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An Information Intervention and Consent to Data Linkage: Experimental Evidence from Teaching

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Non-technical summary

In many countries, including the UK, survey data can only be linked to administrative data if survey respondents give their informed consent to the linkage. This paper belongs to a growing literature that seeks to understand the influences of consent to data linkage and methods of maximising consent.

This paper takes an important first step in investigating the plausibility and potential implications of data linkage in the context of teachers. In addition, we investigate how the provision of additional information about the data linkage process influences the decision to consent.

We find that the propensity for teachers to consent to linking their survey data to employment records is high (75 percent). We argue that the high rate of consent is, at least partially, driven by the relationship that the research team has with the teachers in participating schools. This highlights the important role that a positive relationship with the research team can have on consent to data linkage.

We observe differences in the rate of consent by ethnicity, sex, and sector - teachers from a non-white background, male teachers and those who work in the independent sector are significantly less likely to consent. We also observe that teachers who report that they are more likely to leave the profession over the next 12 months are more likely to give their consent to data linkage.

We find that the provision of additional information about the data linkage process has a large, positive, effect on the propensity for teachers who work in the independent sector to consent to data linkage – a subgroup of teachers who have a significantly lower rate of consent. In a wider context these results suggests that the provision of additional information shows some promise in increasing consent to data linkage among subgroups who were otherwise less likely to consent.

An Information Intervention and Consent to Data Linkage: Experimental Evidence from Teaching

Joshua Fullard*

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Abstract

Using new survey data of teachers in England we investigate the propensity for teachers to consent to data linkage, differences by observable characteristics and the effect of a randomly assigned information intervention. We find that consent rates are high (75 percent), possibly due to the relationship between participating schools and the research team, but observe differences by ethnicity, sex, and sector - teachers from a non-white background, male teachers and those who work in the independent sector are significantly less likely to consent. While we find that the provision of additional information does not increase consent to data linkage our heterogeneity analysis shows that the information treatment has a large, positive, effect on teachers who work in the independent sector – a subgroup of teachers who have a significantly lower rate of consent.

JEL classifications: C83;I29

Keywords: Survey Methods, Consent, Data Linkage, Randomised Control Trial, Teachers

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1. Introduction

Challenges around teacher retention are a serious problem facing policymakers around the world. In England, for example, more than 36,000 classroom teachers, roughly 1 in 10, leave the profession each year. As a consequence, pupil-to-teacher ratios have increased by almost 2 over the last decade (17.3 in 2010 to 19.1 in 2019).

There are several, potentially non-exclusive, reasons why teachers might leave the profession. Traditional models have emphasised the role of pecuniary factors (e.g. Manski (1987), Zabalza (1979)). However, it is not clear why teachers who leave the profession generally sort into lower or similarly paying occupations - even those with a degree in a STEM subject who we'd expect to have strong employment opportunities tend to go into similarly or lower paying jobs (Fullard 2021b, Scafidi et al., 2006).[1] Other factors may correlate with earning: many studies have emphasised the role of relative job security, fertility choices, working hours, class sizes and senior leadership quality (e.g. Loeb et al., (2005), Smithers and Robinson (2003), Stinebrickner (1998)).

It is challenging to separate these various explanations using traditional datasets as any combination of factors can conceivably be consistent with observed choices (e.g. Manski (2004)) yet the policy implications of these various reasons are distinct. Constraints related to fertility choices can be alleviated by encouraging schools to offer more flexible working. The effect of poor senior leadership could be mitigated though training and development aimed at boosting the ability of senior leaders. Long working hours or large class sizes can be reduced by hiring more support staff as well as streamlining time intensive activities such as marking.

Consequently, many researchers investigating the determinants of teacher attrition use survey data. The most common approaches is to directly ask: i) teachers who leave why they left ii) current teachers if they consider leaving the profession and, if they do, why (e.g. Lynch (2016)). While these surveys are useful for identifying different factors that can affect attrition there remains questions over the external validity of surveying former teachers due to selection – the determinants of attrition behaviour among former teachers are not necessarily the same as current teachers – as well as issues around recall bias (e.g. Hipp et al., (2020)).

[1] STEM stands for science, technology, engineering, and mathematics and refers to any degree subject that falls under these four disciplines.

While surveying current teachers is more representative, attrition intentions from survey data is often significantly higher than the actual behaviour we observe. Using data from the NFER Teacher Voice Survey Lynch (2016) reports attrition intentions of around 25 percent (vs an actual attrition rate of 10 percent). However, researchers have recently started measuring intentions using a 0-100 probability scale, instead of a binary choice, and this does appear to more similar to actual behaviour. Using a survey of 2,000 classroom teachers in England Fullard (2021a) finds attrition intentions of 12 percent (vs actual attrition rate of 10 percent).

In addition, these surveys of teachers have limited policy applications as they cannot be used to identify the relative magnitude of various factors (e.g., how much should policymakers increase salaries to compensate for an increase in class sizes to maintain existing rates of attrition).

To get around these limitations' researchers have increasingly been using experimental methods to identify teachers' preferences. These include Johnston (2020) and Burge et al., (2021) who use a discrete choice experiment to estimate teachers' preferences for their compensation structure, contract type and working conditions in Texas and England respectively. Most recently Fullard (2022) has used teachers' elicited labour market and teaching related expectations to investigate the role that inaccurate beliefs about labour market opportunities outside of teaching has on attrition intentions. While this research gives us an insight into the factors that are associated with attrition it remains unclear if these experiments can be used to predict actual behaviour.

To investigate the predictive power of these experiments' researchers are required to link the survey data from these experiments to administrative data. In England, for example, the simplest solution would be linking the survey data with the School Workforce Census (SWC) held by the Department for Education (DfE).[2] However, in many settings, including ours, data linkage can only occur if the teacher gives their informed consent to the linkage.

Experiments and surveys of teachers generally take place online, and this mode usually has a significantly lower consent rate than face-to-face respondents.[3] Furthermore, teachers tend to

[2] The School Workforce Census is a census that is completed annually by every state funded school in England in November.

[3] For example Jäckle et al., (2021b) found that web respondents were 30.8 percentage point less likely to consent that face-to-face respondents (42.0% vs 72.6). Even after controlling for selection into face-to-face interviews the difference was still 21.6 percentage points.

be suspicious of the DfE handling their personal data, therefore getting consent to linkage could be challenging in our setting.[4]

In this paper we find that consent rates are high (75 percent), possibly due to the relationship between participating schools and the research team, but observe differences by ethnicity, sex, and sector - teachers from a non-white background, male teachers and those who work in the independent sector are significantly less likely to consent.

Using a randomized information treatment, we also investigate whether the provision of additional information on data linkage increases the likelihood that teachers will consent. While we find that the provision of additional information does not increase consent to data linkage our heterogeneity analysis shows that the information treatment has a large, positive, effect on teachers who work in the independent sector – a subgroup of teachers who have a significantly lower rate of consent.

Our paper belongs to a growing literature that seeks to understand the influences of consent to data linkage and methods of maximising consent. The prior literature has generally found that the decision to consent is not fixed and can be influenced by a range of factors. These factors include the topic and mode of interview. Edwards and Biddle (2021) found that consent rates to educational and health records were substantially higher than to income or economic records, and Sakshaug et al., (2017) found a significantly higher consent rate among face-to-face interviews compared to online respondents. Existing research also shows that the wording and timing of the question influences the decision to consent. Using a sample of registered voters in Maryland Kreuter et al., (2016) found that the framing of consent questions significantly affected the likelihood of obtaining consent. Using data from the Innovation Panel of the UKHLS Sala et al., (2014) found that the placing a consent question in a relevant module of questions, rather than at the end of a survey, increases consent.

The provision of additional information is commonly used to maximise consent to data linkage, yet the effectiveness of this approach is not well established. While there is some

[4] We interviewed several teachers before we stared this project who indicated that they had reservations about allowing the DfE to handle their personal data due to high-profile instances of the DfE breaking data protection laws. For example, in 2019 the DfE broke data protection laws when it shared children's personal data with the home office and in 2020 an audit by the Information Commissioner's Office found that the DfE had failed to comply to data protection laws and listed more than 130 recommendations for change (with 32 of these recommendations being urgent and 57 high priority).

evidence that additional information can increase consent to data linkage in web surveys: using the consent module of the Australian Longitudinal Study of Women's Health Graves et al., (2019) found that the provision of additional details increased consent to linkage, empirical evidence predominately finds that additional information does not increase consent rates (e.g. Jäckle et al., (2021a)). A potential reason for this is that the additional information provided in web surveys is not specifically tailored to the individual respondent's needs - in the same way that an interviewer can reply to a respondents concerns in a face-to-face interview.[5] In this paper we investigate if the provision of additional information increases consent to data linkage in the context of teaching – a relatively homogenous group with an information intervention detailing how the DfE will handle and process the data linkage. Our paper is organised as follows, section 2 discusses our setting and the empirical strategy, section 3 presents our results and robustness checks, and section 4 discusses our results and concludes.

2. Sample

The data we use comes from a survey of teachers in Essex. Teachers from participating schools were invited to reply to an online survey administrated by the Mobile EssexLab, based at the University of Essex. The survey was fielded in early July 2020.

The online survey took about 15 minutes to complete. Participation in the survey was incentivized using monetary rewards – a £5 Amazon voucher. The online survey was designed to collect a rich set of information on teachers' including their personal and school characteristics as well as their attrition intentions measured using a percent chance format on a scale from 0 to 100%. At the start of the survey respondents were asked to consent to have their data linked to their administrative records held by the DfE. The exact wording of the consent questions can be viewed in the Appendix (A1 and A2). Half of the respondents were provided information about the data linkage process. The additional information they received can be viewed in Appendix (A3).[6]

Teachers were recruited by contacting schools, near the Mobile EssexLab, asking them to circulate the project details among their teaching staff, inviting them to participate.[7] 450

[5] There is strong evidence that, in face-to-face interviews, the interviewer-respondent relationship can have a strong effect on consent to data-linkage (e.g. Patterson et al., (2021))

[6] Respondents were immediately informed that no data linkage would take place and no data linkage did take place.

[7] 66 schools agreed to circulate the study information to their teaching staff.

teachers responded that they would be interested in taking part in the study. Of those 416 met the eligibility criteria and were invited to participate.[8] A total of 340 classroom teachers took part in the survey (a response rate of 82%). We drop 23 respondents who did not respond to the questions on attrition intentions, giving us a sample of 317.

Sample characteristics are shown in Table 1 (column 1). Along with a breakdown of the sample by sector (state funded in column 2 and independent in column 3) and a comparison to the population of teachers in the state funded sector in Essex (column 4).[9] Our respondents are a similar age to the population (21.5% vs 20% are under the age of 30 and 21% vs 19% are 50 or over) but are more likely to be white (95% vs 89%) and male (30% vs 24%). Our sample is also under representative of primary school teachers (21% vs 52%) but are similar in terms of working hours (27% vs 27% work part time) and pay (£37,700 vs £37,000 of full-time teachers).

2.1 Teacher characteristics and consent to data linkage

In our sample 75% of teachers consented to have their data linked to their administrative records held by the DfE. This is higher than most online surveys. For example Sakshaug et al., (2017) found a linkage consent rate of 54% in Germany (vs 95% face-to-face) and Thornby et al., (2018) found a consent rate of 69% in the Next Steps Age 25 Survey in the UK (vs 89% face-to-face). We suspect that the high rate of consent is driven by the relationship that the research team has with the teachers in participating schools. We will discuss this in detail in section 4.

Table 2 reports the coefficients associated to the probability that a teacher will consent to data linkage for a selection of our key background variables. These results are presented for the whole sample (column 1), by age (column 2 and 3) and by sector (column 4 and 5).

First looking at the differences by sex we observe that male teachers are generally less likely to consent to data linkage, particularly men who are under the age of 40 – 19.5pp less likely to consent than their female counterparts. While this is consistent with some studies (e.g.

[8] 29 were excluded because they were not classroom teachers (i.e. they were support staff (e.g. teaching assistants), senior leaders (e.g. principles) or administrative staff (i.e. business manager)). 5 were excluded because they had already handed in their notice.

[9] While our respondents come from a much smaller geographical regions the lowest level of publically available data on teacher characteristics, that we can compare our teachers to, is at the regional level.

Bryant et al., (2006)) the literature generally finds higher rates of consent for men (e.g. (Huang et al., 2007)) or no gender difference (e.g. (Klassen et al., 2005)).

Looking at ethnicity we observe that white teachers are 17.5pp more likely to consent than their non-white counterparts. While this is consistent with the literature that finds that ethnic minorities tend have lower rates of consent (e.g. Woolf et al., (2000)) we have to be careful with our interpretation as non-white teachers represent a small proportion of our sample.

We observe a positive relationship between teachers' age and consent, but the magnitude is small – an increase in teachers' age from the youngest in our sample (22) to the mean (40) is associated to an increase in consent by 0.5pp. This is largely consistent with the literature that finds no meaningful differences by age (e.g. Bryant et al., (2006)).

Looking at teacher's job characteristics we observe lower consent rates among those who work in primary schools (12pp) and those who work in independent schools (10pp) compared to those who work in secondary schools and state schools respectively. While it is unsurprising that there are differences among these different groups, due to selection, we are surprised that the magnitudes are similar.[10] Teachers who work part time and those who have worked as a supply teacher are marginally more likely to consent, although the differences are not statistically significant.

Looking at the teachers' educational attainment we observe slightly higher rates for those with a degree in a STEM field of study (3.2pp) and lower for those who with a degree in Education (10.7pp) compared to all other subjects. Those who attended university at a Russell Group (1994 Group) Institution are 0.3pp (10.5pp) less (more) likely to consent compared to those who attended other universities.[11,12] The high consent rate observed among teachers from the 1994 Group is driven by the fact this group includes the university where the research team is based. Specifically, 87 percent of teachers from the same university as

[10] We expected teachers from the independent sector to have the lowest consent rates due to differences in prosocial behaviour between pubic sector and state sector works (e.g. Brock et al., (2016)) but are surprised by the large difference between secondary and primary school teachers.

[11] The Russell Group is a group of 24 larger research-intensive universities in the UK. Members include the University of Birmingham, Cambridge, King's College London, Oxford and Warwick.

[12] The 1994 Group is a collection of smaller research-intensive universities founded in 1994 to defend the interests of smaller universities in response to the formation of the Russell Group. It was dissolved in 2013. There were 11 members at the time of dissolution including the University of Essex, University of East Anglia, Institute of Education University of London and the University of Leicester.

the research team consented compared to 72 percent of teachers from all other institutions. This is discussed further in section 4.

Teachers who self-reported that they are a good teacher are less likely to give consent (3.4pp) while those who report that they are in a school with a good leadership team are more likely to give consent (5pp).

Finally turning our attention to teachers' attrition intentions, we observe that teachers who are more likely to leave the profession over the next 12 months are more likely to give their consent to data linkage. This suggests that concerns over the DfE handling teachers' personal data does impact the propensity to give consent – although the magnitude is small. For example, a 1sd increase in teachers' attrition intentions is associated to a 1.6pp increase in consent to data linkage.

2.2 Balance Tests

Half of the teachers were provided additional information about the data linkage process. The assignment to treatment and control groups was randomly allocated by survey software. Table 3 shows that those who received the additional information and those who did not are balanced on most demographic, educational, school and teaching characteristics. However, teachers who received the treatment were more likely to be male (35% vs 24%), less likely to be married (47% vs 58%), more likely to have a degree in a STEM subject (17% vs 10%), have graduated from a 1994 Group university (27% vs 16%) and less likely to work part time (23% vs 31%).[13] Again, the sample is balanced on most characteristics by treatment group. We discuss this in section 3.2.

2.3 Empirical Strategy

We investigate the effect of the additional information on teachers' consent to data linkage by estimating the following OLS specification:

$$Y_{is} = \alpha T_{is} + \beta_1 X_i + \beta_2 \theta_s + \varepsilon_i \qquad (1)$$

[13] We acknowledge that some of these differences are quite large and argue that this is down to chance. To account for these differences, we control for observable characteristics in our regressions and perform a range of robustness checks.

Where Y_{is} is a dummy variable that indicates if teacher i from school s consented to data linkage or not. T_{is} is a treatment dummy equal to one if individual i from school s revived the treatment and zero otherwise. X_i and θ_s are a vector of individual and school specific characteristics. A full list of these characteristics are presented at the bottom of Table 4. Note that our standard errors are clustered at the school level.

Attrition among classroom teachers in England is high, roughly 1 in 10 leave each year, and in the previous section we observed that teachers who are considering leaving the profession are more likely to consent to data linkage. We therefore include attrition intentions, measured using a 0-100 scale, to control for this (γ_{ist}). We include school fixed effects (φ_s) to account for differences in how the schools circulated the project details inviting participants to take part.[14]

$$Y_{is} = \alpha T_{is} + \beta_1 X_i + \beta_2 \theta_s + \beta_3 \gamma_{ist} + \varphi_s + \varepsilon_i \quad (2)$$

We will also consider the interaction of $T_{is}$with dummies including the teachers' sector (independent), phase (primary), contract (part time) and sex (male teacher) to investigate how the provisional information might affect consent differently by these characteristics.

While we control for the prestige of the university the teacher attended using two 1/0 dummies in equations 1 and 2 in our individual specific controls (X_i) we might still worry that there is a significant amount of variation within these groups that is not accounted for – recall that teachers who attended the same university as the research team are significantly more likely to consent. As a robustness check we modify equation 2 by removing the two university prestige dummies from the teachers' specific characteristics (X_i') and adding university fixed effects (η_i).

$$Y_{is} = \alpha T_{is} + \beta_1 X_i' + \beta_2 \theta_s + \beta_3 \gamma_{ist} + \varphi_s + \eta_i + \varepsilon_i \quad (3)$$

[14] From the conversations we have had with head teachers we are aware that some heads encouraged participation through emails/staff meetings while others just forwarded the project details. These could affect how much the participant trusts the research team/organisation and their consent to data linkage.

3. Results

3.1 Additional Information and Consent to Data Linkage

By providing additional information about the data linkage the treatment may have increased the likelihood that teachers would consent. Table 4 reports the coefficient associated with the treatment dummy on consent.

In a univariate regression the information treatment reduces the likelihood that teachers will consent to data linkage by 3.6pp (column 1). When we control for differences in our respondents individual and school characteristics (equation 1) the effect increases marginally (3.9pp column 2). When we include and our respondents short run (column 3) and longer run (column 4) attrition intentions and school fixed effects (equation 2) the effect size increases to 6.5pp and 6.05pp respectively, but none of these estimates are statistically distinguishable from zero – we observe a p-value of 0.35 and 0.39 for column 3 and 4 respectively. When we include institution fixed effects in our most conservative specification (equation 3) the magnitude increases slightly but remains statistically indistinguishable from zero (7pp and 6.5pp in column 5 and 6 respectively).

Recall that teacher's consent rates differ by a range of observable characteristics therefore it is also plausible that the response to the information might be heterogeneous. Despite our relatively modest sample size Table 5 investigates the heterogeneity in treatment effect by interacting the treatment dummy by: sector (Independent), phrase (Primary), contract (part time) and sex (Male teacher). These results indicate that the additional information impacts consent to data linkage differently according to sector. Additional information increases the likelihood that teachers in the independent sector will consent by around 30pp, relative to their colleagues in the state sector (row a columns 1 and 2) and this is statistically significant at the 1 percent level. We also observe positive effects for primary school teachers (23pp, relative to secondary school teachers, in row a column 3 and 4) and male teachers (13pp, relative to female teachers, in row a column 7 and 8) although these are imprecisely estimated (p-value of 0.42 in column 8 for example).

Interestingly when we add institution fixed effects (equation 3) the coefficient of the interaction term increases in magnitude. Row b in table 5 shows that the results for primary school teachers and independent teachers increases to 35pp and 33pp respectively, where the latter remains statistically significant at the 10 percent level.

As these different subgroups - independent teachers and primary teachers - have lower consent rates the positive effect that we observe from these interactions suggests that additional information can increase consent to data linkage in web surveys among respondents who were otherwise less likely to consent.

3.2 Robustness Checks

3.2.1 Independent schools

Teachers in the independent sector are less likely to consent to data linkage and respond to additional information differently than their state sector colleagues. These differences could be due to selection, teachers who leave the state sector and sort into the independent sector are likely to have significant differences in intrinsic motivation (e.g., Brock et al., (2016)) which is likely to impact consent to data linkage. However, it could also be that data linkage to the SWC might be less relevant for those in the independent sector. The administrative records of the SWC only covers those who have taught in the state sector. While it is true that most teachers in independent schools have worked, and were trained, in the state sector this is not necessarily true for all teachers in independent schools.

If we restrict our analysis to those teachers who are definitely in the SWC, specifically teachers who are currently working in the state sector, Table 6 shows that our main results hold. Although the magnitude is slightly larger, which is what we would expect as teachers from the independent sector generally responded positively to the additional information. These regressions also include controls for the level of deprivation in the school, a 1/0 dummy that indicates if the proportion of students at the school eligible for free school meals is greater than the national average, and the schools Ofsted rating.[15] These variables are not included in our main regressions because this data is only available for state schools.[16]

Interacting the treatment dummy by school phase (primary), contract (part time) and sex (male) on this restricted sample Table A1 in the appendix shows that we observe positive effects for primary school teachers (12.5pp vs secondary) and male teachers (5.4pp vs

[15] Ofsted ratings are indicators of the quality of a school. The Ofsted ratings that a school can get following an inspection are as follows: Outstanding, Good, Requires Improvement and Inadequate.
[16] In these regressions we also drop two state schools teachers because the information on the data on free school meal eligibility was unavailable for their school. This has no impact on our results.

female) – although the latter disappears in our more conservative specification (equation 3, row b).

3.2.2 Matching

Recall that our treatment group is more (less) likely to have male (part-time) teachers and those from 1994 Institutions than the control group. While we control for observable characteristics our results are robust to using inverse probability weighting, propensity score matching and regression adjustment, on observable characteristics (Table 7). The effects using inverse probability weighting and regression adjustment are similar in magnitude to our OLS specification but the results using propensity score matching are larger. This seems to suggest that our results are sensitive to the underlying assumptions which isn't surprising given our modest sample size. For propensity score matching, similarity between subjects is based on estimated probabilities, for inverse probability weighting it is based on weighted means while for regression adjustment it is based on a weighted function of the covariates for each observation.

3.2.3 Connection to the research team

We argue that the high rate of consent we observe is, at least partially, driven by the relationship between the teachers and the research team. Indeed, some teachers may have had more contact with the university where the research team is based than others through a personal capacity (i.e., attending the university themselves) or through a professional capacity (i.e., the university does events with local schools) and this could affect consent to data linkage.

Contacting administrators from the universities students union, who are responsible for organising volunteering events, we obtained the names of local schools that the students union had contact with in an volunteering capacity during the 2019/20 academic years. 15 percent of our sample were in schools that were visited by students.

Consistent with our hypothesis teachers from these schools have an 8pp higher rate of consent than those who were not visited (81 percent vs 73 percent). Including a 1/0 dummy in

our regressions to control for if the school was visited by student volunteers or not has no impact on our results (not reported but available on request).[17]

4. Discussion and Concluding Remarks

In our sample 75 percent of our respondents consent to data linkage. This is significantly higher than what we expected - previous discussions with teachers suggested that many would not be keen to give the DfE permission to handle their personal data. We argue that the high rate of consent observed in our data is, at least partially, due to trust in the research team. All the schools are in close proximity to the university where the research team is based, and many of the teachers have strong links to the university through their personal connections, 13 percent of the sample completed their undergraduate studies at the university. In addition, many of these teachers have strong links to the university in their professional capacity as the university regularly does events with local schools.[18] Consistent with this argument teachers who obtained their undergraduate degree from the university are more likely to consent to data linkage and teachers from schools where students from the university volunteered are more likely to consent.

The significantly lower rates of consent to data linkage among teachers in the independent sector is consistent with this argument. A smaller proportion of teachers have studied at the same university as the research team (9 percent) and these teachers will have had significantly fewer interactions with the university in a professional capacity – as far as we are aware the university volunteering and outreach programmes are exclusively in the state funded sector. These results highlight the important role that a positive relationship with the research team has on consent to data linkage.

While these results should be treated with caution, due to the limited geographical scope of our respondents - teachers based in this small geographical area might be systematically more trusting of the DfE, for example – it does provide some evidence that consent to data linkage among teachers is unlikely to be worse than respondents consent to linkage to employment records in other web surveys (e.g. 54% in Germany to federal employment records and 48%

[17] We do not include this in our main specification due to concerns over measurement: i) other sections of the university also organise volunteering/outreach with local schools and they were unwilling to provide us with a list of the schools they are involved with ii) the list is from the 2019/20 academic year which was disrupted by the Covid-19 pandemic. It is unclear if these visits happened, and we were not given information on the schools visited previous years.

[18] These include university students volunteering for school events, members of academic staff giving talks, local students visiting the university campus, university sports teams taking part in sports days etc.

in the UK to Department for Work and Pension records (Sakshaug et al., 2017, Thornby et al., 2018)). Therefore, a research project aiming to use a survey-administrative linked dataset of teachers is likely to be worthwhile.

The results from this project suggest lower consent rates among male teachers and teachers from an ethnic minority background. As teachers with these characteristics are underrepresented in the school workforce researchers should consider over sampling these groups. We also observe differences in consent rates by both self-reported teaching ability and attrition intentions. This highlights the fact that there are likely to be systematic differences among those who do, and do not, consent to data linkage, and results using a combined dataset ought to be carefully interpreted.

While our main results show that the provision of additional information has no effect on consent to data linkage our heterogeneity analysis suggests that additional information has a large, statistically significant effect on a subgroup of teachers who are otherwise less likely to consent to linkage.

We argue that because the additional information provided to teachers is tailored to the questions that they are likely to have, it has a positive effect on those who are unsure if they want to consent. While these results do suggest that the provision of additional information might have some value in web surveys further research is needed. Specifically, we observe that the sign for our treatment effect is negative. While the effect is statistically indistinguishable from zero, it is plausible that the additional information makes teachers marginally less likely to consent, but our modest sample sizes means that we are underpowered. After all, many teachers might be unsure about what the data linkage process is and more information about the process could make them less likely to consent.

Our data does not allow us to identify if the information was used (e.g., paradata on whether the link was clicked) therefore our treatment effect represents the average effect of respondents having access to additional information. Consequently, further research is needed to distinguish between a signalling effect and the effect of receiving additional information. For example, the provision of additional information could be a positive signal about the research team but might also be a negative signal about what the research team is asking the respondent to consent to.

Researchers have increasingly been turning to experimental methods to investigate the determinants of teacher attrition. But research that links these experiments to actual behaviour is lacking. This paper takes an important first step in investigating the plausibility and potential implications of data linkage in the context of teachers. We find that teachers have a high consent rate which suggests that an administrative-survey linked dataset is worthwhile in our context. In addition, the provision of additional information shows some promise in increasing consent to data linkage among subgroups who were otherwise less likely to consent. But more work needs to be done. Investigating consent to data linkage among teachers across different geographical settings and an experiment looking at how characteristics of the research team (e.g., location/prestige) both seem especially promising.

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Table 1 Sample Descriptive Statistics

	(1)	(2)	(3)	(4)
		Sample		Population (State Funded in Essex)
	Whole	State Funded	Independent	
Age Years	39.5	40	35.6	NA
Under 25	3.5	2.5	10	5
25-29	18	18	17	15
30-39	33	32	44	33
40-49	25	25	20	28
50-59	16	18	5	16
60 or over	5	5	5	3
White	95	96	90	89
Male	30	30	30	24
Primary school	21	18	40	52
Part Time	27	27	27	27
Mean Salaries[1] (£'s)	37,700	37,500	39,000	37,000
Independent Schools	13	0	100	0
n	317	276	41	12,757

Column 1 reports the characteristics of our whole sample. Columns 2 and 3 report the characteristics of the teachers in our sample who work in the state funded and independent sector respectively. Column 4 reports the characteristics of all the teachers who work in Essex.

[1] Only using full time teachers

Table 2 OLS regression of consent to data linkage on a selection on teacher and school characteristics

	(1) Sample	(2) Age 40 or under	(3) Age Over 40	(4) Independent Sector	(5) State Funded
Male	-0.0992	-0.195**	0.109	-0.318	-0.0938
	(0.0650)	(0.0851)	(0.128)	(0.161)	(0.0735)
White	0.175*	0.206	0.127	0.0771	0.183*
	(0.0966)	(0.154)	(0.159)	(0.167)	(0.109)
Age (years)	0.000288	0.000473	-0.0101	-0.0154	0.00199
	(0.00411)	(0.0122)	(0.00736)	(0.0311)	(0.00359)
Primary Teacher	-0.124*	-0.102	-0.203	0.127	-0.148*
	(0.0708)	(0.0860)	(0.122)	(0.212)	(0.0763)
Secondary Teacher [Omitted Category]					
Independent School	-0.104**	-0.0777	-0.167*	0	0
	(0.0491)	(0.0596)	(0.0986)	(.)	(.)
State School [Omitted Category]					
Part Time	0.0549	0.0444	0.0672	0.195	0.0721
	(0.0540)	(0.0898)	(0.112)	(0.466)	(0.0608)
Supply Teacher	0.0898	0.127	0.0840	0.269	0.0241
	(0.0690)	(0.0778)	(0.0896)	(0.207)	(0.0736)
Degree Subject					
Degree STEM	0.0322	0.0105	0.0199	0.425**	-0.00234
	(0.0659)	(0.0843)	(0.103)	(0.132)	(0.0623)
Degree Education	-0.107	-0.226	0.0204	-0.537	-0.0437
	(0.112)	(0.184)	(0.116)	(0.325)	(0.117)
Other Degree subject [Omitted Category]					
University Attended					
1994 Group	0.105	0.140	0.0172	-0.237	0.0780
	(0.0644)	(0.0909)	(0.0792)	(0.446)	(0.0706)
Russell Group	-0.0287	-0.0480	-0.0390	-0.171	-0.0318
	(0.0642)	(0.0864)	(0.0938)	(0.312)	(0.0675)
Other UK Universities [Omitted Category]					
Ability Good					
Self	-0.0340	-0.0235	-0.0266	0.131	-0.0322
	(0.0601)	(0.0783)	(0.0903)	(0.329)	(0.0602)

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School Leadership	0.0470	0.0472	0.0503	-0.0800	0.0396
	(0.0312)	(0.0334)	(0.0582)	(0.0984)	(0.0318)
Probability Leave in 12 months	0.000657	0.00132	-0.000500	0.00173	0.00106
	(0.00111)	(0.00223)	(0.00136)	(0.00494)	(0.00116)
Constant	0.356	0.142	1.034**	1.029	0.393
	(0.252)	(0.500)	(0.464)	(1.479)	(0.264)
DV mean	0.74	0.70	0.79	0.63	0.75
(SD)	(0.44)	(0.46)	(0.41)	(0.48)	(0.43)
R^2	0.099	0.172	0.217	0.741	0.078
N	317	182	135	41	276

This table presents OLS regressions for teachers consent to data linkage on their individual and school characteristics. Column 1 contains our full sample, columns 2 and 3 restrict the sample by age and columns 4 and 5 restrict the sample by sector. We use robust standard errors that are reported in parentheses and the stars indicate statistical significance to our usual levels: . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The following is a list of the variables that are included in the regressions but not reported: Marital status, HH Secondary Earner, Dependent Children in HH, Teaching Experience, Degree Class, Non-UK University, Annual Pay, Actual Hours Worked, Own ability and senior. leadership ability (self-reported).

Table 3. Balance Table. The proportion of teachers in our whole sample and those who are in the Treatment and Control group by characteristics.

	Sample	Treatment	Control		Sample	Treatment	Control
Personal Characteristics				**School Characteristics**			
Age	39.47	38.65	40.33	Primary School	0.21	0.20	0.22
	(10.66)	(10.33)	(10.96)		(0.409)	(0.400)	(0.419)
Male	0.30	0.35**	0.24	Independent	0.13	0.16	0.10
	(0.457)	(0.478)	(0.431)	School	(0.336)	(0.363)	(0.304)
White	0.95	0.94	0.96				
	(0.219)	(0.242)	(0.193)	**Teaching Experience**			
Married	0.52	0.47*	0.58				
	(0.500)	(0.501)	(0.496)	0-5 years	0.32	0.32	0.32
Secondary	0.37	0.35	0.38		(0.467)	(0.467)	(0.468)
Earner	(0.483)	(0.480)	(0.488)	6-10 years	0.21	0.22	0.21
					(0.411)	(0.414)	(0.410)
Degree Subject				11-20 years	0.28	0.30	0.26
STEM	0.14	0.17*	0.10		(0.450)	(0.462)	(0.438)
	(0.346)	(0.380)	(0.304)	20+ years	0.19	0.16	0.21
Education	0.11	0.09	0.13		(0.390)	(0.369)	(0.410)
	(0.310)	(0.283)	(0.335)	Supply Teacher	0.23	0.25	0.21
					(0.420)	(0.433)	(0.405)
Degree Class				**Contract**			
1st	0.14	0.17	0.12	Part Time	0.27	0.23*	0.31
	(0.350)	(0.375)	(0.321)		(0.445)	(0.422)	(0.466)
2:1	0.50	0.49	0.50	Annual Salary	35.64	35.89	35.39
	(0.501)	(0.501)	(0.502)		(12.40)	(13.26)	(11.48)
2:2	0.24	0.21	0.28	Actual Hours	48.34	48.94	47.72
	(0.430)	(0.409)	(0.448)	worked	(12.04)	(11.57)	(12.51)
3rd/Pass	0.08	0.07	0.08				
	(0.270)	(0.263)	(0.277)	**Ability Good**			
				Self	0.75	0.76	0.74
Awarding Institution					(0.433)	(0.430)	(0.438)
1994 Group	0.22	0.27**	0.16	Leadership	0.53	0.46	0.60
	(0.413)	(0.447)	(0.368)		(0.844)	(0.873)	(0.809)
Russell Group	0.21	0.19	0.24				
	(0.409)	(0.391)	(0.427)	**Attrition Intentions**			
Non-UK institution	0.06	0.06	0.06	1 year	14.32	15.57	13.03
	(0.232)	(0.230)	(0.234)		(25.80)	(27.00)	(24.52)
				2 year	21.46	22.02	20.89
					(29.10)	(30.11)	(28.12)
				5 year	37.30	37.42	37.17
					(34.09)	(35.00)	(33.25)
N	317	161	156		317	161	156

Standard Deviations are reported in parentheses and starts indicate if the difference between the treatment and control group are statistically significance at the usual levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Treatment effect on teachers consent to data linkage (OLS)

	(1) Consent	(2) Consent	(3) Consent	(4) Consent	(5) Consent	(6) Consent
Treatment	-0.0359	-0.0390	-0.0648	-0.0605	-0.0702	-0.0655
	(0.0522)	(0.0540)	(0.0687)	(0.0699)	(0.0833)	(0.0860)
Individual Characteristics		X	X	X	X	X
School Characteristics		X	X	X	X	X
School Fixed Effects			X	X	X	X
Attrition Intentions (1 year)			X		X	
Attrition Intentions (3 years)				X		X
Institution Fixed Effects					X	X
Constant	0.756***	0.402	0.345	0.363	-0.0699	-0.0908
	(0.0347)	(0.270)	(0.345)	(0.342)	(0.517)	(0.532)
DV mean	0.74	0.74	0.74	0.74	0.74	0.74
(SD)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)
R^2	0.002	0.099	0.284	0.281	0.582	0.578
N	317	317	317	317	317	317

The Individual and School Characteristics are: Age, Sex, Ethnicity, Marital status, HH Secondary Earner, Dependent Children in HH, Primary School, Independent school, Teaching Experience, worked as a supply teacher, Degree Subject, Degree Class, 1994 Group, Russell Group, Non-UK University, Part Time Teacher, Annual Pay, Actual Hours Worked, Own ability and senior leadership ability (self-reported). Standard errors are reported in parentheses and starts indicate significance at the usual levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Treatment effect on teachers consent to data linkage by school sector (column 1-2), phase (columns 3-4), contract (columns 5-6) and sex (columns 7-8).

	(1) Independent School	(2) Independent School	(3) Early Primary	(4) Early Primary	(5) Part Time	(6) Part Time	(7) Male Teacher	(8) Male Teacher
Row a)				Equation 2				
Treatment	0.302***	0.287***	0.231	0.235	-0.0214	-0.0101	0.131	0.120
X Characteristics	(0.0717)	(0.0711)	(0.345)	(0.335)	(0.151)	(0.156)	(0.142)	(0.148)
Attrition Intentions								
1 Year	X		X		X		X	
3 Year		X		X		X		X
Row b)				Equation 3				
Treatment	0.333*	0.324*	0.349	0.352	-0.0239	-0.00398	-0.0283	-0.0330
X Characteristics	(0.181)	(0.186)	(0.320)	(0.323)	(0.252)	(0.261)	(0.192)	(0.193)
Attrition Intentions								
1 Year	X		X		X		X	
3 Year		X		X		X		X
DV mean	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
(SD)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)
N	317	317	317	317	317	317	317	317

The regressions in row a and b use the specification set out in equation 2 and 3 respectively in section 2.3 in the text. These regression all include the following controls: Age, Sex, Ethnicity, Marital status, HH Secondary Earner, Dependent Children in HH, Primary School, Independent school, Teaching Experience, worked as a supply teacher, Degree Subject, Degree Class, 1994 Group, Russell Group, Non-UK University, Part Time Teacher, Annual Pay, Actual Hours Worked, Own ability and senior. leadership ability (self-reported) and school fixed effects. Standard errors are reported in parentheses and starts indicate significance at the usual levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Treatment effect on consent to data linkage restricting our analysis to only state school teachers.

	(1) Consent	(2) Consent	(3) Consent	(4) Consent	(5) Consent	(6) Consent
Treatment	-0.0508	-0.0592	-0.0821	-0.0771	-0.0934	-0.0918
	(0.0533)	(0.0579)	(0.0731)	(0.0746)	(0.0969)	(0.1000)
Individual Characteristics		X	X	X	X	X
School Characteristics		X	X	X	X	X
School Fixed Effects			X	X	X	X
Attrition Intentions (1 year)			X		X	
Attrition Intentions (3 years)				X		X
Institution Fixed Effects					X	X
Constant	0.784***	0.428	1.005**	1.006**	0.232	0.250
	(0.0325)	(0.289)	(0.414)	(0.412)	(0.632)	(0.657)
DV mean	0.75	0.75	0.75	0.75	0.75	0.75
(SD)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)
R^2	0.004	0.095	0.271	0.267	0.601	0.602
N	274	274	274	274	274	274

The Individual and School Characteristics are: Age, Sex, Ethnicity, Marital status, HH Secondary Earner, Dependent Children in HH, Primary School, Independent school, Teaching Experience, worked as a supply teacher, Degree Subject, Degree Class, 1994 Group, Russell Group, Non-UK University, Part Time Teacher, Annual Pay, Actual Hours Worked, Own ability, senior leadership ability (self-reported), FSM and Ofsted rating. In these regressions we also drop two state schools teachers because the information on the data on free school meal eligibility was unavailable for their school. Standard errors are reported in parentheses and starts indicate significance at the usual levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

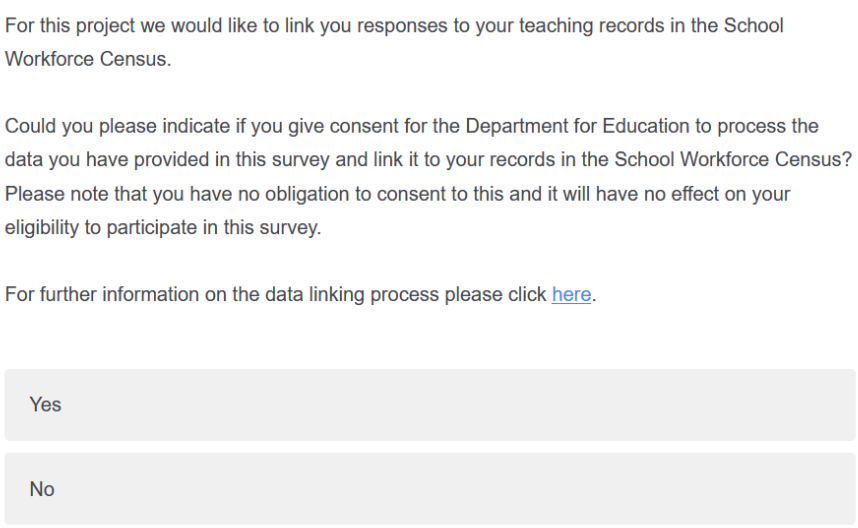
Table 7. Treatment effect on consent to data linkage.

	(1) Regression Adjustment	(2) Propensity Score Matching	(3) Inverse Probability Weighting
Treatment	-0.0388	-0.0915*	-0.0391
	(0.0485)	(0.0540)	(0.0470)
DV mean	0.74	0.74	0.74
(SD)	(0.44)	(0.44)	(0.44)
N	317	317	317

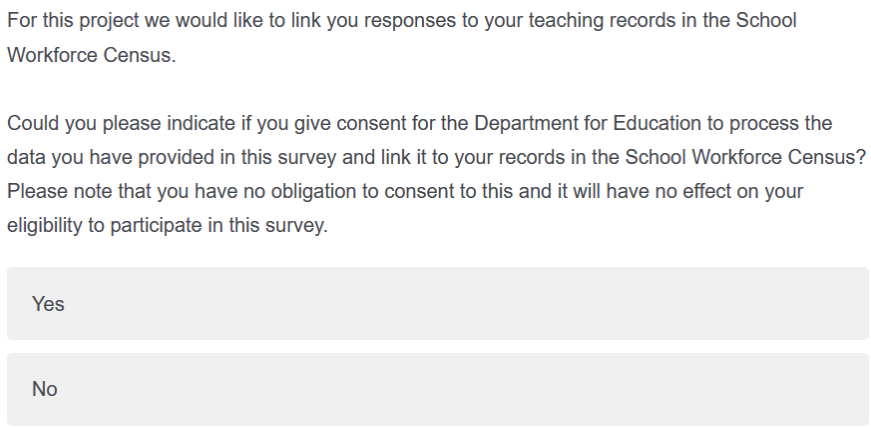
We control match on the teachers individual and school characteristics. These are: Age, Sex, Ethnicity, Marital status, HH Secondary Earner, Dependent Children in HH, Primary School, Independent school, Teaching Experience, worked as a supply teacher, Degree Subject, Degree Class, 1994 Group, Russell Group, Non-UK University, Part Time Teacher, Annual Pay, Actual Hours Worked, Own ability (self-reported), senior leadership ability (self-reported) and short run attrition intentions. Standard errors are reported in parentheses and starts indicate significance at the usual levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix

A1) Treatment Question



A2) Control Question



A3) Those in the treatment group who clicked on the additional information would receive the following additional text:

The DfE will match the survey data you provide in this survey with your records in the School Workforce Census. This data will be matched using your name, date of birth and the name of the school that you teach in. The matched dataset will then be deindividualised (all of the information that is sensitive will be removed and replace with a random identifier (e.g. your name will be removed, your date of birth will be removed, the school you teach in will be removed)). In addition, the research team will only be able to access this combined dataset in a secure setting (i.e., a safe room at the UK Data Service or the ONS's Secure Connection).

Appendix Table A1. Treatment effect on state sector teachers consent to data linkage by phase (columns 1-2), contract (columns 3-4) and sex (columns 5-6).

	(1) Early Primary	(2) Early Primary	(3) Part Time	(4) Part Time	(5) Male Teacher	(6) Male Teacher
Row a			Equation 2			
Treatment	0.114	0.125	0.0110	0.0257	0.0540	0.0378
X Characteristics	(0.322)	(0.316)	(0.173)	(0.178)	(0.135)	(0.142)
Attrition Intentions						
1 Year	X		X		X	
3 Year		X		X		X
Row b			Equation 3			
Treatment	0.291	0.297	0.0445	0.0528	-0.129	-0.129
X Characteristics	(0.241)	(0.250)	(0.263)	(0.264)	(0.187)	(0.192)
Attrition Intentions						
1 Year	X		X		X	
3 Year		X		X		X
DV mean	0.75	0.75	0.75	0.75	0.75	0.75
(SD)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)
N	274	274	274	274	274	274

The regressions in row a and b use the specification set out in equation 2 and 3 respectively in section 2.3 in the text. These regressions all include the following controls: Age, Sex, Ethnicity, Marital status, HH Secondary Earner, Dependent Children in HH, Primary School, Independent school, Teaching Experience, worked as a supply teacher, Degree Subject, Degree Class, 1994 Group, Russell Group, Non-UK University, Part Time Teacher, Annual Pay, Actual Hours Worked, Own ability and senior. leadership ability (self-reported) and school fixed effects. In these regressions we also drop two state schools teachers because the information on the data on free school meal eligibility was unavailable for their school. Standard errors are reported in parentheses and starts indicate significance at the usual levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$