third, we investigate whether management practices may be disproportionately important for students from disadvantaged backgrounds. We can investigate this within colleges in fixed effect regressions (thus controlling for any systematic differences between colleges that could be correlated with overall management practices). This enables us to evaluate whether management practices are associated with an improvement in outcomes that is differentially important across disadvantaged and other students within the same institution.

Our first key finding is that structured management practices matter for educational achievement and progression to university education at the individual level, and these results are robust to alternative specifications. Our main result is that a one standard deviation increase in the management score is associated with around a 2 percentage point increase in the likelihood of achieving good upper secondary ('level 3') qualifications, or pursuing a degree by age 20. Our second main finding is that good management practices appear to be more important for achieving upper secondary qualifications for students from low-income backgrounds, controlling for prior ability. This is robust to including institutional fixed effects, and also to including interactions between the socioeconomic background of students and other institutional characteristics. In a hypothetical scenario where a learner is moved from a college at the 10th percentile of management practices to the 90th, this would be associated with 8% higher probability of achieving a good high school qualification (at level 3), which is nearly half of the educational gap between those from poor and non-poor backgrounds. The labour market returns to level 3 qualifications have been estimated to be at least 6% (Machin *et al.* 2018), suggesting that improving college management practices has the potential to help to reduce inequality and improve social mobility.<sup>10</sup>

Having established that management practices matter in the FE sector for student outcomes, we go on to explore whether there are any particular principal or college characteristics that tend to be associated with better management practices. We find that spatial measures of competition (from other colleges) appear to matter, but other features—including observable characteristics of college principals—do not explain differences in management practices. This gives us confidence that the management practices score is not simply reflecting other attributes of colleges.

We explore further the link between management scores and measures of effective college leadership, and find that there is some evidence that these two dimensions are related, but that management practices do not simply reflect more effective leadership. In particular, we merge our survey with measures of principals' 'ability' (Ruiz-Valenzuela *et al.* 2017), and find that these do not generally explain differences in management practices, though it is difficult to draw firm conclusions given the small sample size in this piece of analysis. We also explore the extent to which measures of effective principal leadership and accountability (based on additional questions in our survey) relate to management practices, and find that these are highly correlated. Both are positively associated with educational outcomes, but overall there is a stronger relationship between management practices and progression. We interpret these findings as evidence that management practices are capturing something distinct from effective leadership. While we expect the leaders of organizations to influence management practices, such practices reflect processes on the ground that can be thought of as a type of technology (Bloom *et al.* 2016), evolving slowly as particular leaders come and go.

The remainder of this paper is structured as follows. We describe the institutional setting and data (Section 2). We then report on how management practices relate to educational outcomes within a regression framework (Section 3). We evaluate the implications for labour market outcomes (Section 4). We then explore how management practices vary across FE colleges, and how this correlates with observable characteristics (Section 5). We then bring our findings together and discuss implications for policy in the conclusion (Section 6).

## 2 | INSTITUTIONAL SETTING AND DATA

### 2.1 | England's further education sector

FE colleges are major providers of education for adults and for young people in post-compulsory education in England. The latter have become an increasing part of their budget over time (around 40%), and tend to be the most reliable as government funding for adult skills has fallen over many years. Given the broad mission of FE colleges, we focus our study on management practices around areas that are mostly relevant to their provision for young people (16–19 year olds). We also include sixth form colleges in our study. These are much smaller institutions and cater exclusively for young people. They have a stronger focus on academic education (A levels). FE and sixth form colleges have a high degree of autonomy from the government, although they are subject to the same regulatory regime as schools for the provision of education for young people. Thus, like schools, they are subject to visits from the national inspectorate (Ofsted) and are scored according to the same criteria. These reports are in the public domain and are a key part of the accountability infrastructure.

About half of each cohort attend FE and sixth form colleges in the year following national exams at the end of compulsory schooling (GCSEs). All students live within close distance of an educational institution where they can pursue further education (in a secondary school or sixth form college) or an FE college. There is no 'selection' into FE colleges as such, but there will be to the type of course a student is able to undertake (which is determined by results in GCSE exams). Disadvantaged groups are over-represented in FE and sixth form colleges: 15% of students in FE and sixth form colleges were eligible to receive free school meals in their final year of lower secondary education (i.e. age 16),<sup>11</sup> which is double the share of those staying in schools for their upper secondary education. Typically, those attending FE colleges will be doing a vocational qualification, and some may choose to combine this with A levels. Since 2015, all new entrants need to repeat GCSE English and/or Maths if they failed to get a good grade in the national exams at age 16. The other half of the cohort remain in their secondary school for their further education. Although it is—in theory—compulsory to stay in some form of education or training until age 18, there is some drop-out before that time. Nationally, about 4% of each cohort are classified as 'not in education training or employment' at age 18.

Whereas academic qualifications in further education (A levels) are well understood, these are pursued by only about 40% of students as their main qualification. This is the main route to university studies. Other qualifications are broadly classified as 'vocational', although they vary in their prerequisites, length, duration and field of study. Post-16 vocational education has frequently been criticized as having too many options to choose from and too few progression pathways to higher levels of education and skills (see, for example, Hupkau *et al.* 2017). Many attempts have been made at reform in the FE sector, and this is ongoing, occurring against a backdrop of funding cuts and high levels of policy churn (as discussed by Norris and Adam 2017).

This is the environment and policy context in which we conduct our survey of management practices, the first of its type in this sector. The complex and pressurized environment makes this a very interesting sector to explore, apart from its obvious importance in the national educational infrastructure.

### 2.2 | Measuring management practices in the FE sector

In order to measure management practices in FE colleges, we adapted the WMS methodology, first described in Bloom and Van Reenen (2007). The WMS consists of a series of open-ended



questions on organizational processes that need to be scored between 1 and 5, where a high score indicates that a college has adopted structured management practices.

The core survey as developed originally for the manufacturing sector consists of 18 questions about management under the following groupings: operations, management, targets and incentives. This has been adapted previously for schools (Bloom *et al.* 2015a) through tailoring and adding to the operations questions. Here, we have taken the 20 school questions as our starting point, and adjusted them so that they are appropriate for FE and sixth form colleges in England.

This process involved changing the language in some of the questions so that they are relevant for the sector (e.g. using ‘learner’ rather than ‘student’, which is the norm in this sector) and adding one question in the operations section to measure effectiveness of matching learners to courses, which is a particular issue in FE colleges where students select their courses. In order to inform the survey design, we discussed the questions and piloted the survey with representatives from the Association of Colleges and other sector stakeholders, including former college principals. We also discussed our questions with members of the WMS core team to ensure consistency with previous surveys. Our main measure of management practices, the management score, is the average of the set of 21 questions, but we also analyse the different groupings separately. Our core survey questions are grouped into four categories, as follows (the full set of questions is set out in Table A1.1 of the Online Appendix).

- Operations

- *Matching learners to courses:* Learners are recruited and retained in well-matched qualifications/courses.
- *Standardization of teaching processes:* Materials and practices are standardized and aligned in order to be capable of moving learners through learning pathways over time, and ensuring that courses meet the needs of individuals and employers.
- *Personalization of instruction and learning:* Flexibility in teaching methods and learner involvement, ensuring that all individuals can master the learning objectives.
- *Data-driven planning and learner transitions:* College uses assessment to verify learning outcomes at critical stages, makes data easily available, and uses them intelligently to adapt learner strategies and course offerings accordingly.
- *Adopting educational best practices:* College incorporates teaching best practices and the sharing of these resources into the classroom.

- Monitoring

- *Continuous improvement:* College implements process documentation and continuous improvement.
- *Performance tracking:* College performance is measured with appropriate methods and frequency, and communicated effectively with staff, governors and other stakeholders.
- *Performance review:* Performance is reviewed with appropriate frequency and follow-up.
- *Performance dialogue:* The quality of performance review conversations.
- *Consequence management:* The extent to which differing levels of college performance (not only individual teacher performance) lead to different consequences.

- Target setting

- *Target balance:* System tracks meaningful targets tied to learner outcomes, in particular, the extent to which colleges set their own internal targets and use these in a sensible way.

- *Target interconnection*: College and individual targets are aligned with each other and the overall system goals.
  - *Time horizon of targets*: College has a rational approach to planning and setting the targets.
  - *Target stretch*: Targets are appropriately difficult to achieve.
  - *Clarity and comparability of targets*: Performance measures are understandable, and performance is openly communicated.
- People/talent management
    - *Rewarding high performers*: Good teacher performance is rewarded proportionately.
    - *Fixing poor performers*: College is able to deal with underperformers.
    - *Promoting high performers*: Promotions and career progression are based on performance.
    - *Managing talent*: College identifies and targets needed teaching, leadership and other capacity in the college.
    - *Retaining talent*: College will go out of its way to keep its top talent.
    - *Attracting talent/creating a distinctive employee value proposition*: College has a clear employee value proposition.

We targeted principals or vice principals as the interviewee with college-wide knowledge of processes and systems in place, and this is consistent with the schools' survey (Bloom *et al.* 2015a) where headteachers or principals were interviewed. Also consistent with the schools' survey, we included an extra section of questions on principal leadership that were scored. This included three questions on leadership vision and strategy, clearly defined accountability, and clearly defined leadership and teacher roles. We also added some specific questions relevant to FE that have not been asked in other sectors (e.g. extent of engagement with higher education institutions and employers), and background characteristics of principals and colleges to explore as determinants of potential differences in management practices.

The interviews were focused on management practices governing 16–19 provision (as processes may well vary according to different areas of college activity). However, we also asked about whether processes are centralized across the college, or whether there is flexibility across subject areas or learning.

### 2.2.1 | Conducting the survey

Once we had designed the survey instrument, we passed it to a survey firm that had conducted the WMS previously and was well trained in its methods. The interviewers received rigorous training, including from external experts in the WMS methodology, and members of the research team also met with the interviewers in order to explain the institutional context and motivation of the study.

We attempted to reach the full population of FE colleges in England that have at least one learner aged 16–19 years old (310 colleges), with a number of emails and endorsements in sector newsletters from the UK Government's Department for Education and Association of Colleges. We achieved a sample of 79 colleges over the period February to September 2019. (While 83 interviews were conducted, there were three instances where colleges had two individuals keen to take part separately, and we had to drop one college from our sample as we were unable to obtain outcome data for it.) Overall, this represents a response rate of 25%,<sup>12</sup> which is relatively high relative to comparable management surveys in the education sector.<sup>13</sup>

Once a principal agreed to take part, they were emailed some information on the study, and a short online survey that included consent and basic information questions, to save time in the subsequent management survey that would be conducted on the phone. At the end of the online survey, participants were able to schedule a time for the interviewers to call them and conduct the full survey.

As in previous WMS surveys, we followed several steps to obtain a high-quality response.

First, a ‘double blind’ methodology is used to reduce biases. Interviewers are not given any metrics on the institution’s performance in advance of the interview. These are matched in from independent sources after the interviews are finished. In addition, as in similar surveys in other sectors, interviews are conducted without informing the principals that their answers would be evaluated against a scoring grid. This allows the gathering of information on actual management practices as opposed to the principal’s aspirations of what should happen.

Second, the interviewers are trained by individuals who had conducted the WMS before in other contexts, and a number of calibration exercises are conducted to ensure consistency of scoring. All interviews are reviewed and approved by the survey manager, and around 60% of interviews are double-scored, by the interviewer conducting the interview and their manager listening in. Of those that are double-scored, the correlation between the surveyor and manager is 0.86.

Third, we collected data on the interview process itself (such as the time of day and the day of the week), characteristics of the interviewee and the identity of the interviewer. These variables can be used as ‘noise controls’ in the regression analysis to improve the precision of our estimates by reducing some of the measurement error.

## 2.3 | Measures of college performance

### 2.3.1 | Institution-level outcomes

We obtained a number of measures of performance at the institution level, either ready-made (from the National Student Survey (NSS), the FE Choices learner/employer satisfaction surveys, and the national inspectorate, Ofsted) or constructed based on data on learners from administrative data in the Individualized Learner Record (ILR). Measures from these data sources are used to construct publicly available information on the performance metrics of FE institutions, and we use the most recently available data for each outcome measure. Subsection A2.1 of the Online Appendix describes in detail the data sources and cleaning steps for the institutional data, but key information is summarized here. All measures enable us to evaluate the correlation between management practices and different contemporaneous outcome measures.

In the NSS, we use the overall satisfaction measure that represents the share of learners who are satisfied with their course. Learner and employer satisfaction from the FE Choices survey are measured as the percentage of learners who would recommend the college to their friends, and the percentage of employers that would recommend this training provider to another employer, respectively. For Ofsted scores, we use the most recent data available from Ofsted inspections, and reverse the raw Ofsted effectiveness scores (1–4, where, based on the ratings of school inspectors, 1 is outstanding and 4 is inadequate) in our analysis so that higher values reflect higher scores.

Administrative data from the ILR is used to construct institutional measures of achievement that are appropriate for young people in further education (i.e. age 16–19). These are the proportion of learners who achieved at least one aim at level 2 (equivalent to a good grade in ‘lower secondary’ exams: GCSE grades A\*–C) or level 3 (A level or vocational equivalent), respectively.



These outcomes are important for educational progression and in the labour market (as shown by Machin *et al.* 2020a; McIntosh 2006; Patrignani *et al.* 2017).

### 2.3.2 | Individual-level outcomes

Since the main focus of our management survey is on 16–19 provision at FE colleges, our individual-level analysis centres on the outcomes of young learners. We construct individual-level outcomes using administrative records from the National Pupil Dataset linked to the ILR (2013–16) and Higher Education Statistics Agency (2015–16). In combination, these data permit us to track individuals from the last year of secondary school through further education and higher education. We are able to observe the entire population of individuals who enter the colleges, whether or not they complete their course. We use the most recent individual-level data available to us, which enables us to observe medium-term outcomes for learners who attended these colleges (up to age 20).

We focus on the population of learners from the 2012 GCSE cohort (age 16 at that point) that entered further education in 2013 (age 17). Using the sources described above, we construct three key medium-term educational outcomes: these are indicators for whether, by age 20, an individual has achieved level 2 or higher, or level 3 or higher, or is enrolled in higher education, respectively. We then merge this dataset with our WMS survey based on the institution that each learner attended in 2013 (age 17).

Due to lags between learners being at specific colleges and the measurement of their educational outcomes, and the fact that our management survey was conducted in 2019, for the purpose of the individual-level analysis, we focus on the subsample of colleges where the principal has been working at the college for at least 6 years. This implies that these principals were at their respective colleges in 2013 (the year the 2012 GCSE cohort entered further education). Assuming that there is some persistence in the management practice scores (consistent with a view of management as an organizational technology; Bloom *et al.* 2016), this allows us to attribute at least some influence on the management scores collected in the WMS survey (in 2019) to the current principal who was also working at the college 6 years previously, and therefore consider that the management practices that we measure in 2019 are likely to be correlated with the quality of management practices when the students whose outcomes we measure were at the college. Our final sample for the individual analysis consists of the 45 colleges where principals have been at the college for over 6 years, and 40,000–45,000 learners (depending on the outcome variable), and our results are robust to alternative cut-offs. We note that because of these lags in the data, it is likely that our measures of management quality are subject to more measurement error than if we had conducted the WMS in 2013 (which would attenuate the correlation between management practices and outcomes). It might also be the case that colleges that were worse or better in the past change their management practices differentially over time (implying that our estimate might capture reverse causality to some extent; the bias could go in either direction). As we do not have a measure of the change in management practices, it is difficult to gauge how serious a concern this is. But there is only a weak (negative) correlation between management practices and the change in college performance over time (meaning that colleges with better management practices in 2019 displayed slightly less growth in performance over recent years). Furthermore, there is no significant relationship between a college performing relatively well in 2013 and management practices in 2019.<sup>14</sup>

As an extension to our main analysis, we also explore whether college management practices are related to early labour market outcomes. As in our main regressions, we use the sample of young learners that entered FE and sixth form colleges in academic year 2013 (age 17), and focus on their labour outcomes (employment and wages) in year 2017 (age 20).

## 2.4 | Other data

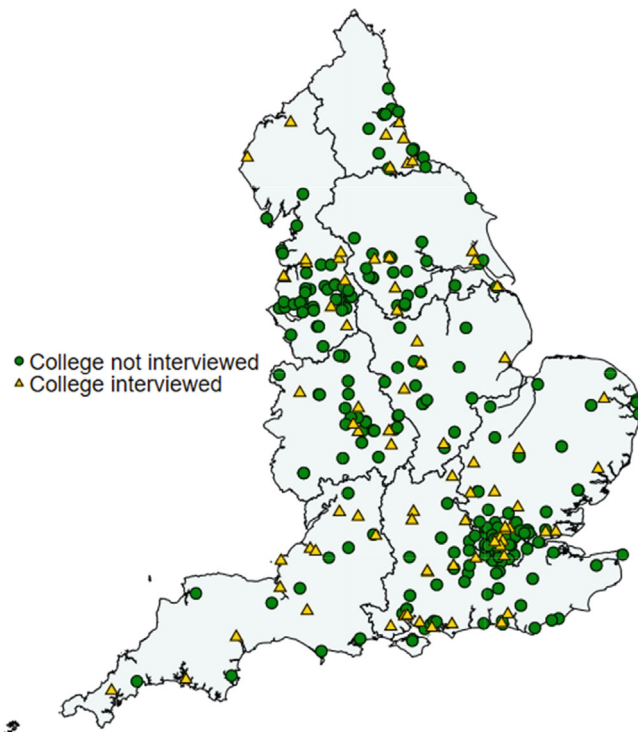
### 2.4.1 | Individual-level controls

The individual-level data include demographics (gender and ethnicity), family background information (free school meal eligibility and English as first language), and previous attainment in national exams during compulsory schooling (KS4 GCSE points). For more detail on the individual-level data, see Subsection A2.2 of the Online Appendix.

### 2.4.2 | Regional characteristics

We geocoded the colleges in our sample, together with the wider population of colleges and schools offering sixth form provision, in order to obtain some geographic characteristics based on regional economic indicators or spatial measures of competition. Figure 1 plots the colleges that we interviewed on a map, together with the wider population of colleges, and shows that our sample is evenly spread across England.

In order to test whether management quality in colleges is influenced by the extent of competition that they face (a result that has been established in other sectors), we included in the survey a question on the extent of competition faced by the college. For a more objective measure, we also calculated alternative competition variables based on the locations of FE colleges/sixth form colleges or schools with post-16 provision. In line with work published recently in the related sector of university technical colleges (Machin *et al.* 2020b), we calculated two measures of spatial competition: (i) the number of other colleges within a radius of 20 km, and (ii) the number of other colleges and schools with post-16 provision within a radius of 20 km. In our analysis, we constructed a ‘high competition’ dummy equal to 1 where the number of competitors is greater



**FIGURE 1** Map of population of colleges and sample of colleges interviewed. *Notes:* Analysis based on geocoded locations of colleges in the population and our sample.

than the 75th percentile of the sample on each of the competition measures in turn (self-reported, colleges, or colleges and schools).

We also obtained geographic characteristics of the regions where our surveyed colleges are located: regional GDP per capita and population density in 2017, from Eurostat.

### 2.4.3 | Measures of the ‘effectiveness’ of principals

Here, we draw upon work in Ruiz-Valenzuela *et al.* (2017), where the effectiveness of principals is estimated using panel data on learners in colleges over time, to recover principal and college ‘fixed effects’ in institution-level learner outcomes (at levels 2 and 3). More detail on the methodology is set out in Subsection A2.3 of the Online Appendix. We gathered the most recent estimate of principal’s fixed effect for each of the colleges, and were able to merge such information for 61 out of the 79 colleges in our WMS sample. To capture a measure of relative effectiveness and abstract from the units of measurement in Ruiz-Valenzuela *et al.* (2017), we standardize the principal fixed effects.

## 2.5 | Descriptive statistics

Table 1 describes the key variables used in the analysis for the overall sample and in the subsample used in our analysis with individual-level data. There is little difference between the two samples.

Table 1 begins with the management practice scores (which are scaled from 1 to 5). The average college has a relatively high management score of 4.24, though there is substantial variation, as shown in Figure 2, which plots the distribution of management scores across our sample. Within the overall score, FE colleges do particularly well in terms of operations practices, which has a higher mean and smaller standard deviation than the other management practice groupings. And they appear to do worse in terms of people management, where there is a lower mean and a thicker lower tail. This might be explained by the fact that colleges are restricted in the extent to which they are able to use pay to incentivize teachers.<sup>15</sup> This finding is consistent with the schools sector, where people management practices tend to be worse than non-people management practices, in the UK and internationally (Bloom *et al.* 2015a). Figure B1 of the Online Appendix plots the distribution of management practice scores across the separate groupings, illustrating these patterns.

We compare the college sample to the distribution of management scores in UK secondary schools (sourced from Bloom *et al.* 2015a) and university departments (sourced from McCormack *et al.* 2014) in Figure 3. This shows that on average and based on these samples, FE colleges appear to be better managed than both schools and university departments, but the difference is larger in the case of schools. We explore the extent to which the FE college sample is selected (based on observables) below.

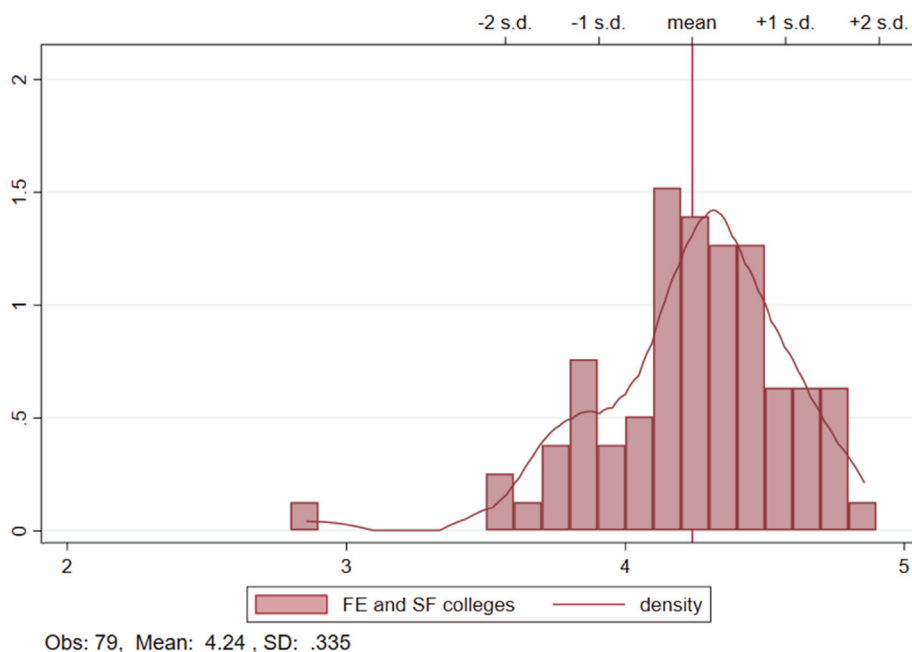
At the end of the interviews, the principals were asked to rate the management practices at their colleges. Overall, we find a positive correlation between these self-assessed scores and the WMS scores (as shown in Figure B2 of the Online Appendix), which suggests that there is an alignment between what principals consider to be good practice and the scoring methodology in the WMS. These data also show that a large number of principals underestimate their relative management practice scores: a high share (around half) of those who rated themselves lower than the average actually had higher than average WMS management scores.<sup>16</sup>

Next, we describe the key outcomes for which we explore the relationship with management practices at the institution level. On average across our sample, colleges tend to perform relatively well: 78% of learners in colleges say that they are satisfied in the NSS, and 80% and 82% of learners and employers, respectively, are satisfied with these colleges according to the FE Choices

TABLE 1 Descriptive statistics.

Variable	Colleges interviewed ( <i>N</i> = 79)		Colleges tenure +6 ( <i>N</i> = 45)		<i>p</i> -value of difference
	Mean	SD	Mean	SD	
<i>Management practices</i>					
Management score	4.24	0.34	4.28	0.36	0.30
Operations score	4.59	0.36	4.63	0.41	0.31
Monitor score	4.35	0.44	4.43	0.44	0.07
Target score	4.12	0.45	4.11	0.52	0.77
People score	3.96	0.46	3.99	0.46	0.44
Leadership score	4.21	0.55	4.27	0.55	0.27
<i>Institution-level outcomes</i>					
Share satisfied	0.78	0.12	0.77	0.13	0.21
Learner satisfaction (FE Choices)	0.80	0.08	0.80	0.08	0.87
Employer satisfaction (FE Choices)	0.82	0.10	0.82	0.12	0.87
Ofsted effectiveness (reversed score)	2.90	0.73	2.93	0.75	0.63
Proportion achieved at least 1 aim, level 2 (16–19)	0.79	0.06	0.80	0.05	0.10
Proportion achieved at least 1 aim, level 3 (16–19)	0.80	0.08	0.80	0.09	0.69
<i>College characteristics</i>					
Number of learners	8837	6443	9815	7137	0.12
Log number of learners	8.79	0.85	8.93	0.76	0.10
Teacher–student ratio	0.06	0.08	0.05	0.05	0.48
Number of learners aged 16–19	3555	2034	3664	2054	0.59
Sixth form	0.18	0.38	0.11	0.32	0.08
<i>Principal characteristics</i>					
Female	0.46	0.50	0.47	0.50	0.82
FE-management-specific qualification	0.33	0.47	0.38	0.49	0.30
Teaching qualification	0.72	0.45	0.69	0.47	0.46
6+ years of tenure at college	0.57	0.50	1.00	0.00	0.00
Experience in industry	0.51	0.50	0.60	0.50	0.06
<i>Geographic region-level variables</i>					
High density colleges	0.25	0.44	0.29	0.46	0.41
Region population density (2017)	916	1595	976	1667	0.71
Region GDP per capita (2017)	30,811	8230	31,375	8494	0.49

*Notes:* Management score is average of all 21 WMS management scores. Scores of separate groupings of scores indicated in Online Appendix Table A1.1. Leadership score is average of the scores across the three leadership and accountability questions in Table A1.2. Share satisfied is % students satisfied with their course. Learner satisfaction is % learners who would recommend the college to their friends. Employer satisfaction is % employers that would recommend this training provider to another employer. (These variables are missing for some colleges, as shown in Table 2.) Ofsted effectiveness score is reversed raw score awarded to the institution (1–4, where 1 is outstanding, and 4 is inadequate). Proportion learners achieved level 2 is proportion of learners aged 16–19 years old who achieve at least one aim at level 2 out of the total learners aged 16–19 years old with at least one active aim at level 2 (similarly for level 3 achieved). Sixth form equals 1 for a sixth form college. Principal characteristics dummies equal 1 if the characteristics listed apply. High density dummy equals 1 if the college is in the top 25% of colleges with a higher number of colleges within 20 km. Population density and GDP per capita are regional measures (NUTS1) obtained from Eurostat.



**FIGURE 2** Histogram of management scores in FE colleges. *Notes:* Histogram of management scores based on a sample of 79 colleges.

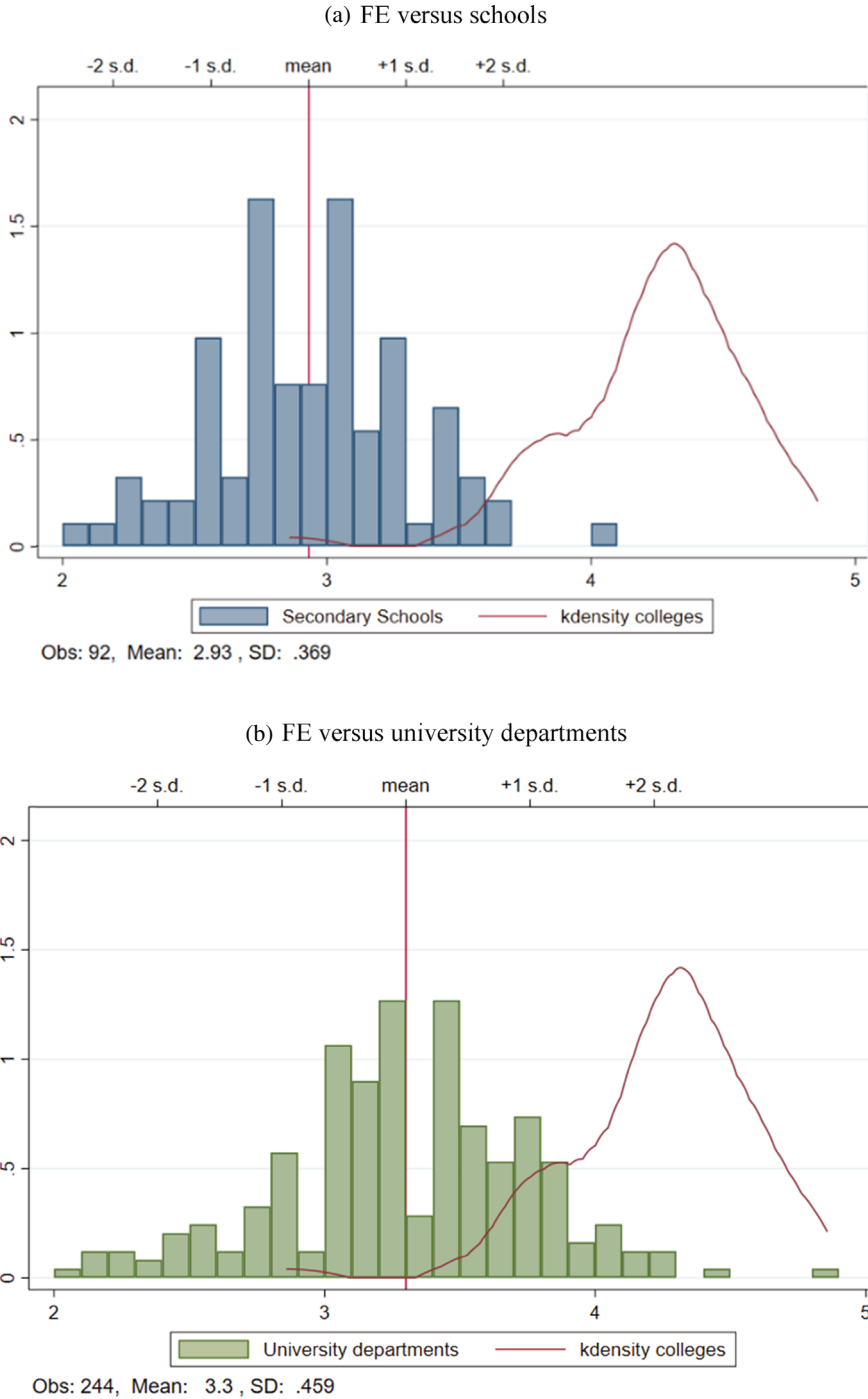
surveys. On average, the Ofsted effectiveness score is 2.9 (representing a ‘good’ rating here as the scores are reversed), and 79% and 80% of learners achieved at least one aim at levels 2 and 3, respectively. Regarding the colleges themselves, on average there are nearly 9000 learners in these colleges across all types of provision, and 3600 are aged 16–19 (which is the focus of our survey). In the sample, 18% of colleges are sixth form colleges.

Table 1 also describes the characteristics of the college principals, of which 46% are women. Regarding their training and background, 33% have an FE-management-specific qualification, 72% have a teaching-specific qualification, and 51% have some experience in industry. Some 57% of principals have been working at their college for over 6 years.

We report our favoured spatial measure of competition here: 25% of the sample face a high density of colleges in their surrounding area (this is by construction, as this variable is an indicator that equals 1 for colleges that are in the top quartile in terms of the number of other colleges within a 20 km radius). Figure B3 in the Online Appendix plots the spatial competition measures on a map—these spatial measures are positively correlated with self-reported measures. Finally, the average college is in a NUTS1 region, where population density was 916 people per square kilometre (eight of the colleges in our sample are in London, which drives up this average), and GDP per capita was nearly 31,000 in 2017.

As discussed, in our individual-level analysis, we focus on a subset of colleges where the principal has been at the college for at least 6 years. Assuming that there is some persistence in management practices (which we measure in 2019), this allows us to correlate the management practices of the college attended at age 17 with the outcomes of individuals who we observe by age 20. For more details, see Subsection A2.2 of the Online Appendix.

As mentioned above, the subsample of colleges where the principal has been in post for at least 6 years is very similar to the full sample (and *p*-values of the difference are rarely statistically significant).<sup>17</sup> We summarize the key outcomes, prior achievement and demographic variables



**FIGURE 3** Histogram of management scores in FE colleges versus schools. *Notes:* Here, kdensity refers to the kernel density estimate plot for management practices in colleges. Schools data from the UK sourced from Bloom *et al.* (2015a); universities data sourced from McCormack *et al.* (2014).



at the individual level in Table B1 of the Online Appendix. Again, these do not differ in the subsample compared to the full sample of colleges.<sup>18</sup>

### 2.5.1 | Balance checks

We first compare our sample of colleges interviewed and the population of FE colleges that have at least one learner in the 16–19 age group (see panel A of Online Appendix Table B2). There is little evidence that our sample of colleges performs better than the average college, though they do seem to do slightly better in terms of Ofsted scores (this relationship is significant at the 10% level). Our sample of colleges does seem to be positively selected in terms of size—colleges in the sample are 42% larger, have 37% more aims, and have 38% higher expenditure in absolute terms. Normalizing aims and expenditure by the number of learners, however, shows that on a per learner basis, there is no evidence of selection. It appears to be the case that larger colleges participated in our survey, but they do not appear to be better resourced in per learner terms.<sup>19</sup> Given the positive selection in terms of size, we ensure that we control for college size in regressions that link college outcomes to management practices.

## 3 | MANAGEMENT PRACTICES AND EDUCATIONAL OUTCOMES

Are management scores associated with educational outcomes, as has been found to be the case in other educational contexts? In the following subsections, we first estimate basic institution-level regressions, and then present a more disaggregated analysis at the individual level. In both cases, we control for many confounders, including the prior achievement of students entering colleges. The individual-level analysis enables us to consider medium- and longer-run outcomes as well as control for more background characteristics of individuals.

### 3.1 | Management practices and educational outcomes at the institution level

We begin by estimating a version of the education production function, as follows:

$$Y_{jk} = \alpha_0 + \alpha_1 M_j + \alpha'_2 Z_j + \alpha'_3 R_k + u_{jk}, \quad (1)$$

where  $Y_{jk}$  are the outcomes for college  $j$  in region  $k$ ,  $M_j$  is the standardized management score (the z-score of the average of 21 individual management questions),  $Z_j$  are characteristics of the college—in particular its overall size (which is a proxy for school resources)—a measure of prior achievement of incoming cohorts and demographics, and  $R_k$  are geographic characteristics.

The results are in Table 2. Each panel relates to a different institutional-level outcome, and in general there is a positive relationship between management practices and contemporaneous educational outcomes. These are significant in the case of (NSS) share satisfied, employer satisfaction and the share of learners achieving at least one aim at level 2 or level 3, even in the more saturated specifications where prior attainment of learners is controlled for. Figure 4 shows the scatterplots corresponding to columns (1) and (4) for the NSS share satisfied and proportion of learners achieving level 3 aims.

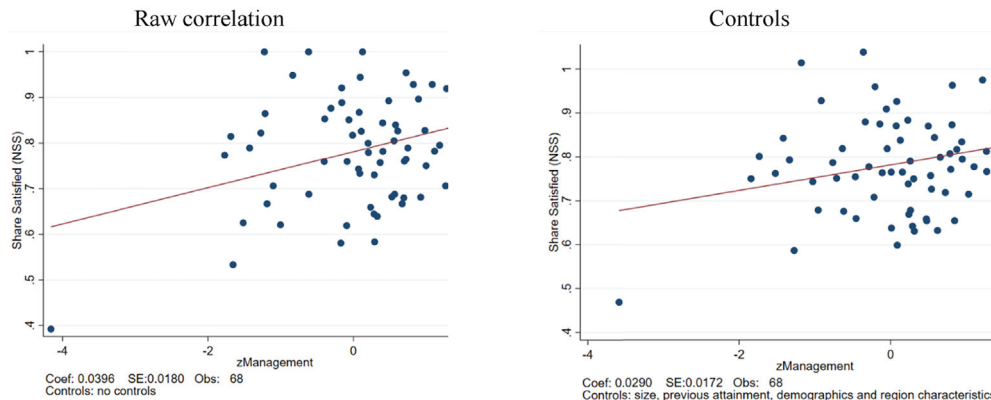
These results suggest that management practices might help to explain differences in college performance. We note, however, that these specifications have few degrees of freedom, and as such the significance of the relationships tends to be lost when we consider alternative specifications in the robustness checks, for example when we include extensive controls for survey noise such as interviewer dummies or day of the week that the interview was held (see Table B3 of the

TABLE 2 Management practices and institution-level outcomes.

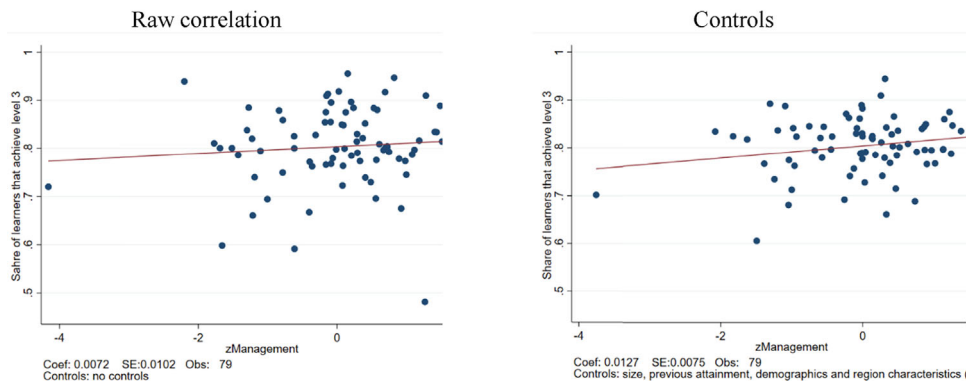
	(1)	(2)	(3)	(4)
<i>Panel A: Share satisfied (NSS)</i>				
zManagement	0.040** (0.018)	0.040** (0.018)	0.035** (0.017)	0.029* (0.017)
Observations	68	68	68	68
Adjusted R-squared	0.100	0.086	0.086	0.123
<i>Panel B: Learner satisfaction (FE Choices)</i>				
zManagement	0.020** (0.009)	0.019** (0.009)	0.016 (0.010)	0.017 (0.010)
Observations	65	65	65	65
Adjusted R-squared	0.061	0.082	0.081	0.063
<i>Panel C: Employer satisfaction (FE Choices)</i>				
zManagement	0.030** (0.012)	0.029** (0.012)	0.030** (0.013)	0.033** (0.014)
Observations	63	63	63	63
Adjusted R-squared	0.076	0.094	0.081	0.089
<i>Panel D: Ofsted (reversed score)</i>				
zManagement	0.121 (0.102)	0.109 (0.103)	0.102 (0.104)	0.108 (0.105)
Observations	79	79	79	79
Adjusted R-squared	0.015	0.016	0.061	0.037
<i>Panel E: Share of learners who achieved at least one aim at level 2</i>				
zManagement	0.011* (0.006)	0.013** (0.006)	0.011** (0.006)	0.010* (0.005)
Observations	79	79	79	79
Adjusted R-squared	0.018	0.062	0.178	0.220
<i>Panel F: Share of learners who achieved at least one aim at level 3</i>				
zManagement	0.007 (0.010)	0.011 (0.010)	0.014* (0.007)	0.013* (0.008)
Observations	79	79	79	79
Adjusted R-squared	-0.005	0.055	0.445	0.448
Size		Yes	Yes	Yes
Previous achievement			Yes	Yes
Demographics			Yes	Yes
Log population density				Yes
Log region GDP per capita				Yes

*Notes:* Robust standard errors in parentheses. Each panel reports results for a different outcome variable as defined in the notes to Table 1. zManagement is the standardized management score. Column (1) shows the raw correlation between management z-score and the outcome variables of interest. Column (2) add the total number of learners in the college (in logs) as control. Column (3) adds the average GCSE score (in standard deviations) of the 2015 KS4 for each of the FE colleges in our sample in 2016. Column (4) adds the percentage of learners who are women, percentage of learners eligible for FSM, and percentage of learners who speak English at home, of the 2015 cohort that enters each of the FE colleges in 2016. Log population density and log region GDP per capita (2017) are at the NUTS1 level. \*\*\*, \*\*, \* denote significance at the 1%, 5%, 10% level, respectively.

(a) NSS share satisfied



(b) Proportion of learners achieving level 3 aims



**FIGURE 4** Management practices and institution-level outcomes. *Notes:* Scatterplots of simple correlations between (a) NSS share satisfied, and (b) the proportion of learners that achieve level 3 aims, and management score (standardized), corresponding to Table 2, columns (1) and (4), respectively.

Online Appendix).<sup>20</sup> Overall, this analysis suggests that there is a positive association between management practices and aggregated outcomes at the college level, and motivates our further, better-identified analysis at the individual level that follows.

### 3.2 | Management practices and educational outcomes at the individual level

In our individual level analysis, we estimate logit regressions of the form

$$Y_{ijk} = \beta_0 + \beta_1 M_j + \beta'_2 X_i + \beta'_3 Z_j + \beta'_4 R_k + u_{ijk}, \tag{2}$$

where  $Y_{ijk}$  are three core binary outcomes for individual  $i$  in college  $j$  and region  $k$ : whether or not a learner has achieved qualifications at level 2 (equivalent to GCSE) or level 3 (upper secondary level), or is pursuing a degree, by age 20.<sup>21</sup> As before,  $M_j$  is the standardized management score, and  $Z_j$  are college characteristics, in particular college size, and  $R_k$  are key geographic characteristics.<sup>22</sup> We now control for a series of individual characteristics, including prior achievement and demographics, within the vector  $X_i$ . The coefficient of interest is  $\beta_1$ , which gives the association

**TABLE 3** Management practices and learner outcomes.

	(1)	(2)	(3)	(4)
<i>Panel A: Achieved level 2 plus by age 20 (mean = 0.86)</i>				
zManagement	0.010*	0.011**	0.006*	0.008**
	(0.006)	(0.006)	(0.004)	(0.003)
Observations	38,501	38,501	38,501	38,501
Clusters	44	44	44	44
<i>Panel B: Achieved level 3 plus by age 20 (mean = 0.66)</i>				
zManagement	0.032*	0.036**	0.018**	0.019***
	(0.017)	(0.015)	(0.009)	(0.007)
Observations	44,584	44,584	44,584	44,584
Clusters	45	45	45	45
<i>Panel C: Pursuing degree by age 20 (mean = 0.23)</i>				
zManagement	0.025	0.033	0.017*	0.019**
	(0.021)	(0.020)	(0.010)	(0.008)
Observations	44,584	44,584	44,584	44,584
Clusters	45	45	45	45
Size		Yes	Yes	Yes
Previous achievement			Yes	Yes
Demographics			Yes	Yes
Log population density				Yes
Log region GDP per capita				Yes

*Notes:* Standard errors clustered at the college level in parentheses. The sample used in these regressions comprises all learners enrolled at a college where the principal has 6 years or more of tenure. Panel A comprises learners who are enrolled in a level 2 course by age 20, while panels B and C use a sample of learners enrolled in any course by age 20. Coefficients reported are the marginal effects using a logistic regression. Column (1) shows the raw correlation between management z-score and the outcome variables of interest. Column (2) adds the total number of learners (in logs) as control. Column (3) adds the individual GCSE score (in standard deviations). Column (4) adds gender, saturated variables of ethnicity, FSM eligibility and English spoken at home. These are missing for some learners (see Online Appendix Table B1), and in such cases we mean code the variable and add a dummy for missing status. Log population density and log region GDP per capita are regional measures (NUTS1) from 2017.

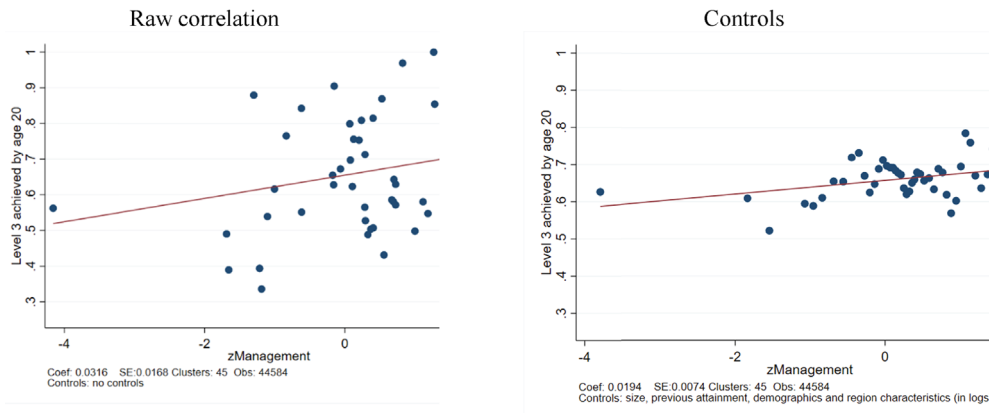
\*\*\*, \*\*, \* denote significance at the 1%, 5%, 10% level, respectively.

between a standard deviation increase in the management score and the probability of achieving the specified educational outcomes.

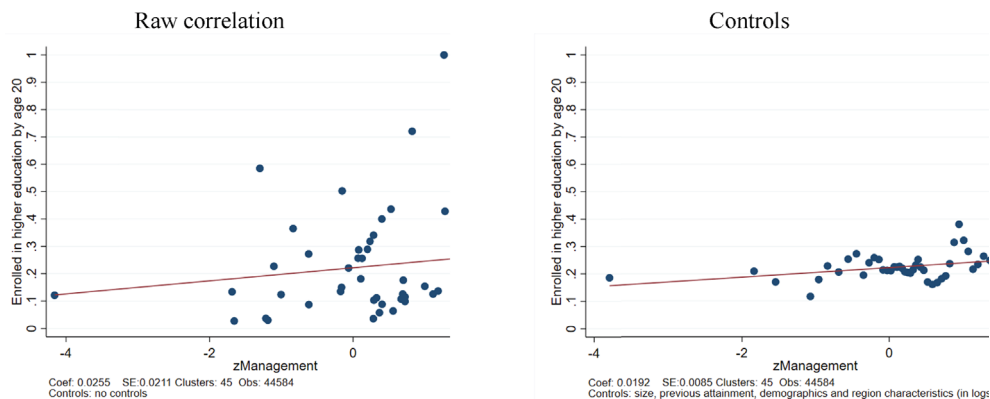
Our results are summarized in Table 3. Again, there appears to be a positive relationship between the probability of achieving each of the three educational outcomes that we measure and management practices. With the likelihood of achieving level 2 or level 3 qualifications (panels A and B), the raw correlations reported in column (1) gain significance when controlling for college size (column (2)), and the coefficients on management practices remain unchanged. The relationship is about double in magnitude for level 3 aims, suggesting that management practices matter in particular at more advanced educational levels. Controlling for individual demographics and prior achievement (i.e. estimating college value-added) halves the magnitude of the coefficient (column (3)), but it is still significant. Finally, adding geographic controls has little impact. On the likelihood of pursuing a degree by age 20, the coefficients on management practices are similar in magnitude to level 3, but the results are significant only in the value-added specifications.<sup>23</sup> The results for level 3 and pursuing a degree are represented graphically in Figure 5.

The upshot of this analysis is that a one standard deviation increase in the management score (0.36 in terms of the raw scores on this sample, as shown in Table 1) is associated with around a 2

(a) Achieved level 3 plus by age 20



(b) Pursuing a degree by age 20



**FIGURE 5** Management practices and individual-level outcomes. *Notes:* Bin scatterplots of simple correlations between (a) the probability of achieving level 3 aims, and (b) studying for a degree, and management score (standardized), corresponding to Table 3, columns (1) and (4), respectively.

percentage point increase in the likelihood of achieving at least a level 3 qualification (for which the mean in the sample is 66%), or pursuing a degree by age 20 (for which the mean is 23%). Proportionally, this represents a higher association between management practices and the probability of pursuing a degree. Further analysis (available on request) shows that this association is driven by students who enter colleges well prepared (i.e. with good GCSE results) and in colleges where higher education is a main area of educational provision.<sup>24</sup>

The relationship between management practices and outcomes is also evident for lower levels of achievement. The association is smaller in magnitude, but still significant in terms of level 2 aims (just under 1 percentage point). On average, 86% of the individuals in the sample achieve this level.

Taken together, the magnitude of the association between management practices and educational outcomes is relatively high when we consider the effect of attending a college that is of higher value-added in general. Aucejo *et al.* (2023) find that a one standard deviation increase in college value-added increases the likelihood of having achieved level 3 or attending university by about 4 percentage points.

### 3.2.1 | Robustness

We find that these results are robust to a number of alternative specifications, including estimating a basic linear probability model, dropping the outlier college (this actually increases the magnitude of our results), adding additional college-level controls to include characteristics of the principals,<sup>25</sup> and adding the full set of survey noise controls (see Table B4 of the Online Appendix).<sup>26</sup> While our focus in this analysis is on colleges where principals have at least 6 years of tenure at college, and on the 2012 GCSE cohort of learners (that enrolled in the colleges in 2013) for whom we observe educational outcomes by age 20, our results are not sensitive to alternative feasible cut-offs (results available on request). For example, results for the 2012 cohort are very similar on the sample of colleges where principals were in the college for 7 or 5 years, and remain positive and significant (for level 3 outcomes) when considering the 2013 GCSE cohort (for whom we are able to track educational outcomes until age 19).<sup>27</sup>

### 3.2.2 | The relative importance of different types of practices

We also explore whether any particular categories of management practices might be driving these results, and find that across outcomes, the magnitudes of the coefficients on management scores for the different management practices groupings are similar, but significance varies (Table 4). For level 2 and level 3 outcomes, the coefficients on the targeting z-score are the most precisely estimated. With respect to the likelihood of pursuing a degree by age 20, people

**TABLE 4** Management practices groupings and learner outcomes.

Management practices in z-score:	Operations (1)	Monitoring (2)	Targeting (3)	People (4)
<i>Panel A: Achieved level 2 plus by age 20 (mean = 0.86)</i>				
z-score	0.005 (0.004)	0.008** (0.004)	0.006*** (0.002)	0.007* (0.004)
Observations	38,501	38,501	38,501	38,501
Clusters	44	44	44	44
<i>Panel B: Achieved level 3 plus by age 20 (mean = 0.66)</i>				
z-score	0.015* (0.008)	0.016* (0.009)	0.016*** (0.005)	0.019** (0.007)
Observations	44,584	44,584	44,584	44,584
Clusters	45	45	45	45
<i>Panel C: Pursuing degree by age 20 (mean = 0.23)</i>				
z-score	0.013 (0.009)	0.017* (0.010)	0.012 (0.008)	0.017** (0.007)
Observations	44,584	44,584	44,584	44,584
Clusters	45	45	45	45

*Notes:* Standard errors clustered at the college level in parentheses. The sample used in these regressions comprises all learners enrolled at a college where the principal has 6 years or more of tenure. Panel A comprises learners who are enrolled in a level 2 course by age 20, while panels B and C use a sample of learners enrolled in any course by age 20. Coefficients reported are the marginal effects using a logistic regression. Each column replicates the specification in column (4) of Table 3, but with average management scores across the groupings of practices as labelled in the columns. (See Online Appendix Table A1.1 for details on the specific practices within each category.) As in Table 3, dependent variables are indicated for each panel.

\*\*\*, \*\*, \* denote significance at the 1%, 5%, 10% level, respectively.



management practices seem to matter most. Consistently across outcomes, operational practices seem to matter less. These findings are consistent with the international evidence on schools (Bloom *et al.* 2015a), which found that people management practices had the strongest relationship with pupil outcomes from all the management practice groupings (followed by targets).<sup>28</sup> People management practices also appear to be worse on average in our sample (Table 1), and are an area where colleges (and public sector institutions) are restricted from implementing the types of incentives that are considered ‘best practice’ in the WMS.

### 3.3 | Do management practices matter more for disadvantaged learners?

Having established that management practices appear to matter for individual-level educational outcomes, we next explore whether they matter more for students coming from a disadvantaged background (as measured using eligibility for free school meals (FSM) while at school). We expect this to be the case, as such learners may have less access to support at home and thus benefit more from well-organized and structured practices in the classroom. This hypothesis is supported by the literature linking school resources to student outcomes. Higher school expenditure or lower class size appear to matter more for students from poorer backgrounds (Gibbons and McNally 2013). On the other hand, it is also possible that a lack of complementary inputs from home could reduce impacts. For example, the evaluation of Fryer (2017) of a management training intervention in schools found treatment effects to be weaker for disadvantaged students.

To test our hypothesis, we include an interaction between the management z-score and FSM status, and also test the robustness to including college fixed effects and adding interactions between FSM status and other institutional indicators. The advantage of this strategy is that we can control for any systematic differences between colleges that could in principle be correlated with management practices overall. This alleviates a potential concern of the analysis presented above that colleges that are good for some unobservable reason (such as good leadership) may also have good management practices. This is not relevant when considering variation within colleges, though we identify something different in this case—specifically, whether management practices are more or less important for disadvantaged students compared to other students within the same institution. We return to the more general point in Section 5, where we consider the correlates of ‘good management practices’. Column (1) of Table 5 replicates our basic results (now using OLS specifications)<sup>29</sup> with the full set of controls for other demographic characteristics and prior achievement, reporting the coefficient on FSM status, which is negative, showing that those from poor socioeconomic backgrounds are less likely to achieve good educational outcomes.<sup>30</sup> Column (2) includes the interaction term, which is positive and significant for level 2 or level 3 outcomes, though there is no evidence of heterogeneity in terms of the likelihood of pursuing a degree by age 20. Column (3) then shows that these significant interaction terms survive when college fixed effects are included (the management z-score drops out in these specifications). This is robust to interacting the FSM status dummy with other institutional characteristics included in the controls (college size, regional GDP and population density, as in column (4)), as well as restricting panels B and C to the same sample as in panel A.

These results imply that raising the management practices in a college from the 10th percentile to the 90th percentile (an increase of 2.49 standard deviations) is associated with an 8 percentage point higher likelihood of achieving a level 3 qualification for learners on FSM.<sup>31</sup> It is nearly half of the gap in the raw probability of FSM and non-FSM students achieving a level 3 qualification by age 20 (which is 19 percentage points). This type of ‘effect’ would apply for every FSM student—as an improvement in management practices in a college would affect future cohorts too. This evidence is consistent with the hypothesis that management practices in colleges are especially important for improving intermediate educational outcomes for disadvantaged

**TABLE 5** Do FE colleges matter for disadvantaged students?

	(1)	(2)	(3)	(4)
<i>Panel A: Achieved level 2 plus by age 20 (mean = 0.86)</i>				
zManagement	0.007** (0.003)	0.005* (0.003)		
FSM eligible	-0.048*** (0.005)	-0.051*** (0.004)	-0.052*** (0.004)	1.034* (0.553)
FSM * zMan		0.016*** (0.004)	0.015*** (0.004)	0.015*** (0.004)
Observations	38,501	38,501	38,501	38,501
Clusters	44	44	44	44
<i>Panel B: Achieved level 3 plus by age 20 (mean = 0.66)</i>				
zManagement	0.018** (0.008)	0.016* (0.008)		
FSM eligible	-0.064*** (0.006)	-0.067*** (0.007)	-0.070*** (0.007)	0.609 (0.553)
FSM * zMan		0.017** (0.006)	0.013** (0.005)	0.015*** (0.005)
Observations	44,584	44,584	44,583	44,583
Clusters	45	45	44	44
<i>Panel C: Pursuing degree by age 20 (mean = 0.23)</i>				
zManagement	0.017** (0.008)	0.019** (0.009)		
FSM eligible	0.003 (0.006)	0.005 (0.006)	-0.001 (0.006)	-1.087* (0.557)
FSM * zMan		-0.010 (0.007)	-0.005 (0.006)	-0.006 (0.006)
Observations	44,584	44,584	44,583	44,583
Clusters	45	45	44	44

*Notes:* Standard errors clustered at the college level in parentheses. The sample used in these regressions comprises all learners enrolled at a college where the principal has 6 years or more of tenure. Panel A comprises learners who are enrolled in a level 2 course by age 20, while panels B and C use a sample of learners enrolled in any course by age 20. Coefficients are estimated using OLS. Columns (1) and (2) include controls for college size, previous achievement, demographics, and regional GDP per head and population density in logs. Column (3) includes college fixed effects and controls for demographics and prior achievement. Column (4) adds interactions of FSM with size, region GDP per head and population density. The share in panel A with FSM eligibility is 16%, and in panels B and C it is 14.8%; cells where this information is missing are coded 0, and a dummy is included in the regression.

\*\*\*, \*\*, \* denote significance at the 1%, 5%, 10% level, respectively.

learners, and therefore for improving social mobility. We explore what this implies for labour market outcomes in the next section.

#### 4 | MANAGEMENT PRACTICES, UPPER SECONDARY EDUCATION AND LABOUR MARKET OUTCOMES

Our results suggest that management practices matter for improving educational attainment, and this is particularly the case with respect to improving the probability that those from disadvantaged backgrounds achieve level 3—upper secondary—qualifications. We know from the

literature that level 3 qualifications matter for future earnings: a conservative estimate gives a 6% return in lifetime earnings.<sup>32</sup> Our results therefore suggest that management practices may be an important channel for improving labour market outcomes for disadvantaged groups.

We also explore the relationship between management practices and labour market outcomes of learners early on in their careers (by age 20) as permitted by the time frame of data available to us—bearing in mind that these are not representative of a longer-term effect. This analysis is based on the sample of learners who are not in higher education at age 20. Given that we have seen that good management practices are associated with a higher probability of entering higher education by this age, interpreting any association between management practices and the school to work transition by that same age is further complicated by this selection effect. Results are reported and discussed in Online Appendix C. The association between earnings and employment (at age 20) and management practices is in fact negative in this selected sample overall, though it is negligible for those from low socioeconomic backgrounds.

## 5 | HOW MANAGEMENT PRACTICES VARY ACROSS FE COLLEGES

We have established that management practices are positively correlated with performance at the institution level, and with individual learner outcomes, even in value-added specifications and controlling for observable college characteristics. It is therefore interesting to understand whether there are any particular principal or college characteristics that tend to be associated with better management practices.

### 5.1 | Do observable characteristics of colleges and their principals explain differences in management practices?

We begin by exploring whether observable principal or college characteristics help to explain differences in management practices, estimating the linear regression

$$M_{jk} = \varphi_0 + \boldsymbol{\varphi}'_1 \mathbf{Z}_j + \varphi_2 \text{comp}_j + \boldsymbol{\varphi}'_3 \mathbf{R}_k + u_{jk}, \quad (3)$$

where for college  $j$  in region  $k$ ,  $\mathbf{Z}_j$  includes college size, an indicator of whether the college is a sixth form college, and principal characteristics;  $\text{comp}$  is a measure of competition faced by the college, our core measure being an indicator for a college being in the top quartile in terms of the number of other colleges within a 20 km radius; and as before,  $\mathbf{R}_k$  includes our regional covariates.

The results are shown in Table 6. In general, the coefficients are of expected sign, though not significant at conventional levels. Larger organizations tend to be better managed, and sixth form colleges worse managed, but these relationships are not significant. Adding in characteristics of the principal, we see that there is a positive and significant coefficient on the FE-management-specific qualification, but not on any other observable characteristics.<sup>33</sup> This finding suggests that this qualification is aligned with what is considered best practice in the WMS, but with a small sample it is difficult to ascertain this robustly. We also note that this relationship remains positive but is not significant once regional covariates are included.<sup>34</sup>

In the saturated specification, the only variable that appears to have explanatory power is our measure of competition—colleges facing a high degree of spatial competition from other colleges have 0.6 of a standard deviation higher management practices, *ceteris paribus* (column (3) of Table 6). The finding that competition is positively related to management practices is consistent with the broader literature on management practices in firms and hospitals; see, for example, Bloom *et al.* (2016) and Bloom *et al.* (2015b), though competition does not appear to be a significant driver for schools in Bloom *et al.* (2015a).<sup>35</sup>

**TABLE 6** Management practices and college/principal characteristics.

	(1)	(2)	(3)
Log number of learners	0.129 (0.140)	0.049 (0.148)	0.048 (0.148)
Sixth form	-0.146 (0.324)	-0.203 (0.326)	-0.212 (0.332)
Female		-0.287 (0.240)	-0.313 (0.240)
FE-management-specific qualification		0.395* (0.226)	0.272 (0.225)
Teaching qualification		-0.284 (0.240)	-0.246 (0.237)
6+ years of tenure at college		0.122 (0.219)	0.148 (0.222)
Experience in industry		0.062 (0.226)	-0.078 (0.237)
High density colleges			0.635** (0.261)
Region log population density (2017)			-0.333 (0.302)
Region log GDP per head (2017)			0.108 (1.090)
Observations	79	79	79
Adjusted R-squared	-0.003	-0.001	0.013

*Notes:* Robust standard errors in parentheses. Dependent variable is the standardized management score. High competition variables are dummies equal to 1 if spatial competition measure is above the 75% percentile.

\*\*\*, \*\*, \* denote significance at the 1%, 5%, 10% level, respectively.

The fact that management practices are not correlated with many of these observable college and principal characteristics but are correlated with outcomes suggests that the relationships between educational outcomes and management practices that we document above are not driven by some obvious omitted variable at the institution level.

## 5.2 | Do higher management scores simply reflect better leadership?

In general, in the literature on management practices, a distinction is made between management practices and the characteristics or styles of particular managers (for discussion, see Valero 2021). While these two dimensions are clearly related, with leaders playing a key role in the way organizations are managed,<sup>36</sup> management practices are also likely to reflect processes on the ground that can be thought of as a technology—evolving slowly, and depending on other organizational and environmental factors. To the extent that the data allow, we seek to explore whether higher management scores can be explained by attributes of particular principals in some way.

While we have found little evidence of a link between observable features of principals and management practices, these say nothing about the underlying effectiveness of principals with respect to learner outcomes. We therefore draw on estimates of principal effectiveness (for level 2 and level 3 outcomes) from Ruiz-Valenzuela *et al.* (2017) to allow us to explore this. Indeed, this

paper found that the principal fixed effects were not correlated with observable characteristics of principals.

At the institution level, we are able to match principal fixed effects to 61 colleges in our sample. We find that there is generally a positive relationship between these and the management score for level 2 effectiveness measures, but this is not significant except when regional covariates are included (see Table B7 of the Online Appendix). The relationships are negative but not significant for level 3. Moreover, when we add the principal fixed effects into our core individual level regressions, the coefficients on management practices are unchanged (results not reported here).<sup>37</sup>

We can also further explore the relationship between leadership and management practices using questions asked in our survey. In addition to the core questions on operational management practices, we asked three questions on college leadership and accountability. The question on leadership vision and strategy measures the extent to which college leaders have an understanding of the broader set of challenges faced by the college, and the right mindset to address them, and the score of this question is combined with the scores on accountability of leaders and the extent to which leadership roles are clearly defined to generate a leadership score (see Table A1.2 of the Online Appendix for details). We find that this score is positively correlated with the core management practices scores (see Figure B4 of the Online Appendix), and explore whether there is evidence of a relationship between the leadership score and learner outcomes. The results are reported in the Online Appendix (Table B8). When the leadership z-score is included in our core value-added specifications, we find an association with learner outcomes of similar magnitude as with management practices, but estimated more noisily. In the case of the probability of studying for a degree by age 20, there is no significant relationship for the leadership scores, and when both measures are included together, only the management score survives. Overall, this analysis suggests that despite these scores being correlated (and therefore likely to give rise to multicollinearity when included in the same regression), the management practice score has a more precise and robust relationship with learner outcomes at higher levels of achievement compared with measures of leadership and accountability. However, we acknowledge that there is more variation in the management index than in the leadership index, which could be driving the relative power of the two measures. The small sample size prevents us from drawing firm conclusions. On balance, the evidence presented is consistent with management scores capturing something distinct from principal effectiveness or effective leadership.

Finally, we note that as in our paper, a correlation between management practices (measured in the same way) and CEO behaviour in firms has been found elsewhere in the literature. Bandiera *et al.* (2020) find that in the sample of firms where they have both WMS scores and their own measure of CEO behaviour, these measures are correlated with each other. But in addition, they are independently correlated with firm productivity, suggesting that they capture distinct drivers of performance. For further discussion on the link between managerial human capital and management practices, see Valero (2021).

## 6 | CONCLUSION

Post-secondary institutions are very important for building up the skills base in the UK and internationally, but much less is known about what drives performance in these institutions compared to schools or universities. We have conducted the first World Management Survey in the FE sector, and found that in this context, as in other sectors, there is variation in management scores that is correlated with important outcomes. Linking our survey data on management practices with individual level administrative data on educational histories, we find that structured management practices matter as a predictor of learner achievement, even after controlling for prior

achievement and demographic information. These associations are stronger for higher levels of educational achievement, and suggest that an increase in management scores of one standard deviation is associated with a 2 percentage point increase in the probability of achieving level 3 qualifications or being enrolled at a university at age 20. Comparing our results with other work on value-added in these institutions (Aucejo *et al.* 2023), the ‘effect’ of improving management practices alone is high relative to improving value-added in general terms.

We also find that management practices matter more (in some dimensions) for students from disadvantaged family backgrounds within institutions. At lower levels of achievement (i.e. outcomes at levels 2 and 3), good management practices matter more for learners from disadvantaged backgrounds. This suggests that improving management practices may play a role in improving labour market outcomes, and hence social mobility in the communities that they serve. Furthermore, as ‘good management’ is a slow-changing technology, any such effect would apply to multiple cohorts of disadvantaged students, thus potentially having a profound effect on social mobility over time.

The institutions in our analysis perform well on average in terms of their management practice scores, and seem to be representative of the sector as a whole except for being larger. The analysis here suggests that improving management practices has some role to play for improving performance and therefore the skills base. However, we have not found evidence of large-scale underperformance in this sector. This might be because the sector operates within a strong accountability framework as it is, and has been under sustained pressure for several reasons, including government-initiated funding cuts.

Our analysis has highlighted some interesting avenues for future research. In particular, we explored whether better management practices simply reflect more effective principals, and found that there is some evidence that these two dimensions are related, but that management practices do not simply reflect more effective leadership. It would be valuable to understand more about the interaction between management practices and leadership styles, given that management practices do not fully capture leadership and we know that principals do matter for outcomes in this sector (Ruiz-Valenzuela *et al.* 2017). It would also be useful to build the evidence base by evaluating management training programmes in an experimental setting.

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## ENDNOTES

- <sup>1</sup> This is regularly discussed in policy reports such as those commissioned by the government (Wolf 2011; Augar Review 2019), as well as reports on economic growth such as those by the LSE Growth Commission.
- <sup>2</sup> While there are publications on various aspects of the operation of FE colleges (see, for example, Hodgson 2015), to our knowledge there is no systematic evaluation of management practices that is comparable to our study.
- <sup>3</sup> See, for example, *Financial Times* (2010).
- <sup>4</sup> Our study covers both FE colleges and sixth form colleges, which we often refer to collectively as 'FE colleges' unless there is a need to distinguish between them in the analysis or discussion. Sixth form colleges cater for 16–18 education only, and tend to have more focus on academic post-16 options (A levels).
- <sup>5</sup> The typical alternative for students (aged 16–18) not enrolling in FE and sixth form colleges is to stay in the school they were in for their 11–16 secondary education (in 'sixth form'). This is an option only for individuals who are attending an 11–18 school (not available everywhere), and if they want to stay on an academic track having done sufficiently well in the national exams at age 16 (GCSE).
- <sup>6</sup> In 2021, just over a quarter (28%) of pupils who were eligible for free school meals had progressed to higher education by age 19, compared with almost 47% of their non-free-school-meals-eligible peers (Farquharson *et al.* 2022).
- <sup>7</sup> For an overview of this body of research over the past 18 years, see Scur *et al.* (2021) and <https://worldmanagementsurvey.org> (accessed 3 March 2024). There is also a (descriptive) literature about management practices in more educational fields to which this relates, for example, Ouchi (2008), where the focus is on the importance of the autonomy of principals and decentralized management systems in schools.
- <sup>8</sup> In contrast, Janke *et al.* (2019) find little evidence of top manager impacts on the performance of hospitals.
- <sup>9</sup> Further education is one of the sectors in the British economy subject to much churn in policy. As discussed by Norris and Adam (2017), there have been 28 major pieces of legislation related to vocational, FE and skills training since the early 1980s, dealing with matters such as changes to qualifications, to regulatory bodies and to funding mechanisms. This has been attributed to: (a) competing and often conflicting ideas about what the sector is for; (b) the high level of discretion that ministers have to make changes to the system; (c) organizations not being given time to bed in and make progress on reforms; (d) poor levels of institutional memory in Whitehall.
- <sup>10</sup> We extend the analysis in order to explore directly whether management practices matter for the early labour market outcomes of learners (at age 20). We find little evidence of such a relationship in the short time frame available in the data. The lack of effect could also be because management practices are influencing the probability of entering higher education (inducing negative selection into the labour market at age 20).
- <sup>11</sup> Eligibility for FSM is a standard measure of socioeconomic disadvantage and is based on whether the family is eligible for various types of income support. Eligibility for FSM applies only to students up to the end of their lower secondary education at age 16.
- <sup>12</sup> More specifically, we interviewed representatives of 65 FE colleges ( $N = 216$ , response rate 30%) and 14 sixth form colleges ( $N = 93$ , response rate 15%).
- <sup>13</sup> For example, in schools, Bloom *et al.* (2015a) achieve a response rate of 8% in England, and around 20% in the USA and Canada.
- <sup>14</sup> Results available on request. College performance is measured here as the percentage of learners with a level 3 qualification.
- <sup>15</sup> In fact, full-time FE teaching professionals in the UK earn, on average, around £2500 less than secondary school teachers (ONS 2018).
- <sup>16</sup> Conversely, a lower share tended to overestimate their relative position. A quarter of those who considered their college to be above average turned out to have lower than average WMS scores.
- <sup>17</sup> Colleges in our subsample are slightly less likely to be a sixth form college, and their principals slightly more likely to have had industry experience; these differences are significant at the 10% level.
- <sup>18</sup> Panel B of Online Appendix Table B1 shows that individual-level outcomes in the analysis subsample also look almost identical for the full sample of colleges interviewed.
- <sup>19</sup> In panel B of Online Appendix Table B2, we replicate the same exercise for the subsample of colleges that we use in our individual-level analysis, and the findings are similar: there is balance in the key outcomes of level 2 and level 3 achieved, and some negative selection in student satisfaction and number of courses per learner.
- <sup>20</sup> In particular, Figure 4 reveals the presence of an outlier college that has particularly low management scores and also does worse in its outcomes. The significance of some coefficients for some of the institutional-level outcomes reduces when this college is excluded.
- <sup>21</sup> In further analysis (not reported here), we analyse the relationships between management practices and whether learners have achieved non-graduate tertiary level qualifications (at levels 4 and 5) by age 20. These qualifications are not the focus of our analysis as the number of learners pursuing these qualifications is much smaller (about 4% of the cohort). The coefficients are small, positive and insignificant.

- <sup>22</sup> College size proxies overall resources because funding is highly correlated with the number of students.
- <sup>23</sup> Constraining the sample in panels B and C of Table 3 to the learners in panel A (those who take level 2 courses at the college) yields similar results, though the size of the coefficient in panel C is slightly smaller. This restriction involves removing higher-ability learners—those who entered to pursue qualifications only at level 3 or higher—from the sample.
- <sup>24</sup> Around two-thirds of surveyed colleges reported that higher education was a main area of provision, and such colleges tend to be on average larger, with fewer nearby competitor colleges, and in poorer areas.
- <sup>25</sup> These include dummies for gender, qualifications (FE-management-specific qualification, teaching qualification), experience in industry, and dummy for principals with 6 years or more of tenure at the college.
- <sup>26</sup> We also note that in equivalent regressions on the full sample of colleges (i.e. to include colleges where principal tenure is below 6 years), the coefficients are still positive for all outcomes, but they are not significant at conventional levels. This is not surprising because it seems likely that management practices will change with the leadership team over time, therefore the management scores as at 2019 are likely to be a more noisy measure in the enlarged sample.
- <sup>27</sup> As discussed in Subsection 2.3, these individual-level regressions are run on the subsample of colleges where the principal has been at the college for at least 6 years. Online Appendix Table B5 replicates Table 3 on the full sample of colleges (using the OLS specification, which allows for a more straightforward interpretation of interactions; see note 28), and shows that there is a positive but insignificant coefficient on management practices for the full sample. Column (3) shows, using an interaction term, that there is a positive and significant relationship between management practices and learner outcomes for the subsample of colleges.
- <sup>28</sup> See Online Appendix, Table B4, in Bloom *et al.* (2015a).
- <sup>29</sup> Note that the results reported here are based on a linear probability model (column (2) of Online Appendix Table B4), because of the complexities of determining statistical significance of interaction terms in non-linear models (Norton *et al.* 2004). As Table B4 illustrates, the coefficients in logit and OLS estimations are very similar.
- <sup>30</sup> It might seem curious that FSM students are not less likely to enter university compared to other students. But this is because exam results at age 16 are included in these regressions. Without including controls, FSM students are less likely to enter university at age 20 by 9.5 percentage points compared to other students.
- <sup>31</sup> In order to calculate this, we use the coefficients in column (3), since college fixed effects specifications do not allow us to observe the main effect of college management practices, which varies at the institution level. Panel B, column (3) shows that the main coefficient is 0.016, and the interaction term coefficient is 0.017. The total ‘effect’ for FSM learners is therefore 0.033. This implies that a one standard deviation increase in management practices is associated with a 3.3 percentage point increase in the probability of FSM learners achieving level 3. In our thought experiment of moving from the 10th to the 90th percentile of management scores (2.49 standard deviations), this is  $3.3 \times 2.49 = 8.2$  percentage points.
- <sup>32</sup> See Machin *et al.* (2018), the working paper version of Machin *et al.* (2020a), which also includes estimates of the returns to level 3 qualifications. These estimates are conservative compared to other papers that used different approaches to estimate higher returns, although there is substantial heterogeneity according to what is studied at level 3 (Patrignani *et al.* 2017; McIntosh 2006; Department for Education 2021).
- <sup>33</sup> In Online Appendix Table B6, we estimate the simple association between management practices and various different measures of the qualification of the principal and of the workforce more generally. Whether the principal has an FE-management-specific qualification is the only variable that comes out as statistically significant (and with a sizeable coefficient).
- <sup>34</sup> We also explored pairwise correlations (i.e. not controlling for other variables) between the characteristics of principals and management practices, and found that the only variable that was significant (at the 5% level) was the FE-management-specific qualification.
- <sup>35</sup> We note, however, that the significance of this relationship is not robust to alternative measures of competition, including those based on a self-reported measure. We also considered whether lagged values of financial performance might help to explain differences in management practices, to understand the extent to which colleges that are facing financial pressures might be induced to have better (or worse) management practices, but found no evidence of any such relationships.
- <sup>36</sup> In our individual-level analysis, this provides the justification for our focus on colleges where the principal in place at the time of our management survey was also present at the time of the learners in question being at the college.
- <sup>37</sup> In further analysis not reported here, we found no significant correlations between college fixed effects from Ruiz-Valenzuela *et al.* (2017) and management practices, though coefficients were positive and larger in magnitude for level 3 fixed effects.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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