Department for Education

TALIS 2018: teacher working conditions, turnover and attrition

Statistical working paper

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Contents

List of figures

List of tables

Executive summary

Context and aims

1. England currently faces a shortage of teachers, in part due to declining retention. Research suggests that one important influence on teachers' decisions about whether to leave teaching is the quality of working conditions in their school, such as the supportiveness of school leadership and discipline among pupils (Boyd et al., 2011; Kraft, Marinell, & Yee, 2016; Ladd, 2011). Understanding which specific aspects of working conditions have the strongest relationship with retention could therefore help improve the supply of teachers (Section 1).
2. This report uses data collected from a large sample of teachers in the Teaching and Learning International Survey (TALIS) 2018, linked to data from the School Workforce Census (SWC), to investigate how the quality of working conditions varies and how it influences both job satisfaction and whether teachers subsequently leave their school or the teaching profession overall (Section 2).
3. Prior analysis using the TALIS 2013 data (Sims, 2017; Sims, 2020) investigated the relationships between school working conditions and teacher job satisfaction and desire to move school. The present research updates and extends that analysis. In particular, the new data affords the opportunity to compare working conditions across primary and secondary phases, model the relationship between working conditions and whether teachers are observed to actually leave their school or the profession, investigate the importance of school discipline, and compare changes in working conditions for lower secondary teachers over time.[1]

Measuring and comparing working conditions

4. The TALIS data is used to create five overall measures of working conditions in schools, as reported by teachers: Leadership/Management, Workload, Collaboration, Preparation (whether teachers feel prepared for the subjects they teach) and Discipline. Although the five working conditions are likely interrelated to some extent, the correlations between them are weak, suggesting that it is meaningful to analyse them separately (see Appendix A for more detail).
5. On average, primary school teachers report higher scores for Leadership/Management, Collaboration and Discipline in their schools; lower secondary teachers report higher scores on average for Preparation. It is important to

[1] In England, primary teachers participated in TALIS for the first time in 2018, meaning comparisons over time are not feasible.

note that these findings may reflect underlying differences in the nature of teaching in primary and secondary schools (e.g. Collaboration may be easier in smaller, primary schools) and should not be interpreted as a judgement on the quality of leadership across phases. The TALIS data is also used to create an overall score for job satisfaction. Primary teachers report higher levels of job satisfaction than lower secondary teachers (Section 3).

How do working conditions influence job satisfaction and retention?

6. Regression analysis is used to model the influence of the five working conditions on three important outcomes: teacher job satisfaction, turnover (leaving the school) and attrition (leaving the profession). This yields estimates of the association between each aspect of working conditions and the three outcomes, holding constant the other four aspects of working conditions, school phase, teacher gender and experience, a measure of pupil deprivation, and important indicators of each teachers' outside earnings potential (e.g. degree subject). Results are reported separately for experienced teachers (more than five years in the profession) and novice teachers (less than five years) (Section 4).
7. Teachers who report higher Leadership/Management scores for their school also tend to have higher job satisfaction. For a teacher with otherwise average characteristics, a one standard deviation increase in the Leadership/Management score is associated with a half a standard deviation increase in job satisfaction.[2] This is approximately equivalent to saying that moving a teacher from the midpoint of the distribution of Leadership/Management scores to being just within the top 16% of the distribution is associated with moving that teacher from the midpoint of the distribution of job satisfaction scores to being just within the top 31%.
8. Teachers who report higher Leadership/Management scores for their school also tend to have higher retention. For an experienced teacher with otherwise average characteristics, a one standard deviation increase in the Leadership/Management score is associated with a reduction in the probability of leaving the school by the next academic year from 4.1% to 2.3% and a reduction in the probability of leaving the profession altogether from 1% to 0.5%. For a novice teacher with otherwise average characteristics, a one standard deviation increase in the Leadership/Management score is associated with a reduction in the probability of leaving the school by the next academic year from 12.5% to 8% and a reduction in the probability of leaving the profession from 7.1% to 5.2% (Section 5).

[2] This is for a teacher reporting average working conditions and deprivation of the pupil intake, as well as having the modal phase (secondary) and gender (female).

9. The Leadership/Management score is composed of a number of questions capturing: whether there is a supportive culture within the school; whether managers recognise teachers for doing a good job; whether teachers have a chance to participate in decision-making and whether teachers are given the autonomy necessary to do their job. These may be useful areas of focus for school leaders looking to improve the job satisfaction and retention of their staff (Section 7; Appendix A).
10. Teachers who report higher Discipline scores for their school also tend to have higher retention. For an experienced teacher with otherwise average characteristics, a one standard deviation increase in the Discipline score is associated with a reduction in the probability of leaving the school by the next academic year from 3.9% to 3% and a reduction in the probability of leaving the profession from 1% to 0.5%. For a novice teacher with otherwise average characteristics, a one standard deviation increase in the Discipline score is associated with a reduction in the probability of leaving the school by the next academic year from 12.2% to 9% and a reduction in the probability of leaving the profession from 7% to 5.4% (Section 5). Discipline is not robustly associated with job satisfaction.
11. The Discipline score is composed of a number of questions relating to: whether staff in the school consistently enforce behaviour standards; whether teachers are able to control disruptive behaviour; and the extent to which they experience verbal or physical abuse. School leaders looking to improve retention might find these useful areas to prioritise (Section 7; Appendix A).
12. Workload shows an inconsistent relationship with attrition - some models and ways of measuring workload suggest there is a relationship and others do not. This research is therefore inconclusive on this point. Workload does not show a robust relationship with either turnover or job satisfaction (Section 5). The two other working conditions variables - Collaboration and Preparation – do not show a robust relationship with either job satisfaction, turnover or attrition (Section 5).
13. Teachers who report higher job satisfaction are much less likely to leave their jobs, or the profession, by the following academic year. More precisely, a one standard deviation increase in job satisfaction is associated with a 40% reduction in the odds of turnover and a 57% reduction in the odds of attrition. As might be expected, this suggests that job satisfaction is a mediating step on the path between working conditions (Leadership/Management and Discipline) and turnover/attrition (Appendix A).

Limitations and contribution

14. These findings should of course be interpreted with regard to the limitations of this research. In particular, the analytical approach relies on an assumption that the statistical models include the full set of variables relevant for explaining job satisfaction and retention. In addition, working conditions in schools are subtle and

multifaceted constructs and are likely measured with some degree of error (see Section 7). Having said that, the TALIS data is unusually rich and the main findings hold even when teachers are compared within their schools and/or departments (Appendix E) and when indicators of outside earnings potential are accounted for.

15. Despite these limitations, the use of a new linked dataset combining rich teacher-level survey data with measures of observed turnover and attrition allow this research to make a number of original contributions to the literature, many of which have direct implications for school leaders and policymakers looking to tackle teacher shortages.

1. Introduction

16. England has a shortage of secondary school teachers, particularly in STEM (science, technology, engineering and maths) subjects (Sims, 2018). Current shortages are in large part due to supply side factors. In particular, early career retention has been declining steadily since 2009, with each cohort of new teachers leaving faster than the last (Sims, 2018). Over the next few years, demand side factors will become increasingly important, with the secondary pupil population set to grow from 2.84 million to 3.22 million between 2018 and 2023 (DfE, 2019). Other things being equal, this will further increase shortages.

17. Existing research points to two main determinants of teacher retention. The first is the nature of working conditions in teachers' schools. Working conditions are strongly associated with retention (for a review, see: Simon & Johnson, 2015), particularly for early-career teachers (Kukla-Acevedo, 2009). Quantitative research using teacher survey data suggests that - among the various aspects of working conditions - the nature of school leadership has a particularly strong association with both job satisfaction and retention (Boyd et al., 2011; Kraft et al., 2016; Ladd, 2011; Sims, 2020). Other aspects of working conditions which have been linked with retention include pupil behaviour (Johnson & Birkeland, 2003; Kraft et al., 2016), teacher collaboration (Johnson, Kraft, & Papay, 2012; Kraft et al., 2016) and workload (Barmby, 2006; CooperGibson Research, 2018; Perryman & Calvert, 2019; Torres, 2016).

18. The second important determinant of teacher attrition is pay. This has been demonstrated in studies using observational data in which pay varies over school districts (Hendricks, 2014) as well as in quasi-experimental evaluations of policies that have increased pay for specific groups of teachers (Bueno & Sass, 2018; Clotfelter et al., 2008, Feng & Sass, 2018).

19. Research using data on teachers in England shows that, on average, teachers tend to take jobs with lower *total* pay upon leaving the profession (Bamford & Worth, 2017). However, this likely hides wide variation across teachers. In particular, teachers' decisions about whether to remain in the profession are sensitive to the difference between pay in teaching and the pay they would receive in the next best alternative job outside of teaching (Gilpin, 2011; Ondrich, Pas, & Yinger, 2008). These outside-pay ratios vary substantially based on degree subject (Britton et al., 2016). For example, in England, teachers with a STEM degree tend to earn more outside of teaching, while those with a non-STEM degree tend to earn more inside teaching (MAC, 2017) and retention rates by degree subject correlate positively with these differences in outside earning potential (Sims, 2018b). Early-career teachers' decisions about whether to leave their jobs are particularly sensitive to pay (Clotfelter, Ladd, & Vigdor, 2011; Hendricks, 2014).

20. Despite the evidence that has accumulated, there are still a number of important gaps in the evidence relating to why teachers leave the profession. Four in particular stand out. First, limits on the length of the questionnaires used in teacher surveys often constrain the number of aspects of working conditions that can be measured. This limits the detail in which the relationship between working conditions and retention can be explored. Second, working conditions data tends to be collected in small unrepresentative samples, or as school-level averages - which neglects the fact that teachers working in different departments within schools or phases can experience quite different working conditions. Third, there is currently very little research that attempts to account for outside earnings potential at the same time as working conditions. Fourth, while several papers based on US data have linked teacher survey data on working conditions with city or state-level administrative data on which teachers leave the profession (e.g. Kraft, Marinell, & Yee, 2016), no such research exists using data from England.

21. The present research addresses these gaps in the literature by combining detailed, representative data on working conditions from the Teaching and Learning International Survey (TALIS) 2018 with the School Workforce Census (SWC), which records whether teachers leave their school (turnover) and/or the profession (attrition). The report begins by constructing five measures of working conditions and an additional measure of job satisfaction. In Section 3, these measures are used to compare the quality of working conditions between primary and lower secondary teachers in England. In Section 5, these measures of working conditions are combined with indicators of outside earnings potential to model their influence on job satisfaction, turnover and attrition. Finally, in Section 6, the working conditions shown to be associated with satisfaction, turnover and attrition are compared between 2013 (when lower secondary (KS3) teachers in England first participated in TALIS) and 2018, to assess change over time. It is hoped that the results provide useful insights for policymaker and school leaders looking to address teacher shortages.

2. Data

TALIS 2018

22. The first dataset employed in this analysis is TALIS 2018. This is a large-scale international teacher survey, which was first conducted in 2008 and then again in 2013 and 2018. England first participated in the survey in 2013 (lower secondary or Key Stage 3 teachers only) and then again in 2018 (both lower secondary and primary school teachers). In 2018, 48 countries (or regions within countries) took part in the lower secondary survey and 15 countries took part in the primary survey.

23. This research uses the data from England, which was collected between March and May in 2018. A representative set of 200 primary schools were sampled, of which 152 agreed to participate. A further 200 schools containing lower secondary teachers were sampled, of which 149 participated. This represents a weighted school response rate of 86% at primary and 82% at lower secondary. Up to 20 teachers were then randomly sampled from within each school, yielding 2,009 primary teacher responses and 2,376 lower-secondary teacher responses. This represents a weighted teacher response rate of 85% and 84% respectively, which is high by the standards of teacher surveys in England.

24. The TALIS data is supplied with sampling (teacher) and Balanced-Repeated-Replication (BRR) weights which account for the complex survey design and non-response patterns. These weights are applied wherever possible in the analysis in order to make the data approximately representative of teachers in England at the time. These weights also account for clustering of teachers within schools, producing the correct standard errors without the need for either multi-level models or separate adjustment of standard errors. For more information on the sampling and weighting approach see Micklewright et al. (2014).

25. The TALIS teacher questionnaire contains more than 50 groups of questions addressing a wide range of subjects including: teacher demographic characteristics, qualifications and training, working patterns, professional development, feedback, pedagogical practice and school climate. Among these, two groups of variables are of particular interest for present purposes: a group of 26 questions measuring various aspects of teachers working conditions and a group of four variables which collectively measure teacher job satisfaction. Descriptive statistics for these variables are provided in Section 3 and further details can be found in Appendix A, Table 3.

School Workforce Census (SWC)

26. The second dataset used in this analysis is SWC, which is an administrative dataset containing information on all teachers directly employed by state-funded primary and

secondary schools in England. The SWC data has been collected from all state-funded schools during the autumn term of each academic year since 2010. Two waves of SWC data are utilised here: the 2017 wave, which was collected in the autumn term, one term before the TALIS 2018 survey data, and the 2018 data, which was collected in the autumn term of the subsequent academic year.

27. Just under three-quarters of TALIS respondents (73%) gave permission for their data to be linked to their records in the SWC. The Department for Education were able to successfully link 84% of these, yielding 2,684 linked records. Data pertaining to respondents who did not give consent for linkage were not linked and are excluded from this analysis. There are very few observable differences in terms of either demographic characteristics or attitudes of those who consent to data linkage, compared to those who did not (Table 6 and Table 7 in Appendix B).

28. The SWC data consists of a number of files, two of which are of interest for present purposes. The contract file includes information about the characteristics and location of the school at which a teacher works, as well as their terms of employment, including contracted hours and pay. The contract file also contains the information necessary to construct the retention variables for this study. The turnover variable is defined to be equal to one for all TALIS respondents who were working in a TALIS participating school in the 2017/18 academic year but were no longer working in that same school in the SWC data from the following (2018/19) academic year. The attrition variable is defined to be equal to one for all TALIS respondent teachers who are no longer working in any state-funded school in England in the subsequent academic year. The qualification file also provides information on degree subject, which is an important determinant of earning potential outside of teaching.

29. How should part-time teachers be incorporated in this analysis? Analysing them in the same way as full-time teachers would be problematic because some variables, e.g. workload, would have a very different interpretation for part-time teachers. One option would be to scale the relevant variables by the proportion of full-time hours worked by each teacher. However, the TALIS data does not contain precise measures of full-time equivalent hours that would allow scaling of estimates in this way and the equivalent variable in the SWC is missing for a large proportion of teachers. Scaling the estimates in this way would therefore result in a large drop in sample size, as well as compromising the representativeness of the data. Consequently, for the purposes of this analysis, the data is restricted to teachers working full-time. Dropping part-time teachers leaves a dataset that is approximately representative of full-time teachers working in England at the time the TALIS dataset was collected in March-May 2018.

30. Simple descriptive statistics for the final linked sample can be seen in Table 1 below.

Table 1: Linked TALIS-SWC sample descriptive statistics

	Mean	SD	Min	Max
Age	37.1	10.1	18	70
Experience	10.9	8.3	0	42
Gross weekly pay (£)	708.67	194.27	319.73[3]	1921.42
Male (%)	29.7	-	-	-
Secondary (%)	44.4	-	-	-

Notes: N=2,136 full-time teachers for whom the TALIS and SWC data could be linked. The six cells in the bottom right of the table are empty because SD, Min and Max are not meaningful statistics for binary (0/1) variables.

[3] This figure differs from the equivalent STRB minimum figure – this may be because the pay information reported in the SWC is unreliable for some teachers at the lower end of the earnings distribution.

3. Retention, job satisfaction and working conditions

Summary of findings

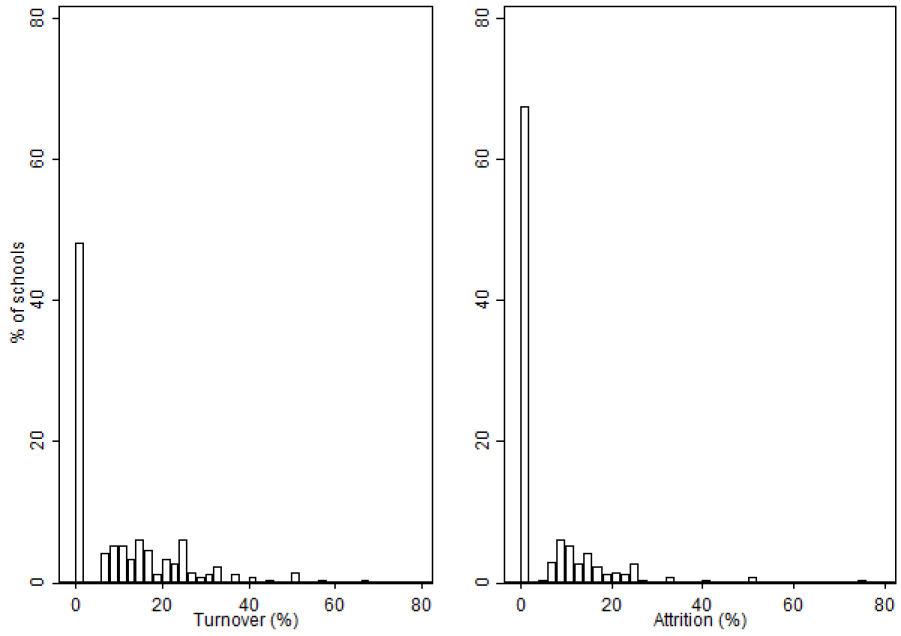
- Mean school-level turnover (leaving the school) among TALIS respondents by the beginning of the subsequent academic year was 11.5%. The equivalent figure for attrition (leaving the profession) was 5.6%.
- Overall scores for Job Satisfaction are higher on average among primary than lower secondary teachers (effect size [ES] = 0.25).
- Overall scores for Leadership/Management are higher on average among primary teachers than among lower secondary teachers (ES = 0.47). This reflects higher levels of autonomy and mutual support reported by primary school teachers.
- Overall scores for Collaboration are higher on average among primary teachers than among lower secondary teachers (ES = 0.34). This reflects a greater frequency of collaborative activities, including professional development.
- Overall scores for Discipline are higher on average among primary teachers than lower secondary teachers (ES = 0.39). This reflects primary teachers being more likely to report that colleagues consistently enforce rules around behaviour.
- Overall scores for whether teachers feel Prepared for their Teaching Assignments are higher on average among lower secondary teachers than primary teachers (ES = 0.3). This reflects lower secondary teachers feeling more prepared for both the content and pedagogy of the subjects they teach.
- Overall scores for Workload showed no clear difference between primary and lower secondary teachers.

31. This section describes the five working conditions, job satisfaction, turnover and attrition variables and compares them between primary and lower secondary teachers. Readers looking for more detail, including the full set of component variables that make up each factor, and pairwise correlations between the factor scores, can find this in Appendix A.

32. Figure 1 shows the distribution of the two main outcome variables - turnover and attrition - when aggregated to the school level. These are both measured using SWC data, for the subsample of TALIS respondents. Two points should be noted here. First, these measures are based on teachers moving or leaving between the TALIS survey collection period (spring 2018) and the subsequent SWC (autumn 2018). They

are therefore lower than might be expected for an annual measure of turnover. Second, these estimates of school level turnover and attrition are based on a random sample of teachers from within each school participating in the TALIS survey. Hence, the data does not include observations for those teachers not in the TALIS sample within those schools. The distribution of both outcome measures shows a strong positive skew. Just under half of schools show zero turnover and just over two thirds show zero attrition. The mean value of turnover is 11.5% (the median is 7.1%) and the mean value of attrition is 5.6% (the median is 0%).

Figure 1: Histograms of turnover and attrition by school



Notes: N=269 schools. Includes primary schools and lower secondary teachers within secondary schools.

33. In order to measure job satisfaction and working conditions, six factor variables were created using confirmatory factor analysis. The resulting factor scores can be thought of as a weighted average of teachers' responses to several closely-related questions from the TALIS teacher questionnaire:

    a. Job Satisfaction, which is made up of four component questions such as 'All in all, I am satisfied with my job'. The variable is identical in makeup to the TJSENVS factor score included in the TALIS data. The Cronbach's alpha for this set of variables is 0.85.[4]

[4] Cronbach's alpha (the alpha) is a measure of internal consistency. In this case, internal consistency refers to the degree of relatedness among the questions from the questionnaire that make up each of the working conditions scores (Cortina, 1993). Values over 0.7 are, by convention, considered good.

b. Leadership/Management, which has been shown to be a strong predictor of job satisfaction, turnover and attrition in several studies (Boyd et al., 2011; Johnson et al., 2012; Kraft et al., 2016; Ladd, 2011; Sims, 2020; Weiss, 1999). This factor is made up of seven component questions such as 'My manager recognises when I have done a good job'. The alpha for this set of variables is 0.82.

c. Workload, which is a strong theme in qualitative research on teacher job satisfaction and retention (Barmby, 2006; CooperGibson Research, 2018; Johnson & Birkeland, 2003; Perryman & Calvert, 2019; Torres, 2016). This factor is made up of five variables such as 'My job leaves me time for my personal life' (reverse scored). The alpha for this set of variables is 0.67. Ideally, this would be 0.7 or higher, however an alpha of 0.67 is unlikely to change the overall conclusions drawn. This factor does not include quantitative estimates of hours worked and is therefore best considered as measuring attitudes toward, or perceptions of, workload. (Appendix F provides results from a model employing an alternative measure of workload based on hours worked).

d. Teacher Collaboration, which has been found to predict both job satisfaction and retention in several studies (Johnson & Birkeland, 2003; Johnson et al., 2004; Kraft et al., 2016; Perryman & Calvert, 2019; Johnson et al., 2012; Kraft et al., 2016). This factor is made up of five variables such as (How often do you) 'Observe other teachers' classes and provide feedback'. The five survey questions that make up this factor are different to the questions that make up the other factors, in that they ask for the frequency with which certain collaborative activities occur. The alpha for this set of variables is also lower than desirable at 0.6. For both these reasons, caution is urged when interpreting the regression coefficients on this variable.

e. Preparation for Teaching Assignments, which captures how well prepared teachers feel for the specific subject and year groups they are assigned to teach, and has been shown to predict job satisfaction and retention (Donaldson & Johnson, 2010 Sims, 2020). This factor is made up of four variables such as (To what extent do you feel prepared for) 'The content of some or all subjects that I teach'. The alpha for this set of variables is 0.64. This is slightly lower than desirable and may attenuate the strength of the relationship between this variable and the job satisfaction, turnover and attrition outcome variables to some extent.

f. School Discipline, which captures teachers' perceptions of the quality of pupil behaviour and the school's approach to dealing with misbehaviour, and has been shown to predict both job satisfaction and retention (Johnson & Birkeland, 2003; Johnson et al., 2004; Kraft et al., 2016; Sims, 2020; Skaalvik & Skaalvik, 2011; Weiss, 1999). This factor is made up of five variables such

as ‘The school staff enforces rules for student behaviour consistently throughout the school’. The alpha for this set of variables is 0.65. This is slightly lower than desirable and may attenuate the strength of the relationship between this variable and the job satisfaction, turnover and attrition outcome variables to some extent.

34. All six factor scores are scaled so that a teacher with average job satisfaction will have a score of zero, a teacher with job satisfaction one standard deviation above the mean will have a score of one, and a teacher with job satisfaction one standard below the mean will have a score of minus one. Table 2 compares the mean values of the six factors. A p value below 0.05 indicates that the difference is statistically significant. Five of the six variables show a statistically significant difference across phases. The full distribution of each of the factor scores can be found in Figure 11 in Appendix A.

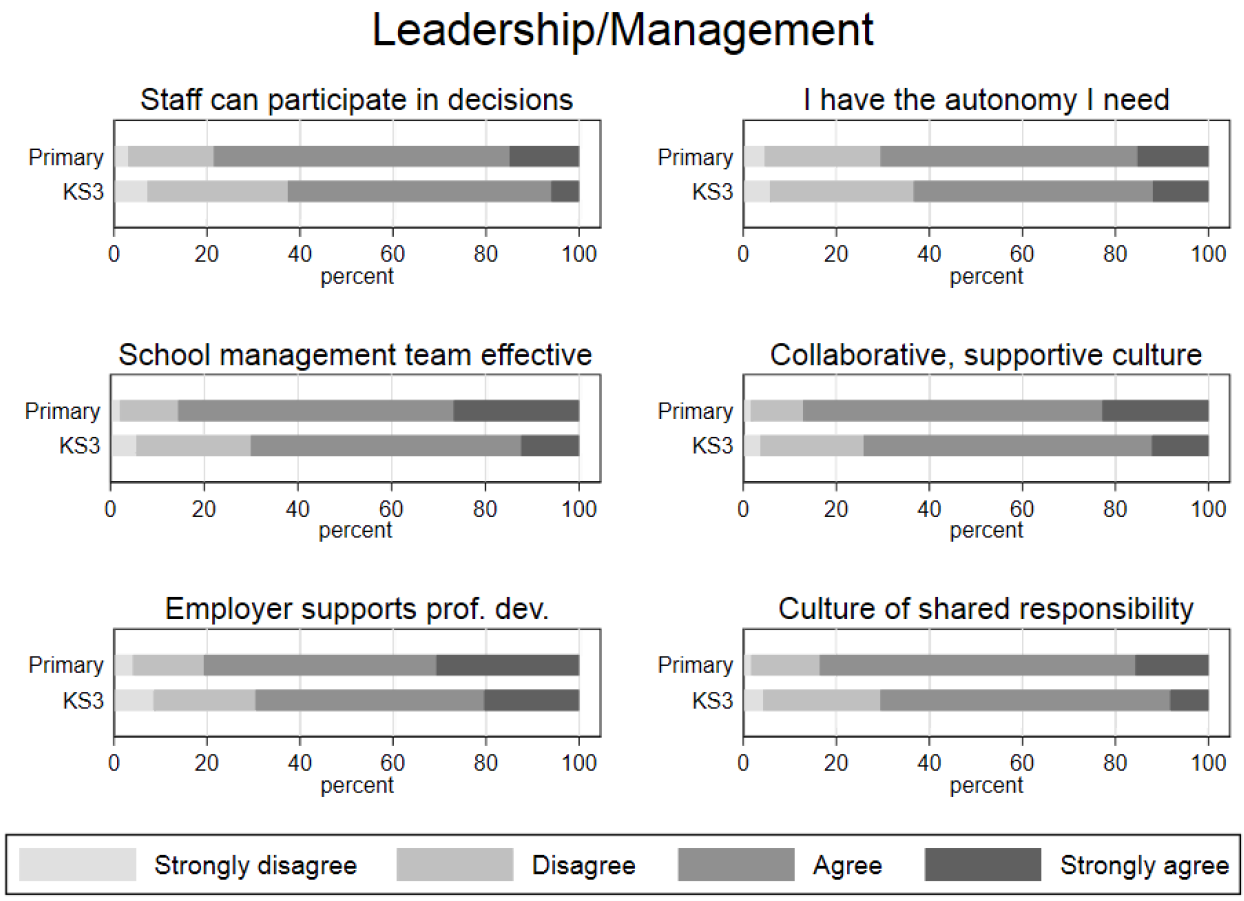
Table 2: Comparing the means of the factor variables across phases

	Primary	Lower Secondary	P value for difference
Job Satisfaction	0.16	-0.09	<0.01
Leadership/Management	0.29	-0.19	<0.01
Workload	0.03	-0.05	0.17
Collaboration	0.17	-0.17	<0.01
Preparation	-0.16	0.14	<0.01
Discipline	0.20	-0.19	<0.01

Notes: N=2,062 teachers

35. Table 2 reveals that scores for Leadership/Management are higher among primary school teachers than among lower secondary school teachers (ES = 0.47). This is driven by differences across several component questions, summarised in Figure 2 below. In particular, primary teachers are more likely to agree or strongly agree that they are able to participate in decision making, have the autonomy they need to do their job, consider their schools’ management team to be effective, experience a collaborative, supportive culture at work, that their employer supports professional development, and that there is a culture of shared responsibility at work. It is important to note that these differences between primary and lower secondary teachers could reflect either differences in the quality of Leadership/Management across phases, or differences in the nature or difficulty of Leadership/Management across phases. For example, it may be easier to give teachers a chance to participate in decision making in primary schools, which tend to be smaller than secondary schools.

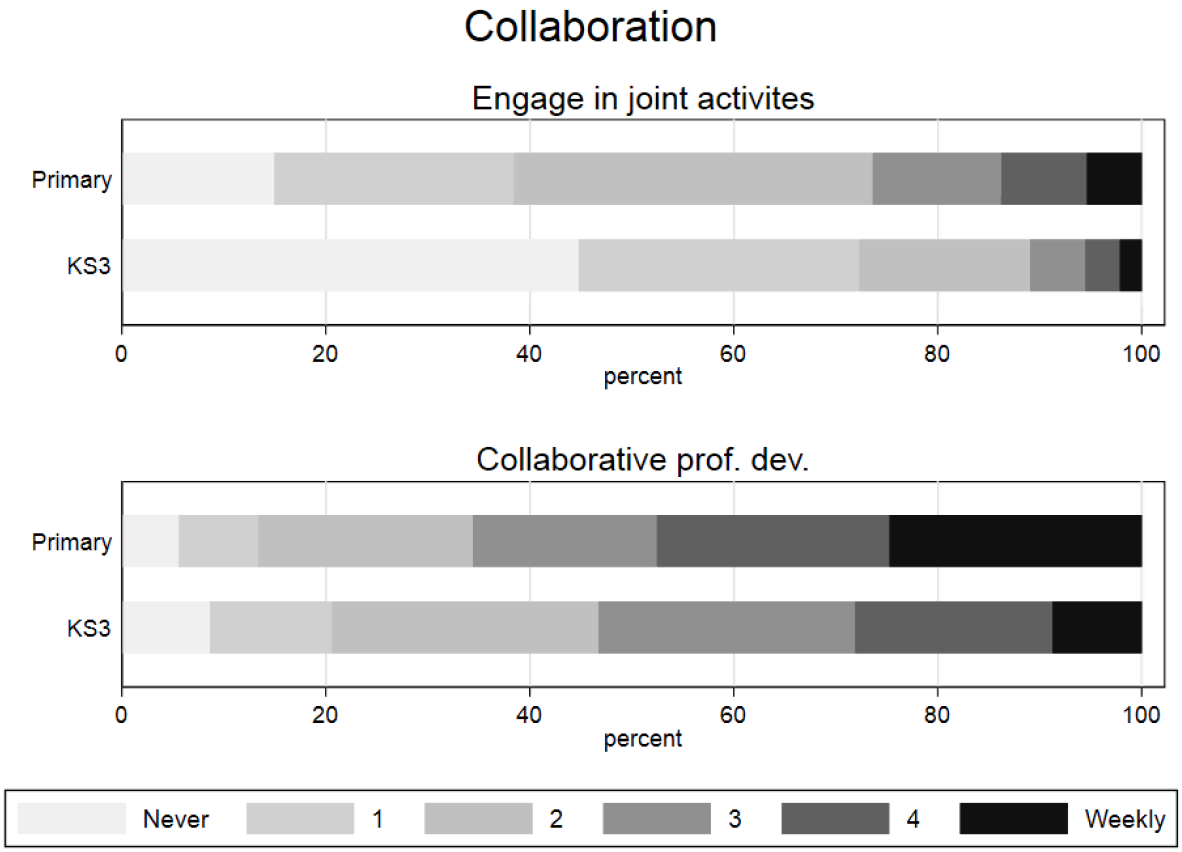
Figure 2: Decomposing differences by phase in the Leadership factor score



Notes: Shows the proportion of teachers providing each response, split by phase, for the six Leadership/Management component questions that differed across phases. The wording of the component questions has been shortened so that it can be displayed clearly on the graphs (see Table 3 Appendix A for more detail). KS3 = Key Stage 3. Prof. dev. = professional development.

36. Table 2 also shows that Collaboration is higher in primary schools (ES = 0.34). This is primarily driven by differences across the two component questions shown in Figure 3 below. Primary school teachers report engaging in joint activities across classes and age groups and collaborative professional development more often than lower secondary teachers. Again, it is important to note that this could be explained by differences in the potential for certain forms of collaboration in primary schools. For example, whole school activities may be more feasible in primary schools due to the lower number of pupils.

Figure 3: Decomposing differences in phase in the Collaboration factor score



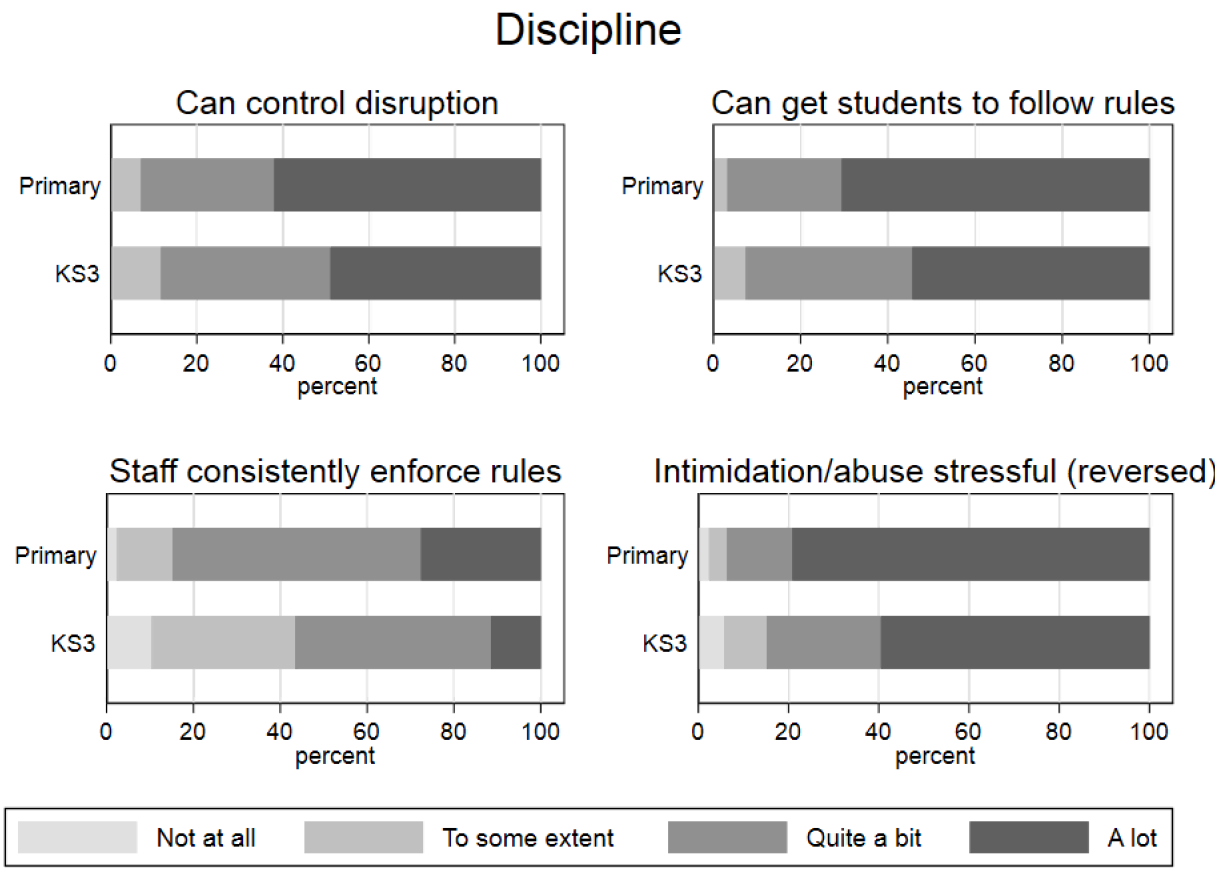
Notes: Shows the proportion of teachers providing each response, split by phase, for the two Collaboration component questions that were different across phases. The wording of the component questions has been shortened so that it can be displayed clearly on the graphs (see Table 3 Appendix A for more detail). KS3 = Key Stage 3. Prof. dev. = professional development.

37. Table 2 shows that Discipline is also perceived to be better amongst primary school teachers than amongst lower secondary teachers (ES = 0.39). This is driven by differences on the four component questions shown in Figure 4 below. In particular, primary teachers are substantially more likely to report that school staff consistently enforce rules for pupil behaviour and that they can control disruption and get pupils to follow rules. Having said that, primary teachers are also more likely to report that being intimidated or verbally abused by pupils is a source of stress for them. Again, it is important to note that this may reflect differences in the nature of teaching pupils of different ages, rather than differences in the underlying quality of behaviour management in the two phases.

38. The only one of the five working conditions measures for which lower secondary teachers report a more positive picture (ES = 0.3) is the extent to which they are Prepared for their Teaching Assignments. As can be seen from Figure 5 below, this difference is driven by primary teachers feeling less prepared in terms of both the content and pedagogy of the subjects they teach. This likely reflects the near

universal prevalence of subject-specialist teaching in secondary schools and subject-general teaching at primary schools in England.

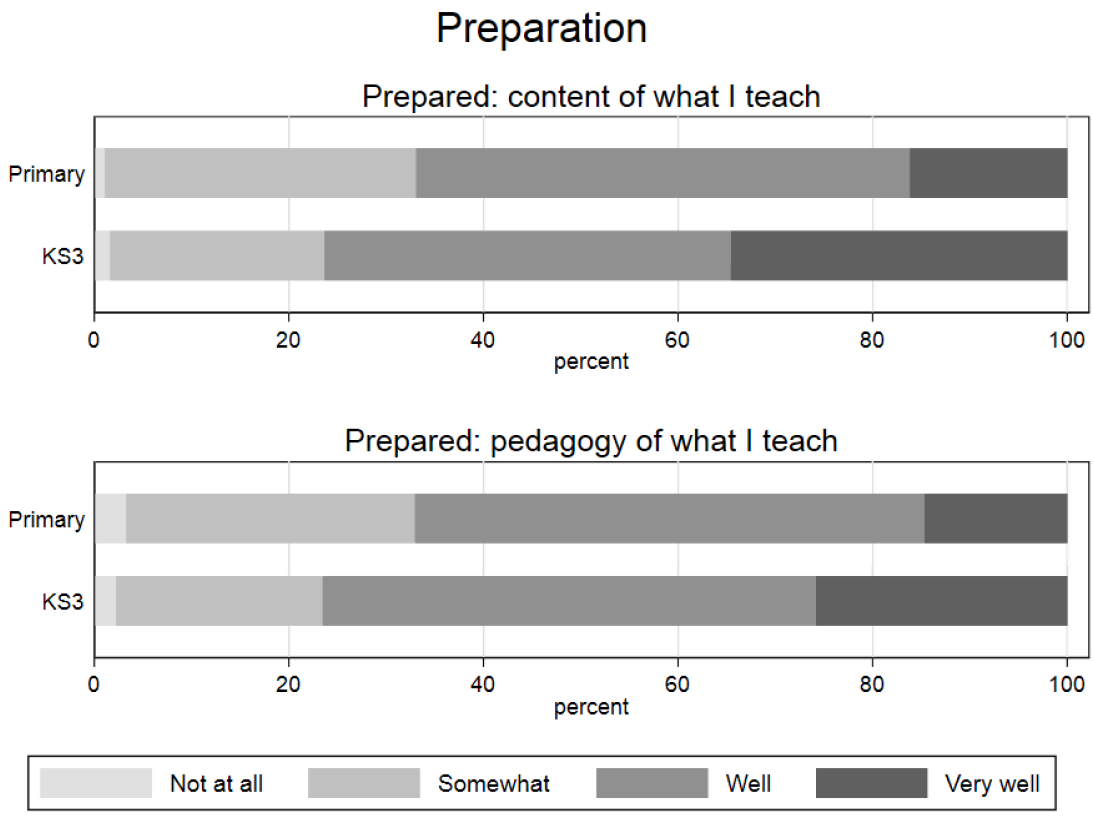
Figure 4: Decomposing differences by phase in the Discipline factor score



Notes: Shows the proportion of teachers providing each response, split by phase, for the four Discipline component questions that were different across phases. The wording of the component questions has been shortened so that it can be displayed clearly on the graphs (see Table 3 Appendix A for more detail). KS3 = Key Stage 3.

39. Taken together, this evidence suggests that working conditions for teachers - in particular Leadership/Management, Collaboration and Discipline - are perceived to be somewhat more positive in primary than in lower secondary schools. The exceptions to this are Preparation for Teaching Assignments, where lower secondary teachers report more positive perceptions, and Workload, where there are no clear differences between the phases.

Figure 5: Decomposing differences by phase in the Preparation factor score



Notes: Shows the proportion of teachers providing each response, split by phase, for the two Preparation component questions that were different across phases. The wording of the component questions has been shortened so that it can be displayed clearly on the graphs (see Table 3 Appendix A for more detail). KS3 = Key Stage 3.

4. Modelling approach

40. In the next section, regression analysis is used to model the association between the five working conditions and the three outcomes: job satisfaction, turnover and attrition. When modelling job satisfaction as the outcome, ordinary least squares regression is used, since this is most appropriate for a continuous outcome. When modelling turnover and attrition, logistic regression is used, as this is most appropriate for modelling a binary (0/1) outcome.

41. For each outcome, a range of different model specifications are employed:

    a. In model A, the outcome is regressed on the working conditions variables one-by-one, while controlling for school phase, teacher gender, teacher experience and a categorical measure of the proportion of pupils from socio-economically disadvantaged backgrounds. This gives the association between each of the working conditions measures and the outcome, holding constant school phase, teacher gender and experience.

    b. In model B, the outcome is regressed on all the working conditions measures simultaneously. This gives the association between each of the working conditions measures and the outcome, holding constant the other four working conditions, school phase, teacher gender, experience and pupil deprivation.

    c. In model C, the outcome is regressed on the same variables as in model B plus an indicator for the school in which each teacher works. This gives the association between each of the working conditions measures and the outcome, holding constant each of the four other working conditions, teacher gender, teacher experience and pupil disadvantage, and other variables which are not included in the data but are shared across the school, such the quality of facilities, school policies, pupil intake and phase. This approach also helps address concerns around school-level common source bias in the data (see Appendix C).

    d. In model D, the outcome is regressed on the same variables as in model B plus a range of variables known to influence teachers' earnings potential outside of teaching: gender, degree subject and age. For further details see Appendix D and Appendix E.

    e. Finally, in model E, the outcome is regressed on the same variables as in model B but the working conditions measures for a given teacher are measured as the average of the working conditions variables for the other teachers in the same school. This helps address concerns around individual-level common-source bias in the data (see Appendix C).

42. Where one of the working conditions variables shows a substantively meaningful and statistically significant relationship with one of the outcomes across all of the models

A-E, the results from Model B are displayed in graphical form. This is done by using the coefficients estimated in Model B to predict the level of the outcome variable for a range of values of the working condition variable in question, with the other variables in the model set to their average value. This is a more intuitive way of displaying the result, which is easier to understand for non-specialists. For those who wish to see the full regression models and output, this is available in Appendix E.

43. Existing research suggests that early-career teachers are more sensitive to working conditions than more experienced teachers (Kukla-Acevedo, 2009). In order to investigate this in the TALIS data, one version of the model includes an interaction term between each of the five working conditions variables and a dummy (0/1) variable indicating whether a teacher has less than five years of experience. This allows the graphs presented in the next section to show the association between working conditions and the outcomes for both ‘novice’ (less than five years of experience) and ‘experienced’ (more than five years of experience) teachers separately.

5. Modelling results

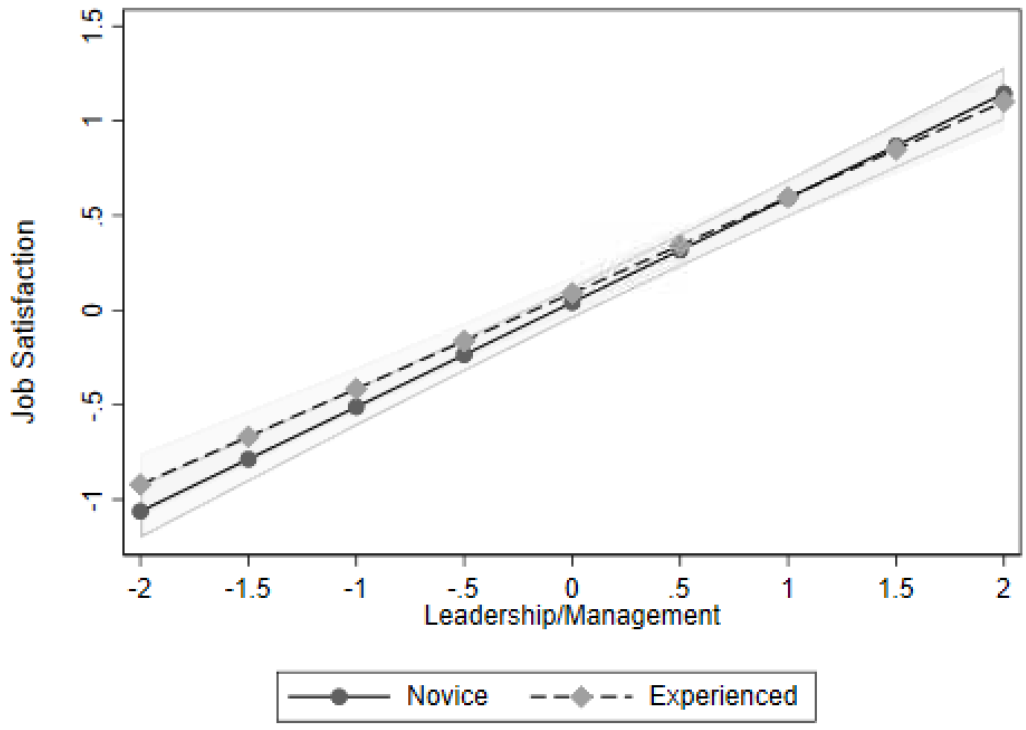
Summary of findings

- Teachers who report higher Leadership/Management scores for their school tend to have higher job satisfaction. More precisely, for a teacher with average characteristics, a one standard deviation increase in the Leadership/Management score is associated with a half a standard deviation increase in job satisfaction. This is approximately equivalent to saying that moving a teacher from the midpoint of the distribution of Leadership/Management scores to being just within the top 16% is associated with moving that teacher from the midpoint of the distribution of job satisfaction scores to being just within the top 31%.
- Teachers who report higher Leadership/Management scores are also less likely to leave their school and the profession. For an experienced teacher (more than 5 years) with otherwise average characteristics, a one standard deviation increase in the Leadership/Management score is associated with a reduction in the probability of leaving the school by the next academic year from 4.1% to 2.3% and a reduction in the probability of leaving the profession from 1% to 0.5%. For a novice teacher (less than five years) with otherwise average characteristics, a one standard deviation increase in the Leadership/Management score is associated with a reduction in the probability of leaving the school by the next academic year from 12.5% to 8% and a reduction in the probability of leaving the profession from 7.1% to 5.2%.
- Teachers who report higher Discipline scores for their schools are also less likely to leave their school or the profession. For an experienced teacher with otherwise average characteristics, a one standard deviation increase in the Discipline score is associated with a reduction in the probability of leaving the school by the next academic year from 3.9% to 3% and a reduction in the probability of leaving the profession from 1% to 0.5%. For a novice teacher with otherwise average characteristics, a one standard deviation increase in the Discipline score is associated with a reduction in the probability of leaving the school by the next academic year from 12.2% to 9% and a reduction in the probability of leaving the profession from 7% to 5.4%. Discipline is not robustly associated with job satisfaction.
- Workload does not show a robust relationship with turnover or job satisfaction. The findings are inconclusive with respect to the link between Workload and attrition.

44. Only one of the working conditions variables was robustly associated with job satisfaction: Leadership/Management (Table 10, Appendix E). Figure 6 shows the predicted value of job satisfaction for varying values of Leadership/Management, holding constant (at their average) the other five working conditions variables, phase, teacher gender and experience, and pupil deprivation. The horizontal axis shows standard deviations (of the Leadership/Management score) and the vertical axis also shows standard deviations (of job satisfaction). Zero is equivalent to the mean across teachers. Score above zero are above average, and vice versa.

45. Increases in the Leadership/Management score are strongly associated with increases in job satisfaction. Indeed, moving a teacher with otherwise average characteristics from the mean, to one standard deviation above the mean on their Leadership/Management score is associated with a half a standard deviation increase in job satisfaction. Approximately speaking, this is equivalent to saying that moving a teacher from the midpoint of the distribution of Leadership/Management scores to being just within the top 16% is associated with moving that teacher from the midpoint of the distribution of job satisfaction scores to being just within the top 31%. There is no difference in the predicted levels of job satisfaction between novice and experienced teachers. The other four working conditions variables (Workload, Discipline, Preparation and Collaboration) did not show a robust association with job satisfaction.

Figure 6: Predicted level of job satisfaction



Notes: N=1,957 teachers. Both the horizontal and vertical axes shows standard deviations. The shaded areas show 90% confidence intervals.

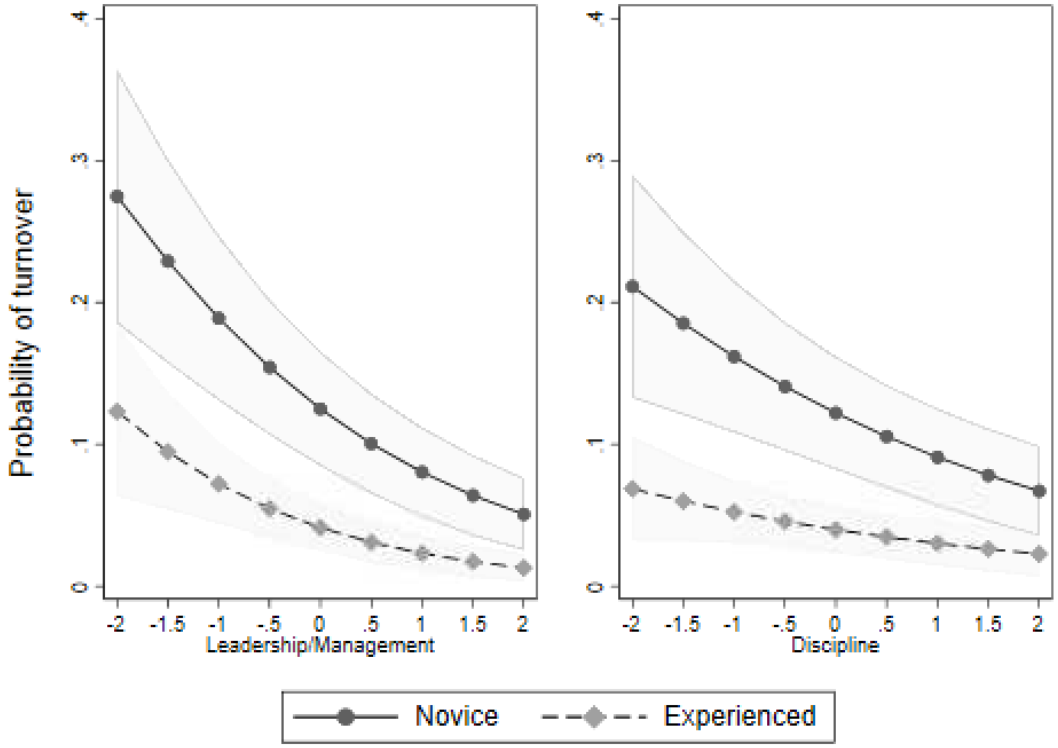
46. Two of the five working conditions variables were associated with turnover across all models: Leadership/Management and Discipline (Table 8, Appendix E). Figure 7 shows the predicted probability of turnover for varying values of these two variables, holding constant (at their average) the other five working conditions variables, phase, teacher gender and experience, and pupil deprivation. The horizontal axis shows standard deviations of the working conditions variables, with zero being equivalent to the mean score. The vertical axis shows the probability of turnover from 0 (0%) to 0.4 (40%). The gradients of the lines show the strength of the relationship between the working conditions variable and the probability that a teacher leaves their school by the time of the subsequent SWC data collection. The solid black line is for 'novice' teachers (those with less than five years of experience) and the dashed grey line is for 'experienced' teachers (those with more than five years of experience).

47. Teachers who report higher Leadership/Management scores for their school are less likely to leave their school. An experienced teacher with otherwise average characteristics moving from the mean (0 on the horizontal axis), to one standard deviation above the mean (+1 on the horizontal axis) on their Leadership/Management score is associated with a fall in the probability of leaving their school from 4.1% to 2.3% (vertical axis). For a novice teacher with otherwise average characteristics, the same increase in Leadership/Management score is associated with a reduction in the probability of leaving the school by the next academic year from 12.5% to 8%.

48. Teachers who report higher Discipline scores for their school are also less likely to leave their school. Moving an experienced teacher with otherwise average characteristics from the mean to one standard deviation above the mean on the Discipline score is associated with a reduction in the probability of leaving the school from 3.9% to 3%. For a novice teacher with otherwise average characteristics, the same increase in the Discipline score is associated with a reduction in the probability of leaving the school from 12.2% to 9%.

49. The three working conditions variables not pictured (Collaboration, Workload and Preparation) did not show a robust association with turnover (Table 8, Appendix E).

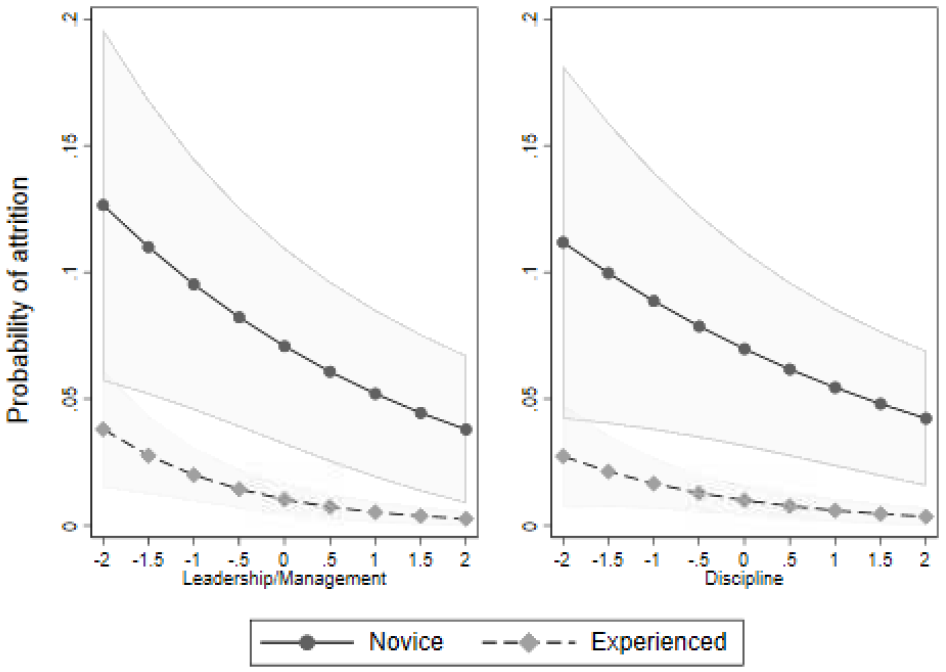
Figure 7: Predicted probability of a teacher leaving their school



Notes: N=1,982 teachers. Horizontal axis shows standard deviations and the vertical axis shows probabilities. The shaded areas show 90% confidence intervals.

50. Two of the five working conditions variables were associated with attrition across the models: Leadership/Management and Discipline (Table 9, Appendix E). Figure 8 shows the predicted probability of attrition (leaving the teaching profession) for varying values of these two working conditions variables, holding constant the other variables in the model. The horizontal axis again shows standard deviations of the working conditions variables and the vertical axis shows the probability of a teacher leaving the teaching profession from 0 (0%) to 0.2 (20%). The gradients of the lines show the strength of the relationship between the working conditions variable and the probability that a teacher is no longer working in any state-funded school in England five months later (when the SWC data was next collected).

Figure 8: Predicted probability of a teacher leaving the teaching profession



Notes: N=1,953 teachers. The vertical axis shows probabilities and the horizontal axis shows standard deviations. The shaded areas show 90% confidence intervals.

51. Teacher who report higher Leadership/Management scores are again less likely to leave the profession. Indeed, for an experienced teacher with otherwise average characteristics, a one standard deviation increase in Leadership/Management is associated with a fall in the probability of leaving the profession from around 1% to around 0.5%. For a novice teacher with otherwise average characteristics, the same increase in Leadership/Management score is associated with a decrease in the probability of leaving the profession from 7.1% to 5.2%.

52. Discipline shows a similar relationship with attrition. Moving an experienced teacher from the mean to one standard deviation above the mean on the Discipline score is associated with a fall in the probability of leaving the profession from around 1% to around 0.5%. For a novice teacher with otherwise average characteristics, the same increase in the Discipline score is associated with a decrease in the probability of leaving the profession by the next academic year from 7% to 5.4%. The three working conditions variables not pictured (Workload, Collaboration and Preparation) did not show a robust association with attrition.

53. It is notable, given the findings from other research, that no robust associations were found between Workload and any of the three outcomes: turnover, attrition or job satisfaction. In order to investigate this further, Appendix F shows the results from a similar analysis using an alternative measure of workload based on the total number of hours per week worked by each teacher. This section shows results from regression analyses analogous to those reported in Appendix E, but employing a

measure of workload based on self-reported total hours worked per week. Table 11 shows the results from regressing the full set of working conditions factors (including the total hours measure of workload) on turnover, attrition and job satisfaction. As in all previous models, the sample is restricted to those who report working full time. In addition, the sample has also been restricted to those who report working a number of hours consistent with working full time. A one standard deviation increase in hours worked is associated with a 33% (1-0.67) reduction in the odds of attrition. By contrast, hours worked is not associated with turnover or job satisfaction.

54. Table 11 shows that, while this alternative measure of workload is not associated with turnover or job satisfaction, it does show a sizable association with attrition. Table 12 tests whether the association between hours worked and attrition is robust to different model specifications, sample restrictions and tests for common source bias. The results are, however, highly inconsistent - some modelling and measurement approaches suggest a relationship; other do not. Taken together, these results are inconclusive regarding the relationship between Workload and retention.

55. Collaboration did not show a robust association with any of the three outcome measures. Unlike the other working conditions factors, the component questions for Collaboration measure the frequency of certain types of events, rather than teachers' perceptions. This raises a question about whether certain type of collaborative activities might be useful in moderation but, at very high levels of frequency, become negative for teachers. In order to investigate this further, additional versions of the models were run which included both a linear and squared term for Collaboration. This would allow for a hump-shaped relationship between Collaboration and e.g. job satisfaction, in which additional collaboration first showed a positive association with job satisfaction initially, but then, at higher levels of collaboration, showed a negative association with job satisfaction. However, no support was found for this version of the model, suggesting this cannot explain the lack of any robust association.

56. Up until this point, job satisfaction, turnover and attrition have been analysed solely as outcome variables. That is, they have been modelled as the result of the working conditions in teachers' schools. In practice, however, job satisfaction is likely to affect teachers' decisions about whether to remain in their job. Indeed, teachers who report higher job satisfaction in the linked TALIS/SWC data are much less likely to leave their jobs by the following academic year: a one standard deviation increase in job satisfaction (approximately equivalent to moving from the midpoint, to just within the top 16% of the distribution of job satisfaction scores) is associated with a 40% reduction in the odds of turnover ($p<0.001$) and a 57% reduction in the odds of attrition. Figure 13 in Appendix E investigates this further by combining the results from the models behind Figure 6 and Figure 8 in a single path diagram. It reveals that job satisfaction is indeed associated with attrition, even when accounting for the direct association between attrition and both Leadership/Management and Discipline. Further, the figure suggests that Leadership/Management is associated with attrition both directly, and via the strong association it has with job satisfaction. In short, job satisfaction is best thought of as an intermediate step on the path between working conditions and retention.

6. Comparing working conditions over time (lower secondary only)

Summary of findings

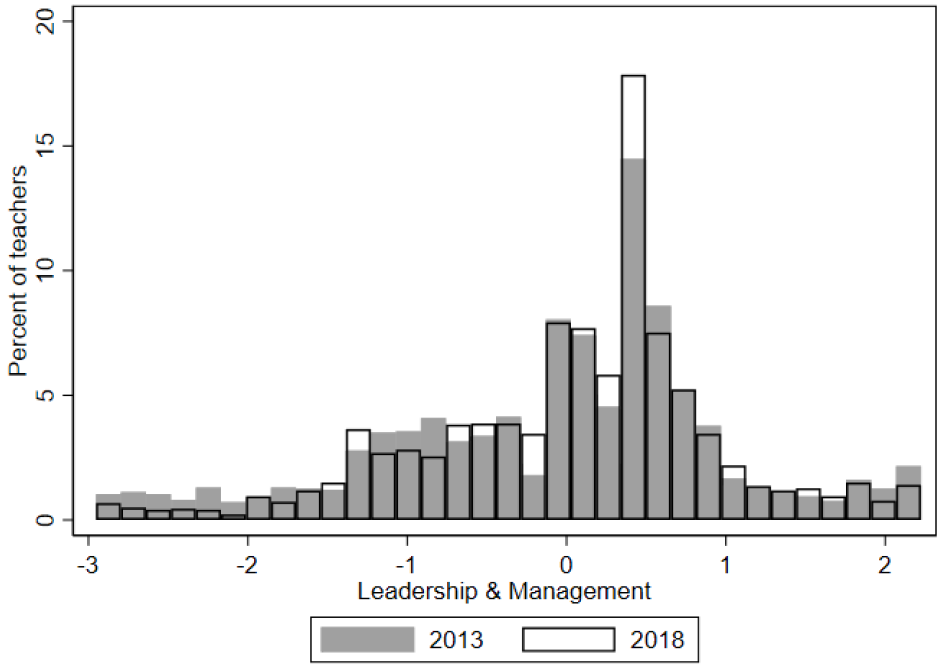
- Scores for Leadership/Management amongst lower secondary teachers increased by an effect size of 0.12 between 2013 and 2018. This reflects a greater proportion of lower secondary teachers reporting that the culture in their school is characterised by shared responsibility and mutual support.

57. TALIS data has now been collected from lower secondary school teachers in England on two occasions - once in 2013 and again in 2018 - allowing for longitudinal comparisons of working conditions. Primary teachers have so far only participated once – in 2018. This section looks at how the aspects of working conditions associated with job satisfaction and retention have changed over that period.

58. There have been a number of small changes to the TALIS questionnaire between the 2013 and 2018 waves (see Appendix G for a summary). First, three extra items were included in the 2018 questionnaire which enabled the construction of a Discipline factor score in the 2018 data. Because these items were not included in TALIS 2013, it is not possible to compare Discipline longitudinally. For Leadership/Management, six of the component questions that make up the 2018 factor were also included in the 2013 questionnaire. To allow consistent comparisons between the two waves, in this section an amended version of the Leadership/Management factor score is used, which does not include the question absent from the 2013 questionnaire.

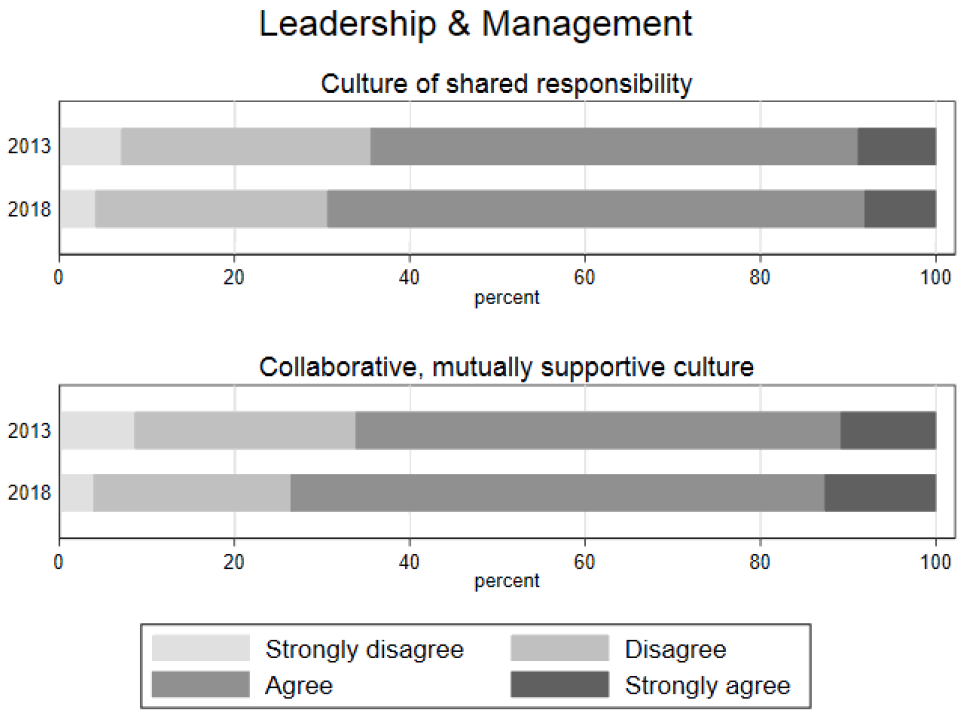
59. Figure 9 shows the distribution of Leadership/Management factor scores for lower secondary teachers in 2013 and 2018. A score of zero represents the mean score across the pooled 2013 and 2018 sample. A score of plus (or minus) one represents a score one standard deviation above (or below) the mean. The figure shows that scores for Leadership/Management have increased since 2018 (ES=0.12, p=0.03). Figure 10 shows that this is primarily driven by an increase in the proportion of teachers agreeing that their school has a culture of shared responsibility and is characterised by collaboration and mutual support.

Figure 9: Comparing Leadership/Management scores 2013-2018



Notes: N=4,419 teachers. Lower-secondary teachers only.

Figure 10: Decomposing increases in the Leadership/Management score



Notes: N=4,066 (top) 4,079 (bottom) teachers. Lower-secondary teachers only.

7. Discussion

60. Prior analysis using the TALIS 2013 data (Sims, 2017; Sims, 2020) investigated the relationships between school working conditions and teacher job satisfaction and desire to move school. The present research used TALIS 2018 to update and extend that analysis. In particular, the new data afforded the opportunity to compare working conditions across primary and secondary phases, model the relationship between working conditions and whether teachers are observed to actually leave their school or the profession, investigate the importance of school discipline, and compare changes in working conditions in secondary schools over time.

61. Leadership/Management has a strong relationship with all three of the outcome variables. A one standard deviation increase in the Leadership/Management score is associated with a half a standard deviation increase in job satisfaction. Approximately speaking, this is equivalent to saying that moving a teacher from the midpoint of the distribution of Leadership/Management scores to being just within the top 16% is associated with moving that teacher from the midpoint of the distribution of job satisfaction scores to being just within the top 31%. The same increase in the Leadership/Management score is association with a reduction in the probability of leaving the school or the profession in the subsequent two terms by around one half for experienced teachers and around one third for novice teachers.

62. School-level average Leadership/Management scores vary considerably (Figure 14, Appendix H). The Leadership/Management score is composed of a number of questions capturing: whether there is a supportive culture within the school; whether managers recognise it when teachers do a good job; whether teachers have a chance to participate in decision making and whether teachers are given the autonomy necessary to do their job. Accordingly, these may be sensible areas for schools to focus on in order to improve job satisfaction and retention.

63. Discipline is also associated with both turnover and attrition. For an experienced teacher with otherwise average characteristics, a one standard deviation increase in the Discipline score (approximately equivalent to moving from the midpoint to just within the top 16% of the distribution of discipline scores) is associated with a reduction in the probability that a teacher leaves the school by a quarter and the profession by one half. For a novice teacher with otherwise average characteristics, the same increase in the discipline score is associated with reduction in leaving either the school or the profession by around one third.

64. As with Leadership/Management, school-level average Discipline scores vary substantially (Figure 14, Appendix H). The Discipline score is composed of a number of questions relating to: whether staff in the school consistently enforce behaviour standards; whether teachers are able to control disruptive behaviour; and the extent to which they experience verbal or physical abuse. This suggests that some schools

could improve retention by focusing on, for example, ensuring rules and standards are consistently enforced.

65. Workload scores show an inconsistent pattern of associations with attrition. In some models there is a large and statistically significant relationship but in other models, there is none. The findings are therefore inconclusive in relation to attrition. By contrast, there is no robust association between Workload and either turnover or job satisfaction.

66. The remaining two working conditions – Collaboration and Preparation for Teaching Assignments - did not show a consistent relationship with either job satisfaction or retention. Collaboration showed an association with attrition in four of the five models (A, B, C and D) but not in model E. This is consistent with the interpretation that individual-level common source bias is the real explanation of any association between Collaboration and attrition. Collaboration and Preparation for Teaching Assignments should therefore be considered a lower priority for school leaders looking to improve job satisfaction and retention.

67. These findings should of course be interpreted with respect to the limitations of this research. Three in particular stand out. First, the modelling approach relies on an assumption that the data – and the models – are not missing other variables which influence job satisfaction and retention. This is a demanding assumption. However the TALIS data contains an unusually rich set of variables relating to working conditions as well as important indicators of outside earnings potential. Furthermore, the key findings all hold when the analysis is conducted for teachers who attend the same school and - for job satisfaction - the same department within the same school.

68. A second concern is that some of the working conditions mediate the relationship between the other working conditions variables and the outcome variables. For example, if Leadership/Management partly affects retention through its effect on Collaboration, then controlling for Collaboration would give a partial account of the total influence of Leadership/Management on retention. Indeed, Table 4 in Appendix A shows that Leadership/Management does have a moderate (around 0.3) correlation with Workload and Collaboration. Having said that, comparing the coefficients on Leadership/Management in column A (when the working conditions variables are entered one by one) and column B (when they are entered simultaneously) in Table 8, Table 9 and Table 10, it is clear that the size of the association is stable across the two specifications. Similar patterns hold for other potentially mediating variables.

69. A third and final concern relates to the way in which the working conditions are measured in the TALIS 2018 questionnaire. For example, although it is possible to identify themes among the variables that comprise the Leadership/Management factor, such as fostering collaboration and mutual support among staff, the questions that make up the factor are drawn from across the TALIS questionnaire and arguably do not have a clear, single unifying theme. This limits the precision with which it is possible to define what exactly is being measured by the factor score. Similarly, while

some of the questions that comprise the Discipline factor clearly relate to school-wide issues, such as consistent enforcement of rules, others are arguably partly assessing individual teachers' ability to keep order, which is not purely a feature of the school working environment. Furthermore, the alpha values for some of the factors are low, which is likely to attenuate the strength of the associations observed to some extent.

70. Despite these limitations, the use of a new linked dataset combining rich teacher-level survey data with measures of observed turnover and attrition allow this research to make a number of original contributions to the literature, many of which have direct implications for school leaders and policymakers looking to tackle teacher shortages.

Appendix A: The working conditions factor variables

Table 3 shows the questionnaire items that make up each of the factor variables.

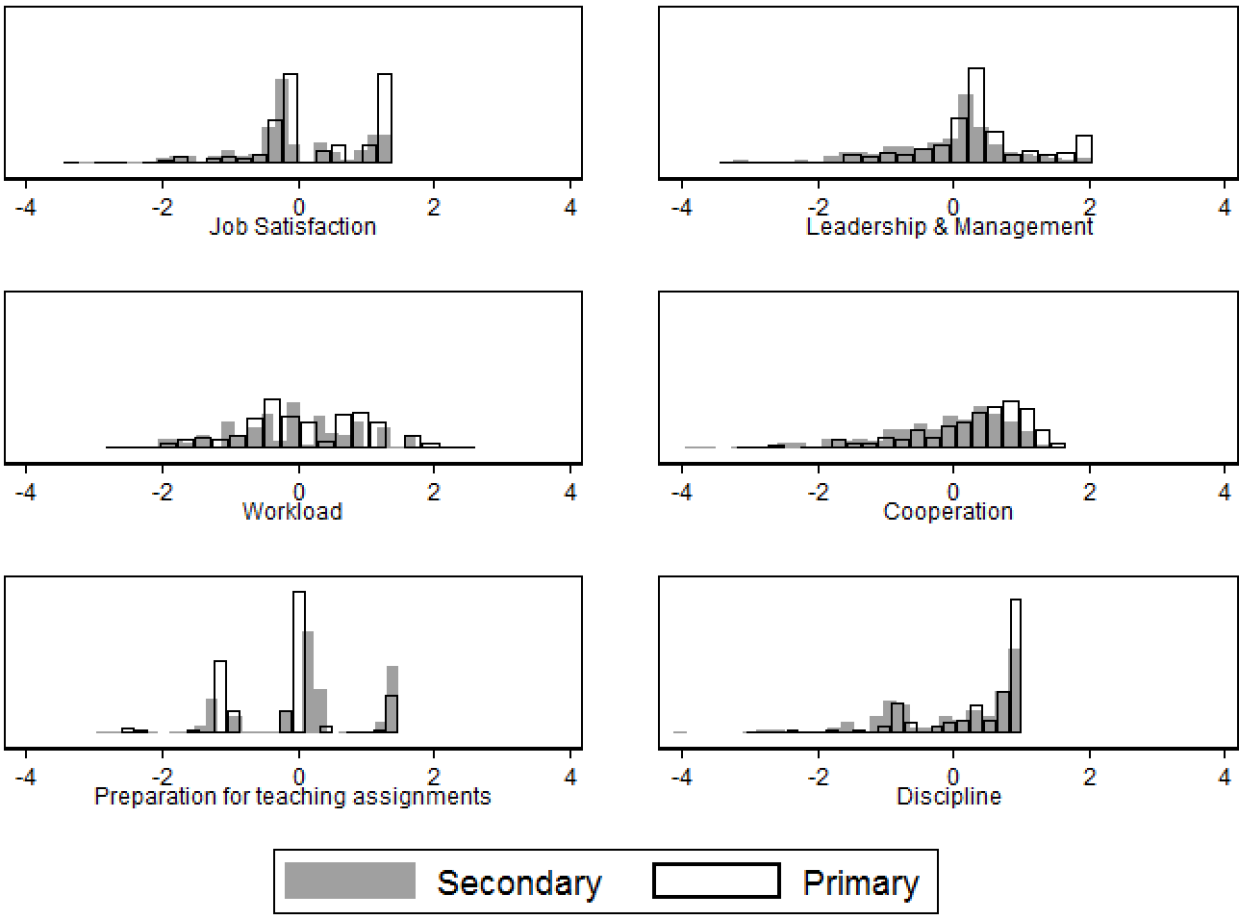
Table 3: Summary of the factor variables

Factor	TALIS Var	Item Wording	Reverse Coded?	Alpha
Job Satisfaction	53c	I would like to change to another school if that were possible	✓	0.85
	53e	I enjoy working at this school		
	53g	I would recommend my school as a good place to work		
	53j	All in all, I am satisfied with my job		
Leadership & Management	28c	There is a lack of employer support (for professional development)	✓	0.82
	48a	This school provides staff with opportunities to actively participate in school decisions		
	48d	This school has a culture of shared responsibility for school issues		
	48e	There is a collaborative school culture which is characterised by mutual support		
	62a	I do not have the autonomy I need to do a good job as a teacher	✓	
	62b	The school has an effective school management team		
	64b	My manager recognises when I have done a good job		
Workload	51b	My job leaves me time for my personal life	✓	0.67
	63a	(Right amount of time) Individual planning or preparation of lessons either at school or out of school	*	
	63c	(Right amount of time) Marking/correcting of students' work	*	
	63e	(Right amount of time) Participation in school management	*	
	63f	(Right amount of time) General administrative work	*	
Collaboration	33b	(How often) Observe other teachers' classes and provide feedback		0.60
	33c	(How often) Engage in joint activities across different classes and age groups		
	33d	(How often) Exchange teaching materials with colleagues		
	33e	(How often) Engage in discussions about the learning development of specific students		
	33h	(How often) Take part in collaborative professional learning		
Preparation for Assignments	6a1	(Formally trained in) Content of some or all subjects that I teach	✓	0.64
	6a2	(Feel prepared for) Content of some or all subjects that I teach		
	6b1	(Formally trained in) Pedagogy of some or all subjects that I teach	✓	
	6b2	(Feel prepared for) Pedagogy of some or all subjects that I teach		
Discipline	34d	(To what extent can you) Control disruptive behaviour in the classroom		0.65
	34h	(To what extent can you) Get students to follow classroom rules .		
	48g	The school staff enforces rules for student behaviour consistently throughout the school		
	52g	(Sources of stress) Maintaining classroom Discipline	✓	
	52h	(Sources of stress) Being intimidated or verbally abused by students	✓	

Notes: * items recoded to make them unipolar.

71. Figure 11 shows the distribution of the six factor variables, split by whether the respondents work in a primary or a secondary school. The distributions - particularly for the Preparation factor - are somewhat 'lumpy', which is to be expected with factor scores created from ordinal questionnaire items. The job satisfaction and Discipline scores also display a 'pile up' of values on the right hand side of the distribution, particularly among primary teachers. This reflects respondents providing the most positive answer to each of the component questions e.g. that they 'strongly agree' with each of the statement about job satisfaction. This suggest that there may be ceiling effects in which some respondents would have responded even more positively, if such an option had been available to them. If so, this will reduce the strength of associations estimated in Section 5, since the true variation has been curtailed at the top end. This suggests that the regression coefficients should be interpreted as lower bounds on the true association.

Figure 11: Distributions of the factor variables



Notes: Shows histograms of the six factor variables at the teacher-level, split by phase. The horizontal axis is measured in standard deviation, with zero representing the mean value.

Table 4 shows pairwise correlations between the six factor variables. As might be expected, job satisfaction shows a strong correlation with Leadership/Management (+0.64) and a moderate correlation with better Workload scores (+0.38). The correlations

amongst the five working conditions variables are generally very low. Only two of the pairwise correlations are above 0.3 (shown in bold). This is reassuring, since it suggests that, for example, Discipline is not mediating the relationship between Leadership/Management and retention. This lack of mediation is a necessary condition for being able to interpret the regression coefficients in models containing all the working conditions variables as showing the result of increasing one working condition score, while holding the others constant.

Table 4: Pairwise correlations between the six factor variables

	1)	2)	3)	4)	5)	6)
1) Job Satisfaction	1					
2) Leadership/Management	**0.64**	1				
3) Workload	**0.38**	**0.31**	1			
4) Collaboration	0.29	**0.32**	0.09	1		
5) Prep. for teaching assignments	0.13	0.08	0.09	0.03	1	
6) Discipline	0.23	0.21	0.11	0.17	0.04	1

Notes: Bold text indicates a correlation >0.3.

Appendix B: Consent to recontact and match to administrative data sources

72. As part of the national questions included in the TALIS survey for England, teachers in England were asked the following question:

"*The Department for Education (DfE) would like to link your responses to this survey with other information about you which it already holds or to which it is lawfully permitted access. Your survey response and linked information would be anonymised and processed by DfE, or contractors working on its behalf, for the sole purposes of education research.*

73. Table 5 illustrates how teachers in England responded. In total, 75 percent of primary teachers and 72 percent of lower secondary teachers provided consent for their data to be linked to administrative records. Less than one-in-five refused.

Table 5: The percentage of teachers who consented to have their data matched

	Primary			Lower secondary		
	% no	% yes	% did not answer	% no	% yes	% did not answer
Data linkage	18%	75%	7%	18%	72%	10%

Notes: Figures refer to unweighted data.

74. Table 6 investigates whether teachers who consented to data linkage differ to those who did not, in terms of school and teacher characteristics. There are few obvious differences between groups, including between genders, teachers who work full- and part-time, those with different amounts of experience and school location, intake, Ofsted grade and examination performance. This further suggests that teachers who agreed to data linkage taking place are not systematically different to those who did not consent, at least in terms of these common school and teacher demographic characteristics.

75. Table 7 provides similar evidence on this matter, but now focusing upon how teachers responded to a selection of the attitudinal questions asked within the TALIS 2018 survey. These results are based upon the pooled primary and lower secondary school samples. There is some evidence that those individuals who regret becoming a teacher and who do not believe that their profession is valued by society are slightly less likely to consent to their data being linked than teachers who are happier in their jobs. Yet, in terms of magnitude, these differences are relatively small. Moreover, there is almost no association between a series of other questions (e.g. overall satisfaction with job, whether they believe teachers are valued by policymakers and

the media, views on pay and workload, whether teaching was their first-choice profession) and the probability of consenting to data linkage.

Table 6: Variation in consent to link to administrative records

	Primary			Secondary		
	% yes	Lower CI	Upper CI	% yes	Lower CI	Upper CI
Gender						
Female	73%	71%	75%	70%	68%	73%
Male	75%	69%	81%	72%	69%	75%
Work-Schedule						
Full-time	75%	72%	77%	75%	72%	77%
Part-time	74%	69%	80%	70%	66%	74%
Role						
Class teacher	80%	76%	83%	77%	74%	80%
Subject lead	80%	77%	83%	82%	79%	86%
Head of Key Stage	84%	77%	90%	86%	79%	92%
Head of Year	78%	69%	87%	91%	85%	97%
Deputy Head	79%	73%	85%	80%	74%	85%
SEN Co-ordinator	76%	66%	86%	-	-	-
Experience						
0 to 5 years	76%	71%	80%	73%	69%	77%
6 to 10 years	76%	71%	81%	74%	70%	78%
11 to 20 years	75%	71%	79%	73%	70%	77%
Over 20 years	69%	65%	74%	71%	65%	76%
School Ofsted						
Inadequate	-	-	-	68%	62%	73%
Requires Improvement	75%	66%	84%	71%	65%	77%
Good	74%	71%	77%	70%	66%	73%
Outstanding	73%	68%	78%	73%	68%	77%
School FSM %						
Low FSM	75%	70%	81%	72%	67%	77%
Second FSM quartile	73%	68%	78%	69%	64%	74%
Third FSM quartile	70%	66%	75%	70%	65%	75%
High FSM	76%	70%	81%	72%	68%	76%
School type						
Sponsored academy	86%	78%	94%	70%	64%	77%
Academy converter	70%	65%	76%	72%	68%	75%
Community school	73%	69%	76%	68%	61%	75%
Voluntary	75%	68%	81%	71%	64%	78%
Independent	71%	62%	80%	71%	65%	77%
Other	82%	78%	87%	70%	62%	78%
Achievement quartile						
Bottom quartile	72%	67%	77%	73%	68%	77%
Second quartile	72%	66%	78%	71%	66%	76%
Third quartile	74%	70%	78%	71%	67%	76%
Top quartile	77%	70%	84%	71%	66%	77%
Region						

South West	70%	59%	81%	67%	56%	78%
South East	79%	75%	84%	71%	67%	74%
London	73%	69%	78%	70%	64%	77%
West Midlands	71%	67%	76%	70%	63%	77%
East Midlands	74%	69%	79%	75%	67%	83%
East of England	71%	63%	79%	68%	61%	74%
North West	71%	65%	77%	70%	64%	76%
North East	79%	67%	92%	61%	46%	76%
Yorkshire and the Humber	73%	64%	82%	76%	71%	82%

Table 7: Characteristics of consenters and non-consenter

	% consent not given	% consent given
Satisfied in job		
S. disagree / disagree	21%	79%
Agree / S. agree	19%	81%
Regret becoming a teacher		
S. disagree / disagree	19%	81%
Agree / S. agree	24%	76%
Teaching profession valued by society		
S. disagree / disagree	21%	79%
Agree / S. agree	17%	83%
Teachers valued by policymakers		
S. disagree / disagree	20%	80%
Agree / S. agree	20%	80%
Teachers valued by media		
S. disagree / disagree	20%	80%
Agree / S. agree	18%	82%
Teaching first choice career		
No	26%	74%
Yes	26%	74%
Workload is unmanageable		
S. disagree / disagree	20%	80%
Agree / S. agree	19%	81%
Teachers underpaid compared to other professionals		
S. disagree / disagree	19%	81%
Agree / S. agree	20%	80%

Notes: Non-respondents to consent question included as consent not given. Non-respondents to each attitudinal question excluded from the analysis for that question. S. agree = strongly agree. S. disagree = strongly disagree

Appendix C: Addressing common source bias

76. An important methodological consideration in the regression analysis is common source bias. In some of the models, both the outcome variable (job satisfaction) and the working conditions variables (e.g. Leadership/Management) are measured by the same survey - a common source. This can introduce bias to the estimates in two ways.

77. The first risk comes from environment common-source bias. This could occur if an event has occurred in a particular school that is unrelated to working conditions but leads all respondents to feel either more negative (or more positive) about the school. This could lead them to report both the working conditions measures and e.g. job satisfaction more negatively (or more positively) which would inflate the association between them. In order to address this problem, an indicator for the school to which each teacher belongs is included. This accounts for the effect of any school level shock unrelated to working conditions which might affect the way in which teachers across the school respond to the survey.

78. The second risk comes from individual common source bias. This could occur if the mood of an individual respondent (positive or negative) on the day they respond might bias both their working conditions reports and the job satisfaction reports (upwards or downwards) which would inflate the association between them. In other models, the outcome measures (turnover and attrition) are drawn from separate datasets to the working conditions measures. However, a concern remains that teachers who have already decided to leave their school at the point they respond to the survey may subconsciously post-rationalise their decision to do so by responding more negatively. In this case, the teacher themselves is the common source of the data being observed. Again, this would inflate the associations in the model. In order to address both of these problems, working conditions measures from teachers in the same school as a focal teacher are used to model job satisfaction for that focal teacher. This breaks the link between the source of the working conditions measures and the outcome measures, providing a check on individual-level common source bias.

Appendix D: Accounting for outside earnings potential

79. The SWC contains information on teachers' pay. However, the relevant consideration for whether or not a teacher leaves the profession is the ratio of pay inside teaching to their potential earnings outside teaching. Since their potential earnings outside of teaching is a counterfactual, there is no dataset which includes this information.

80. One option for addressing this missing data problem would be to model the pay of individuals outside of teaching based on their characteristics and then estimate how much teachers with similar characteristics would be paid if in fact they were not teachers. However, this approach would involve making three important assumptions. First, that the variables that determine pay are all included in the dataset. Second, that a teacher who leaves the teaching profession with e.g. five years of experience in the workforce could start work in a different occupation on the same pay as somebody with five years of occupation-specific experience (see Gathmann & Schonberg, 2010; Kambourov & Manovskii, 2009; Sullivan, 2010). Or, failing that, an alternative assumption about the proportion of the equivalent income they could start on. Third, that the discount rate that teachers apply to differences in income paid in future years of their life is known (see Green & Myerson, 2004). Making all these assumptions correctly would be both difficult and unverifiable.

81. A second option is to use the existing empirical literature to specify the model using a set of indicators known to influence outside earnings potential. In particular, empirical research has consistently found that:

    a. Teachers earlier in their careers are more sensitive to differences in pay, with the influence of pay on retention appearing to fade out after around six years in the profession (Gilpin, 2011; Hendricks, 2014).

    b. Teachers with STEM (science, technology, engineering and maths) degrees have higher outside earnings potential than those with non-STEM degrees (Britton et al., 2016; MAC, 2017) and are particularly sensitive to these outside earning differences (Rickman, Wang & Winters, 2017).

    c. Male teachers are more sensitive to the same difference in pay than female teachers are (Gilpin, 2011; Hendricks, 2014; Rickman, Wang & Winters, 2018) and receive higher pay outside of teaching than females (Britton et al., 2016).

82. This can be explored further using the Annual Population Survey (APS) – a yearly household survey which has been running since 2004 and covers topics including education and employment. Each wave of the APS is comprised of an aggregation of data from four waves of the (quarterly) Labour Force Survey amounting to around 300,000 respondents. The APS aims to be representative of the working age population in the UK. The version of the APS used in this analysis contains three years of data (2016, 2017 and 2018), which further increases the sample size to over

500,000 respondents. However, interest here is exclusively in the data relating to full-time employed graduates in England (where the TALIS survey was conducted) in the early-career period.

83. The APS data was used to run a quantile (median) regression of weekly income on age, age squared, a set of ten dummy variables (nine capturing the major degree subject groupings and a tenth capturing all teachers in the data, regardless of their degree subject) and interactions between all three variables. Probability weights were applied.

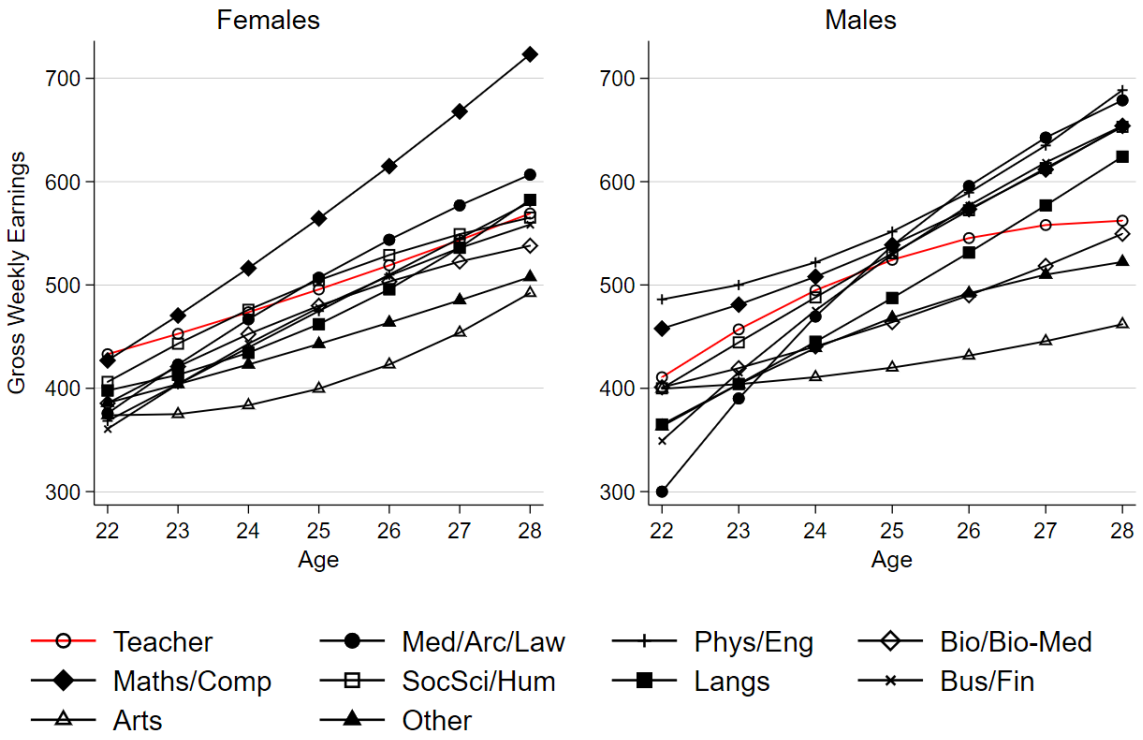
84. Figure 12 provides a concise graphical summary of the findings from the model. The vertical axis shows the predicted median gross weekly earnings of graduates in the APS based on gender (left panel versus right panel), age (horizontal axis) and degree subject (the different series on the chart). The red series shows the predicted earnings of teachers, regardless of the subject of their undergraduate degree.

85. The left-hand panel of the chart shows that the median female teacher at age 22 has higher earnings than non-teacher graduates with degrees in all subjects besides maths / computer science. By the age of 28 however, median predicted earnings for medicine/architecture/law, physics/engineering, social science/humanities, languages and business and finance have caught up with teaching. The right-hand side of the chart shows that the male median teacher at age 22 has higher pay than non-teaching graduates with degrees in all subjects besides maths / computer science, and physics / engineering. By the age of 28 however, median predicted earnings for medicine/architecture/law, physics/engineering, maths and computer science, business/finance and languages all exceed teaching. After the age of 25, male earnings outside of teaching exceed those for females in many subjects.

86. In summary, and consistent with the empirical findings reviewed above, the ratio between earnings in teaching and earnings outside of teaching differs systematically by gender, degree subject and age. During the early stages of teachers' careers, when they are most sensitive to outside earning potential, those with STEM degrees, particularly those who are males, are likely to earn more outside of teaching than inside of teaching. This is not the case for females or those with non-STEM degrees.

87. Based on the literature reviewed above and the findings from Figure 12, model D includes three binary (0/1) variables which capture: having a STEM degree, being under 25 and having less than five years of teaching experience, and being male. The model also includes the three two-way interactions between these three variables and the three-way interaction between all three variables. This specification (see Appendix E) is able to flexibly capture the relationship between being in any of these seven groups and the three outcome variables. Importantly, it does so while avoiding contentious assumptions regarding starting pay in alternative occupations and the discount rates applied to earnings in future years, as discussed above.

Figure 12: Predicted earnings by degree subject



Notes: Left-hand side N=2,559 teachers. Right-hand side N=2,080 teachers. Med/Arc/Law = medicine, architecture, and law. Phys/Eng = physics and engineering. Bio/Bio-Med = biological and bio-medical sciences. Maths/Comp = maths and computer science. SocSci/Hum = social sciences and humanities. Langs = foreign languages. Bus/Fin = business and finance.

Appendix E: Full regression models and output

Model A: $Outcome_i = WC_i + X_i + \epsilon_i$
Where:

- $Outcome_i$ is job satisfaction of individual *i*
- WC_i is one of the five working conditions variables
- X_i is a vector of control variables: phase dummy, gender dummy, years of experience, a categorical measure of the proportion of pupils in the school from disadvantaged backgrounds
- ϵ_i is an error term

When turnover or attrition are used as the dependent variable $Outcome_i$ is replaced with:

- $\log\left(\frac{p(turnover/attrition)}{1-p(turnover/attrition)}\right)_i$

Model B: $Outcome_i = WC_{1i} + WC_{2i} + WC_{3i} + WC_{4i} + WC_{5i} + X_i + \epsilon_i$
Where:

- $WC_{1i} \ldots WC_{5i}$ are the five working conditions variables

Model C: $Outcome_{is} = WC_{1is} + WC_{2is} + WC_{3is} + WC_{4is} + WC_{5is} + X_{is} + S_s + \epsilon_{is}$
Where:

- S_s is a vector of dummy variables for each school *s* (school fixed effects).

In the job satisfaction models, a variant of this is model is run using department fixed effects.

Model D: $Outcome_{is} = WC_{1-5i} + sec_i + male_i + novice_i + STEM_i + (male_i * novice_i) + (novice_i * STEM_i) + (STEM_i * male_i) + (male_i * novice_i * STEM_i) + \epsilon_i$
Where:

- WC_{1-5i} is a vector of the five working conditions, collapsed for compactness
- sec_i is a dummy indicating secondary school
- $novice_i$ is a dummy indicating a teacher has less than five years of experience
- $STEM_i$ is dummy indicating a teacher has a STEM degree

Model E: $Outcome_{is} = \overline{WC}_{1i\neq i} + \overline{WC}_{2i\neq i} + \overline{WC}_{3i\neq i} + \overline{WC}_{4i\neq i} + \overline{WC}_{5i\neq i} + X_i + \epsilon_{is}$
Where:

- $\overline{WC}_{1i\neq i}$ is the mean value of the first of the five working conditions variables, across all units other than the focal unit *i*

The full results from these regression models can be found in Table 8, Table 9 and Table 10 below.

Table 8: Teacher-level turnover models

	Turnover				
	(8A)	**(8B)**	**(8C)**	**(8D)**	**(8E)**
	Variables Separately	Variables Together	School FE	Pay Indicators	Colleague Report
Leadership/ Management	0.58*** (0.04)	0.59*** (0.05)	0.60*** (0.07)	0.59*** (0.05)	0.60*** (0.11)
Workload	0.87* (0.07)	1.05 (0.09)	1.06 (0.13)	1.07 (0.095)	1.05 (0.21)
Collaboration	0.77*** (0.06)	0.90 (0.07)	1.01 (0.11)	0.92 (0.07)	0.76 (0.150)
Preparation	1.11 (0.09)	1.22** (0.11)	1.18 (0.18)	1.19* (0.11)	1.31 (0.31)
Discipline	0.70*** (0.05)	0.74*** (0.05)	0.75** (0.08)	0.73*** (0.06)	0.59** (0.12)
N	2,029	2,029	1,231	1,953	1,021

Notes: ***=p<0.01, **=p<0.05, *=p<0.1. Standard errors in parentheses. N = number of teachers. Model A shows results from five separate logistic regression models, each of which includes only one of the five working conditions variables. Models B-E each present the results from a single logistic regression. Coefficients are odds ratios. All models also include controls for school phase, teacher gender, years of experience and proportion of disadvantaged pupils. School FE = school fixed effects. Model D includes pay indicators as set out in Appendix D & E. The degree subject variable in the model D has been imputed using multiple imputation by chained equations. Colleague report uses working conditions measures calculated as the leave-one-out school average.

Table 9: Teacher-level attrition models

	Attrition				
	(9A)	**(9B)**	**(9C)**	**(9D)**	**(9E)**
	Variables Separately	Variables Together	School FE	Pay Indicators	Colleague Report
Leadership/ Management	0.59*** (0.05)	0.64*** (0.07)	0.63*** (0.10)	0.61*** (0.07)	0.58** (0.13)
Workload	0.88 (0.09)	1.062 (0.13)	1.17 (0.20)	1.11 (0.13)	0.79 (0.23)
Collaboration	0.66*** (0.06)	0.77*** (0.07)	0.74** (0.09)	0.79*** (0.07)	0.90 (0.22)
Preparation	1.09 (0.10)	1.18* (0.11)	1.11 (0.14)	1.12 (0.11)	1.38 (0.37)
Discipline	0.68*** (0.06)	0.72*** (0.07)	0.74** (0.12)	0.73*** (0.07)	0.49** (0.15)
N	2,029	2,029	768	1,982	2,051

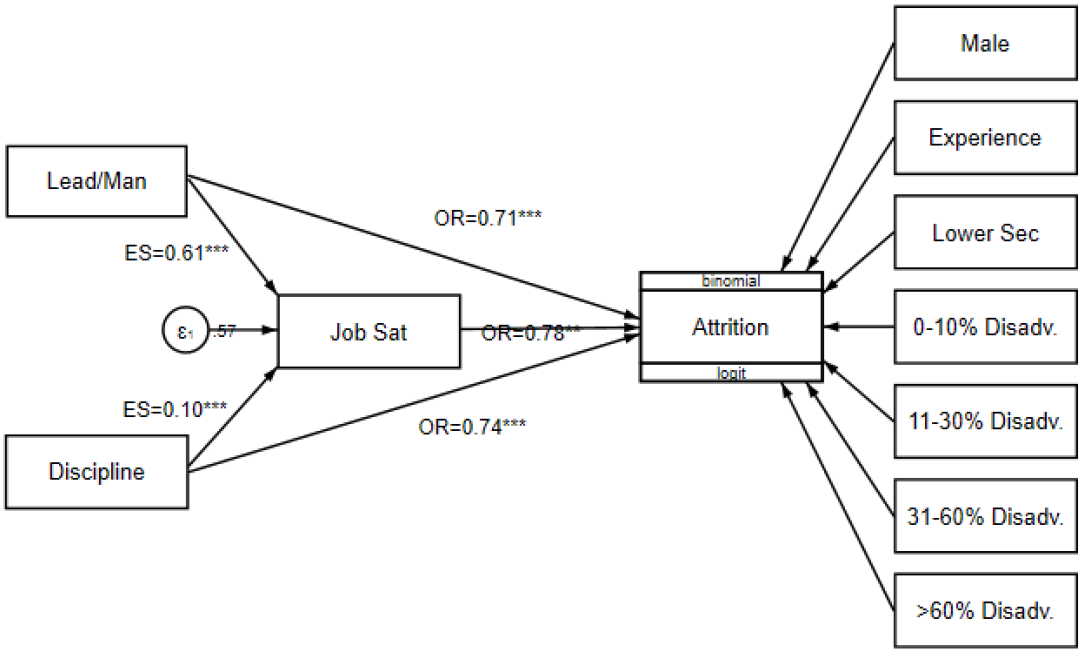
Notes: ***=p<0.01, **=p<0.05, *=p<0.1. Standard errors in parentheses. N = number of teachers. Model A shows results from five separate logistic regression models, each of which includes only one of the five working conditions variables. Models B-E each present the results from a single logistic regression. Coefficients are odds ratios. All models also include controls for school phase, teacher gender, years of experience and proportion of pupils with FSM. School FE = school fixed effects. Model D includes pay indicators as set out in Appendix D & E. The degree subject variable in the model D has been imputed using multiple imputation by chained equations. Colleague report uses working conditions measures calculated as the leave-one-out school average.

Table 10: Teacher-level job satisfaction models

	Job Satisfaction (Z Score)					
	(10A)	**(10B)**	**(10C)**	**(10C)**	**(10D)**	**(10E)**
	Variables Separate	Variables Together	School FE	Schl/Dep FE	Pay Indicators	Colleague Report
Leadership/ Management	0.63*** (0.02)	0.53*** (0.03)	0.40*** (0.03)	0.40*** (0.04)	0.53*** (0.03)	0.51*** (0.05)
Workload	0.36*** (0.02)	0.19*** (0.02)	0.20*** (0.02)	0.18*** (0.03)	0.19*** (0.02)	0.07 (0.05)
Collaboration	0.27*** (0.03)	0.09*** (0.02)	0.10*** (0.02)	0.10*** (0.03)	0.09*** (0.03)	-0.06 (0.05)
Preparation	0.14*** (0.02)	0.04* (0.02)	0.03 (0.02)	0.02 (0.02)	0.04* (0.03)	0.07 (0.06)
Discipline	0.21*** (0.02)	0.08*** (0.02)	0.08*** (0.02)	0.08*** (0.03)	0.09*** (0.02)	0.06 (0.05)
N	2,002	2,002	2,002	1,819	1,928	1,994
R Squared	0.04-0.40	0.456	0.563	0.661	-	0.110

Notes: ***=p<0.01, **=p<0.05, *=p<0.1. Standard errors in parentheses. N = number of teachers. Model A shows results from five separate ordinary least squares regression models, each of which includes only one of the five working conditions variables. Models B-E each present the results from a single ordinary least squares regression. Coefficients are effect sizes. All models also include controls for school phase, teacher gender and years of experience. School FE = school fixed effects. Schl/Dep FE = School-by-department fixed effect. Model D includes pay indicators as set out in Appendix D & E. The degree subject variable in model D has been imputed using multiple imputation by chained equations. Colleague report uses working conditions measures calculated as the leave-one-out school average.

Figure 13: Path diagram combining the job satisfaction and attrition models



Notes: Lead/Man = Leadership/Management factor score. Job Sat = Job Satisfaction factor score. Lower Sec = lower secondary (KS3) teachers; as opposed to primary teachers. Disadv. = socio-economically disadvantaged. ES = Effect Size. OR = Odds Ratio. ***=p<0.01, **=p<0.05, *=p<0.1. Coefficients and p values for the covariates (the furthest right variables) not shown for space reasons.

Appendix F: Alternative measures of working hours

88. This section shows results from regression analyses analogous to those reported in Appendix E, but employing a measure of workload based on self-reported total hours worked per week. Table 11 shows the results from regressing the full set of working conditions factors (including the total hours measure of workload) on turnover, attrition and job satisfaction. As in all previous models, the sample is restricted to those who report working full time. In addition, the sample has also been restricted to those who report working a number of hours consistent with working full time. A one standard deviation increase in hours worked is associated with a 33% (1-0.67=0.33) reduction in the odds of attrition. By contrast, hours worked is not associated with turnover or job satisfaction.

Table 11: Alternative measure of workload

	Model B		
	Turnover	**Attrition**	**Job Sat.**
Workload - Hours (Reversed Z Score)	0.88 (0.12)	0.67** (0.12)	-0.01 (0.03)
Leadership/Management	0.62*** (0.05)	0.65*** (0.07)	0.58*** (0.03)
Collaboration	0.85* (0.07)	0.73*** (0.07)	0.10*** (0.03)
Preparation	1.20** (0.10)	1.14 (0.11)	0.05* (0.02)
Discipline	0.74*** (0.06)	0.75*** (0.07)	0.09*** (0.02)
N	1,865	1,865	1,839

Notes: ***=p<0.01, **=p<0.05, *=p<0.1. Standard errors in parentheses. N = number of teachers. All columns use Model B and also include controls for school phase, teacher gender, years of experience and pupil deprivation. Coefficients in the turnover and attrition columns are odds ratios. Coefficients in the Job Satisfaction column are effect sizes.

89. Table 12 explores whether the association between working hours and attrition is robust across Models B, C and D for both the full sample and the 'trimmed sample'. The full sample relates to all teachers who indicated in the TALIS questionnaire that they worked full time (0.85 FTE or more). The trimmed sample relates to all teachers who indicated that they worked full time and reported working the equivalent of 85% of full time hours when asked about the number of hours worked.

Table 12: Modelling attrition using the alternative measure of workload

	Attrition					
	Model B		**Model C**		**Model D**	
	Trimmed Sample	Full Sample	Trimmed Sample	Full Sample	Trimmed Sample	Full Sample
Workload - Hours (Reversed Z Score)	0.67** (0.12)	0.83** (0.08)	0.72* (0.15)	0.83 (0.11)	0.63** (0.17)	0.82** (0.07)
Leadership/ Management	0.65*** (0.07)	0.64*** (0.06)	0.65** (0.11)	0.65*** (0.10)	0.63*** (0.07)	0.62*** (0.06)
Collaboration	0.73*** (0.07)	0.78*** (0.07)	0.66*** (0.10)	0.76** (0.10)	0.75*** (0.08)	0.80** (0.07)
Preparation	1.14 (0.11)	1.18* (0.11)	1.14 (0.16)	1.11 (0.14)	1.07 (0.1`)	1.11 (0.11)
Discipline	0.75*** (0.07)	0.73*** (0.06)	0.86 (0.13)	0.80 (0.12)	0.76** (0.08)	0.74*** (0.07)
N	1,865	2,024	662	767	1,810	1,965

Notes: ***=p<0.01, **=p<0.05, *=p<0.1. Standard errors in parentheses. N = number of teachers. Coefficients are odds ratios. All models also include controls for school phase, teacher gender, years of experience and pupil deprivation. Model D includes pay indicators as set out in Appendix D & E. The degree subject variable in model D has been imputed using multiple imputation by chained equations. The trimmed sample excludes those who report working less than the TALIS definition of full-time hours. The full sample includes all teachers who report working full time.

90. The table shows that working hours do not show a robust relationship with attrition. While there is a statistically significant association in Model B and Model D; there is not in Model C. The distinctive feature of Model C is that it includes school fixed

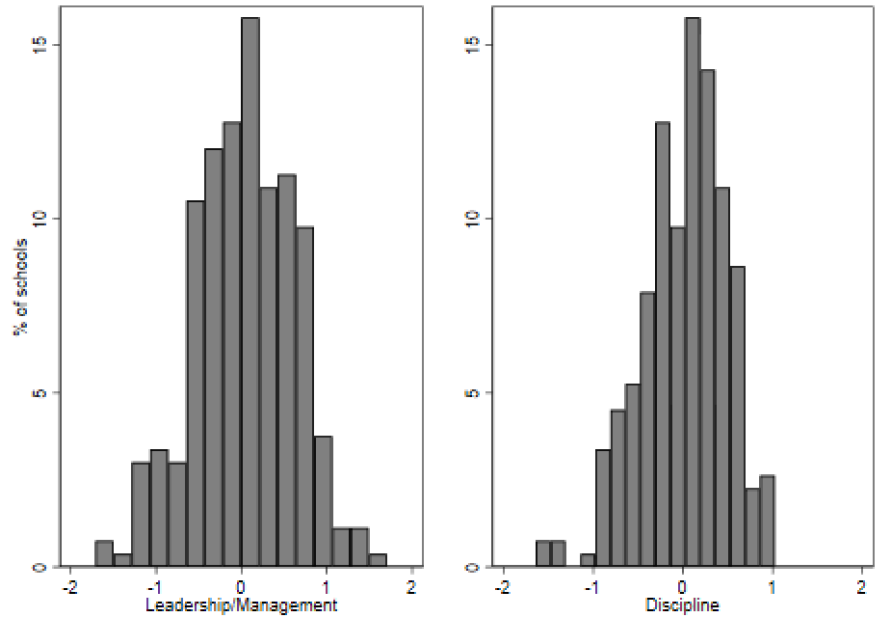
effects. This suggests that what appears to be an association between working hours and attrition might actually be accounted for by unmeasured school characteristics. Alternatively, the reduction in sample size incurred by utilising school fixed effects might explain the lack of statistical significance. Perhaps the safest conclusion is that the analysis is inconclusive on the relationship between workload and attrition.

Appendix G: Comparison of working conditions items in 2013 and 2018

	2013 Items	2018 Items
Lead/ Man	1. School provides staff with opportunities to participate in school decisions 2. I do not have the autonomy I need to do a good job as a teacher 3. The school has an effective school management team 4. There is a collaborative school culture characterised by mutual support 5. There is a lack of employer support (for professional development) 6. The school has a culture of shared responsibility for school issues 7. .	1. School provides staff with opportunities to actively participate in school decisions 2. I do not have the autonomy I need to do a good job as a teacher 3. The school has an effective school management team 4. There is a collaborative school culture which is characterised by mutual support 5. There is a lack of employer support (for professional development) 6. The school has a culture of shared responsibility for school issues 7. My manager recognises when I have done a good job
Discip	1. (Can you) Control disruptive behaviour in the classroom 2. (Can you) Get students to follow classroom rules 3. . 4. . 5. .	1. (Can you) Control disruptive behaviour in the classroom 2. (Can you) Get students to follow classroom rules 3. The school staff enforces rules for student behaviour consistently 4. (Sources of stress) Maintaining classroom discipline 5. (Sources of stress) Being intimidated or verbally abused by students
Coop	1. (How often) Observe other teachers' classes and provide feedback 2. (How often) Engage in joint activities across different classes and age groups 3. (How often) Exchange teaching materials with colleagues 4. (How often) Engage in discussion about the learning of specific students 5. (How often) Take part in collaborative professional learning	1. (How often) Observe other teachers' classes and provide feedback 2. (How often) Engage in joint activities across different classes and age groups 3. (How often) Exchange teaching materials with colleagues 4. (How often) Engage in discussions about the learning development of specific students 5. (How often) Take part in collaborative professional learning
Job Sat	1. I would like to change to another school if that were possible 2. I enjoy working at this school 3. I would recommend my school as a good place to work 4. All in all, I am satisfied with my job	1. I would like to change to another school if that were possible 2. I enjoy working at this school 3. I would recommend my school as a good place to work 4. All in all, I am satisfied with my job
Workload	1. (How many 60 minute hours did you spend on) Your job last week 2. (How many 60 minute hours did you spend on) Planning and lesson preparation last week 3. (How many 60 minute hours did you spend on) Marking and correcting students' work last week	My job leaves me time for my personal life (Right amount of time) Individual planning or preparation of lessons either at school or out of school (Right amount of time) Marking/correcting of students' work (Right amount of time) Participation in school management (Right amount of time) General administrative work

Appendix H: School-level working conditions graphs

Figure 14: Distribution of school average working conditions scores



N=266 schools. Working conditions scores averaged at the school level. X axis is measured in teacher-level standard deviations.

Figure 15: School average Leadership/Management and job satisfaction

N=266 schools. X and Y axis are measured in teacher-level standard deviations.

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