Educational Review

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/cedr20

How did the COVID-19 pandemic affect the anxiety of teachers at work?

John Jerrim, Rebecca Allen & Sam Sims

To cite this article: John Jerrim, Rebecca Allen & Sam Sims (07 Feb 2024): How did the COVID-19 pandemic affect the anxiety of teachers at work?, Educational Review, DOI: 10.1080/00131911.2023.2293455

To link to this article: https://doi.org/10.1080/00131911.2023.2293455

EDUCATIONAL REVIEW
https://doi.org/10.1080/00131911.2023.2293455

Routledge
Taylor & Francis Group

How did the COVID-19 pandemic affect the anxiety of teachers at work?

John Jerrim[a], Rebecca Allen[b] and Sam Sims[c]

[a]UCL Social Research Institute, London, UK; [b]TeacherTapp, London, UK; [c]UCL CEPEO, London, UK

ABSTRACT

This paper explores teachers' anxiety about work at 75 timepoints between October 2019 and July 2022, covering the period before, during and towards the end of the COVID-19 pandemic in England. We find the work-related anxiety of headteachers increased substantially throughout the pandemic – much more so than amongst more junior staff. Female teachers experienced a greater impact than men, particularly amongst those with young children. Differences were also observed in work-related anxiety between independent and state schoolteachers, though only during the first lockdown. We illustrate how providing onsite instruction, live online lessons and working longer hours were all associated with raised levels of work-related anxiety.

ARTICLE HISTORY
Received 7 July 2023
Accepted 6 December 2023

KEYWORDS
Teachers; COVID-19; anxiety

1. Introduction

At the start of 2020, the COVID-19 pandemic sent shockwaves across the world. A deadly new virus was spreading from China to other countries, marking the beginning of one of the most remarkable periods in recent history. Almost every corner of life was affected, particularly education. Important national examinations were cancelled, schools were shut, remote learning was quickly introduced, with it not being clear how long such changes would have to last.[1] The working conditions of teachers were hence fundamentally changed overnight, with significant disruption from the pandemic lasting for the next two years.

Such events are likely to have had a major impact on educators' mental health, including their wellbeing at work. For instance, at the start of the pandemic, schoolteachers had to quickly come to terms with how to deliver effective remote instruction rather than face-to-face, with familiarity and confidence with using technology a major challenge for some teachers. They would also have to do so while potentially having their own children at home. Teachers then had to deal with the psychological challenges of returning to the classroom soon after the peak of each wave, despite

CONTACT John Jerrim J.Jerrim@ucl.ac.uk UCL Social Research Institute, 55-59 Gordon Square, Bloomsbury, London WC1H 0AL, UK @johnpeterjerrim

Supplemental data for this article can be accessed online at https://doi.org/10.1080/00131911.2023.2293455.

concerns over whether it was safe to do so (NEU, 2020). They also faced uncertainty over whether and when schools would shut again, how to implement ever-changing COVID-secure measures (testing, bubbles, face masks), coping with high levels of staff absence and the challenges of awarding pupils' grades in the absence of examinations.

This paper seeks to present new evidence on how a specific aspect of teacher wellbeing – their anxiety about work – varied throughout the COVID-19 pandemic in England. Drawing on data from more than 10,000 teachers, we investigate changes in work-related anxiety across 75 timepoints over a three-year period (October 2019 to July 2022). The frequency of our data collection also means we can link changes in work-related anxiety to important events, such as the announcement of lockdowns / school closures and subsequent reopening.

1.1. Teacher wellbeing and its correlates

The broader literature divides wellbeing into two types: hedonic and eudaimonic wellbeing. Eudaimonic wellbeing is characterised by experiences of meaning and purpose, while hedonic wellbeing relates to experiences of pleasure and enjoyment. The latter is hence often characterised by high levels of positive affect and low levels of negative affect (Jenkins et al., 2022). Anxiety – the focus of this paper – is often considered a negative emotion, hence capturing a specific component of hedonic wellbeing (Paulus & Zvolensky, 2017). Our analysis is therefore designed to measure how this specific aspect of teachers' hedonic wellbeing changed throughout the pandemic. In doing so, we note that other aspects of their wellbeing – e.g. their sense of meaning and purposes – may have varied in different ways.

A host of previous studies have considered factors associated with teachers' hedonic wellbeing, with some studies – like ours – focused on their anxiety levels. A number of papers have explored differences by demographic characteristics, with many finding female teachers to be more likely to suffer from anxiety than their male counterparts (Stengård et al., 2022), with there also being some differences across different age groups and seniority levels (Antoniou et al., 2006). Many authors have highlighted the important link between workload and teachers' hedonic wellbeing (Perryman & Calvert, 2020), with recent evidence suggesting that time spent on marking and administrative tasks may have a particularly detrimental effect (Jerrim & Sims, 2019). Other studies have considered the role played by school accountability, including school inspections (Brady & Wilson, 2021) and testing (Gonzalez et al., 2017), with many finding these to be key drivers of negative emotions expressed by teachers. What happens inside the classroom also matters of course, including how teachers teach. This includes the use of digital technology, with a recent meta-analysis concluding that "teachers present high levels of anxiety or stress due to their use of educational technology in the classroom" (Fernández-Batanero et al., 2021).

With the onset of the pandemic, many of these drivers of teachers' hedonic wellbeing changed almost overnight. It had an almost immediate impact on their workload, how and where teachers worked, as well as key aspects of school accountability systems (e.g. school inspections and national examinations). This makes the COVID-19 pandemic

a particularly interesting context to further study change in teachers' hedonic wellbeing, including their anxiety levels.

1.2. Teacher wellbeing during the COVID-19 pandemic

A relatively small number of previous studies have investigated how teacher wellbeing changed during the COVID-19 pandemic. Conducting semi-structured interviews with 21 Swiss primary school teachers, Hascher et al. (2021) found "high work-load, social distancing and feelings of lack of competence and self-efficacy were among the most aversive aspects of distance teaching." Drawing on cross-sectional data from 394 teachers in Ecuador, Hidalgo-Andrade et al. (2021) concluded that female teachers and those with caring responsibilities had higher levels of stress during the pandemic than male teachers and those without such responsibilities. Zadok-Gurman et al. (2021) undertook a mindfulness intervention study with a group of 67 teachers during the pandemic in Israel. They found their intervention enhanced teachers' wellbeing, even during the stressful events of the pandemic. From a cross-sectional survey of 151 primary teachers in the United States conducted after the first wave, Chan et al. (2021) reported most respondents were "emotionally exhausted", suffering from high levels of task stress and feelings of job ambiguity. In contrast, a survey of 92 teachers in Germany conducted at two points during the 2019/20 academic year found that "depersonalisation" and a lack of feeling of accomplishment increased during the first wave of the pandemic, but emotional exhaustion did not (Weißenfels et al., 2022). From 76 questionnaires returned by Turkish school teachers, Eşici et al. (2021) reported a mix of positive and negative effects of the pandemic, with increased anxiety described as "the most intense of the negative effects". In one of the few longitudinal studies on this issue, Nabe-Nielsen et al. (2022) investigated the mental health of teachers at three timepoints (May, June, December 2020) during the early stages of the pandemic in Denmark. They found that the prevalence of poor mental health amongst teachers increased from 27% to 84% from May to December 2020. Based upon a cross-sectional survey with 399 teachers during school closures, Gutentag and Asterhan (2022) found teachers to report feeling higher levels of burnout relative to before the pandemic, with this related to levels of high work-family conflict. Using data from 274 teachers in Malaysia, Rosli and Bakar (2021) found school staff to have moderate levels of psychological wellbeing during the pandemic, with no difference between genders.

In England, survey data from 54 teachers collected during and following the second lockdown suggested that the pandemic's effect on "organisational wellbeing" (the environment in which they work and their relationship with colleagues) and workload were amongst the most important issues (Jellis et al., 2021). Yet the same authors also concluded that, overall, "there was not a large change in any area that they felt affected their wellbeing". Investigating the impact of the first six weeks of the first lockdown on teachers, Kim and Asbury (2020) found that – after an initial period of uncertainty, they settled into the situation and were able to find a way forward. Similarly, in qualitative interviews with 24 teachers during the pandemic, Kim et al. (2021) identified six key themes impacting teachers in England – uncertainty, practical concerns, worry for pupils, importance of relationships, teacher identity, and reflections. Finally, using longitudinal data from interviews with 24 teachers conducted at three

time points during 2020, Kim et al. (2022) concluded that the mental health and wellbeing of teachers had declined during the pandemic, particularly amongst primary school leaders.

1.3. The present study

Despite these interesting insights, there remain some important gaps in the existing evidence base. Much previous work in this area has been qualitative, with the few quantitative studies typically involving a small sample of teachers. Relatedly, there is little in the way of longitudinal research examining how teachers' wellbeing changed as the pandemic progressed, including in response to key events (such as lockdowns being announced). Likewise, no existing longitudinal study compares how the wellbeing of teachers changed during the pandemic in comparison to pre-pandemic levels. It has also not been possible for previous studies to robustly explore differences between key subgroups (e.g. differences between classroom teachers and headteachers) due to the limited sample sizes available.

The paper specifically attempts to address five research questions. First, the existing literature overviewed above is inconclusive regarding how the pandemic impacted teacher wellbeing, with some studies reporting sizeable negative effects, while the evidence in others is more mixed. A strength of the data we have collected is that the sample of teachers is large and has been collected at many more timepoints than previous work. Such frequency of data collection is important given how rapidly things were changing over this period. We thus begin by asking:

> Research Question 1. How did the work-related anxiety of teachers vary throughout the COVID-19 pandemic? How does this compare to teachers' pre-COVID anxiety levels?

Due to limited sample sizes, previous quantitative work in this area has largely treated "teachers" as a single, homogeneous group. Yet there is obviously substantial heterogeneity in teachers' roles, with some groups experiencing more challenges during the pandemic than others. It seems likely that school leaders were particularly affected, given they had overall responsibility for keeping pace with and delivering rapidly changing government policy (e.g. school closures, examination cancellations) while also having a duty of care to their staff. Our second research question explores this issue:

> Research Question 2. How did the work-related anxiety of headteachers change throughout the pandemic, and in comparison to pre-COVID anxiety levels? How does this compare to more junior staff?

Even before COVID, female teachers reported higher levels of anxiety than their male counterparts (Stengård et al., 2022). But how did this change during the pandemic? For instance, with children being kept home from nursery and school, did this lead to extra work-related pressures amongst parents (e.g. due to having to juggle work and childcare responsibilities) and to what extent was the brunt of this felt by females? Our third question covers this topic by asking:

> Research Question 3. Did work-related anxiety increase more for male or female teachers during the pandemic? How was this linked to their childcare responsibilities?

In the early stages of the pandemic, there may have been different expectations at different types of school. For instance, in independent schools where tuition fees are paid, parents may have expected live online lessons to be delivered by teaching staff, which may not have been the case at state schools. Similarly, schools with more socio-economically advantaged intakes may have more demanding parents, which could lead them to put more pressure of teaching staff to deliver live material. Research question 4 considers such issues by asking:

> Research Question 4. Was there a particularly large increase in work-related anxiety amongst teachers working at certain types of school?

Finally, how much anxiety teachers felt about work during the pandemic is likely to be related to their working conditions. If they were expected to be on-site giving in-person lessons to the children of key workers – and hence exposed to the virus at work – they may have felt more anxious when infection levels were high (particularly during the first wave, when the pathology of COVID was poorly understood). On the other hand, schools – and managerial staff within schools – likely had different expectations surrounding the quantity and type of online content provided by staff which, given other pressures, might also have impacted teachers' anxiety levels. Our final question therefore asks:

> Research Question 5. How was work-related anxiety during the pandemic linked to working onsite or at home and provision of different instructional activities?

2. Data and methodology

2.1. Data

The data we use were collected via the Teacher Tapp survey app (https://Teacher Tapp.co.uk/).[2] Each day at 1530, teachers in England who have downloaded this app receive a notification asking them to answer three short questions. Typically, around 5,000-8,000 teachers respond. As many of the same individuals respond each day, it provides longitudinal information about teachers over time (each teacher in the panel has a unique anonymous teacher ID, making it possible to follow their responses over time). Although the sample is self-selecting – and should hence be considered a convenience rather than probabilistic sample – the demographic characteristics of respondents is broadly in line with the population of teachers in England (see Teacher Tapp, 2018 and Teacher Tapp, 2020 for further details). Survey weights are also provided to further enhance the representativeness of the data. Descriptive characteristics of our analytic sample are presented in Table 1. This illustrates how respondents include both primary and secondary school teachers, teachers of different levels of seniority and across different school types.

Prior to the COVID-19 pandemic, we commissioned Teacher Tapp to ask teachers about their work-related anxiety at multiple points during the 2019/20 academic year. Our intention was to explore how teachers' work-related anxiety varied within and across different school terms (including school holidays). Ethical approval for the project was obtained from the lead author's university ethics committee. After the COVID-19 pandemic reached England, a decision was made to extend the data

Table 1. Descriptive information about the analytic sample.

	Number of anxiety questions answered		
	>= 1	>= 10	>= 60
Gender			
Male	24%	23%	24%
Female	75%	76%	76%
Youngest child at home			
None	39%	40%	40%
Under 5	12%	12%	11%
Primary age	15%	16%	17%
Secondary age	6%	6%	7%
Over 16	10%	12%	14%
Missing	18%	15%	12%
Job Role			
Class Teacher	46%	46%	42%
Middle Leader	37%	40%	45%
SLT	10%	10%	10%
Head	4%	3%	3%
Age group			
Age in 20s	27%	24%	18%
Age in 30s	32%	33%	34%
Age in 40s	25%	27%	29%
Age in 50s	14%	16%	19%
Region			
East of England	12%	13%	15%
London	16%	15%	14%
Midlands	16%	17%	17%
North West	12%	12%	13%
South East	17%	17%	20%
South West	9%	9%	9%
Yorkshire and North East	14%	15%	13%
Outside England	1%	1%	0%
Ofsted rating			
Outstanding	16%	17%	19%
Good	46%	48%	57%
Requires Improvement or Inadequate	12%	12%	14%
Phase			
Primary	49%	48%	43%
Secondary	39%	41%	48%
Fee paying	5%	6%	6%
FSM quartile			
Q1 (Least deprived)	15%	17%	22%
Q2	17%	18%	22%
Q3	17%	17%	22%
Q4 (Most deprived)	17%	17%	18%
Sector			
Independent	9%	9%	6%
State	89%	89%	93%
Observations	**26,394**	**13,199**	**1,972**

Notes: Figures do not always sum to 100% due to missing data on the variable in question. Sample weights applied. Our main analytic sample is based on teachers who responded to at least 10 of the work-related anxiety questions. Appendix C presents some robustness tests where the sample is restricted to teachers that responded to the question on at least 60 time points. SLT = senior leadership team and FSM = free school meals.

collection. The Teacher Tapp panel were hence asked the following question about their work-related anxiety once per week, on 75 selected Tuesday afternoons between October 2019 and July 2022:

> "On a scale where 0 is 'not at all anxious' and 10 is 'completely anxious', overall, how anxious did you feel about work today?"

This question is based on the general anxiety question developed by the UK Office for National Statistics (ONS), which is widely used in high-profile national surveys[3] to measure wellbeing across the population (ONS, 2015). It has hence been subject to extensive validation and is now in widespread use (Benson et al., 2019). A minor adaption we have made is to add "about work" to the question, given our particular interest in teachers' wellbeing in the workplace. To avoid possible day-of-week effects, teachers always responded to this question on a Tuesday afternoon.[4] Appendix A provides the full list of dates when this question was asked, along with the distribution of responses. The mean anxiety score across all timepoints on this 0–10 anxiety scale is 3.7 with a standard deviation of 2.8.

A total of 26,394 teachers answered our work-related anxiety question at least once over our study period. However, as we are most interested in changes in responses over time, we restrict our main analytic sample to the 13,199 teachers who responded to the question on at least 10 out of the 75 occasions.[5] Of course, even after making this restriction, different teachers (and a different number of teachers) respond at different timepoints, due to either choosing to not answer the question, dropping out of the Teacher Tapp panel or leaving the teaching profession completely. Hence, to test the robustness of our key results, alternative estimates are provided in Appendix C where the sample is restricted to only those teachers who responded to the work-related anxiety question on at least 60 occasions (80% of the total). This leads to little change in the substantive conclusions drawn.

A range of other information is available about the Teacher Tapp sample. This includes key background information (e.g. age, gender, children at home, job role) and the school in which they work (e.g. percent of disadvantaged pupils, state/independent sector, Ofsted inspection rating). Moreover, at a smaller number of specific points during the pandemic, teachers have been asked other questions about their work environment. For instance, teachers were asked about the learning activities they had done that day, number of hours worked and how often during the pandemic they were onsite (at school). Given the rapidly evolving nature of the pandemic, these questions were developed by the study authors in collaboration with Teacher Tapp but could not be piloted or validated before being asked to the panel. The topics asked about were largely based upon anecdotal evidence of how schools were responding to the immediate challenges of the pandemic. Further details about these questions – including the dates they were asked – can be found in Appendix A. Responses to these questions are used to provide further background context about teachers' working lives during the pandemic, and how the different instructional activities they were undertaking were linked to their anxiety levels.

2.2. Methodology

To provide a simple descriptive overview we begin by plotting average anxiety scores over our three-year study period, highlighting how this relates to key points during the pandemic in England. This is first done for the sample as a whole, and then for particular subgroups (e.g. headteachers, male versus female teachers). Appendix E presents alternative figures corresponding to the percent of teachers with "high" anxiety levels (scores of seven and above on the 0–10 scale) at each timepoint.[6]

These graphs are supplemented by a set of OLS regression models exploring between group differences in average anxiety scores during four key stages of the pandemic:

- Stage 1 (mid-March – August 2020). When the virus first came to England and the first lockdown was in place.
- Stage 2 (September 2020 – August 2021). Schools fully reopened in September 2020. A second four-week lockdown occurred in November 2020, though schools remained open. A third national lockdown – including school closures – occurred between January and March 2021, after which schools and society began to reopen.
- Stage 3 (September 2021 – February 2022). Schools returned after the summer holidays, with widespread vaccination now complete. The Omicron wave led to disruption between December 2021 and February 2020; schools remained open though many were impacted by staff and student absences.
- Stage 4 (February – July 2022). Society had largely returned to normality following the Omicron wave.

Appendix B provides further details covering key points in England's COVID-19 pandemic, focusing on factors that would have impacted schools. For each of these four stages, we calculate average work-related anxiety scores for each teacher.[7] This provides a measure of their average level of work-related anxiety during each stage of the pandemic. These are then used as the outcome in our regression models exploring between-group differences. Specifically, our models investigating differences in work-related anxiety levels between teachers with different characteristics are of the form:

$$Anx = \alpha + \beta.G + \gamma.J + \delta.C + \tau.A + \tau.S + \theta.Pre + \varepsilon \quad (1)$$

where:

Anx = Average anxiety score during the stage of the pandemic under investigation.

G = A binary variable capturing teacher gender (reference group = male).

J = A set of dummy variables capturing job role (reference = classroom teacher).

C = A set of dummy variables capturing the age of the youngest child at home (reference = No children).

A = A set of dummy variables capturing the teacher age group.

S = A vector of school characteristics, including primary/secondary phase, Ofsted rating and state/independent sector.

Pre = Average anxiety score before the pandemic (October 2019 – early March 2020). Includes both a linear and quadratic term.

ε = Random error term.

Separate models are estimated for each of the four stages of the pandemic listed above. Note that these models control for the pre-pandemic anxiety levels of teachers. Estimates will hence capture whether there was a bigger difference in anxiety levels between groups than during the pre-pandemic period. For instance, the β parameter will reveal whether female teachers were more anxious about work than their male counterparts, over and above the "usual" gender difference in anxiety levels observed prior to the pandemic. A similar interpretation holds for the γ, δ and τ parameters with respect to differences in work-related anxiety between teachers in different job roles, with different family circumstances and of different ages. Sample weights are applied

when estimating these models, with standard errors adjusted to account for potential heteroskedasticity.

Analogous models are estimated to explore differences in work-related anxiety amongst teachers working in different types of school. These models hold all the characteristics of teachers included in equation 1 constant, with school-level covariates included for school phase, Ofsted inspection rating and percent of pupils eligible for FSM. A separate model is estimated with respect to state versus independent school differences, with primary/secondary phase the only other school control.[8]

Turning to our last research question – exploring the link between activities at work during the pandemic and anxiety levels – we estimate a series of OLS regression models:

$$Anx_t = \alpha + \beta.Work\_cond_t + \gamma.T + \tau.S + \theta.Pre + \varepsilon \quad (2)$$

where:

Anx_t = The work-related anxiety score of the teacher at time t.

$Work\_cond_t$ = The working activity being considered at time t (e.g. whether working at home or onsite at school at time t).

T = A vector of teacher characteristics including their age, job role, gender and the age of their youngest child at home.

S = A vector of school characteristics, including primary/secondary phase and state/independent sector.

Pre = Average anxiety score before the pandemic (October 2019 – early March 2020). Includes both a linear and quadratic term.

ε = Random error term.

Separate models are estimated for each timepoint. The parameter of interest from the model presented in equation (2) is β. This captures the association between the instructional activity in question (e.g. whether the teacher was working at home or onsite) and their work-related anxiety level. The controls for teacher, school and pre-pandemic anxiety levels attempt to control for potential confounding stemming from certain types of teachers (e.g. those with higher anxiety levels prior to the pandemic) being more or less likely to experience a certain working condition (e.g. working on site) during the pandemic.

3. Results

Research Question 1. How did the work-related anxiety of teachers vary throughout the COVID-19 pandemic?

Figure 1 presents average work-related anxiety scores of teachers throughout the pandemic. The dashed vertical lines illustrate the two periods where schools across the country were shut to most pupils (other than to the children of key workers) and remote learning was taking place. A numeric key has been added to selected peaks/troughs, with details on how this corresponds to important events provided in the figure notes. Appendix B provides further details as to how important milestones during the pandemic in England match with the survey dates.

In the pre-COVID period, the average work-related anxiety score amongst the Teacher Tapp panel was quite stable, fluctuating between 3 and 4 out of ten. The only notable dip was during the February 2020 half-term break (point 1 in the graph). A similar pattern is

Figure 1. Trends in teachers' work-related anxiety throughout the COVID-19 Pandemic in England. Full sample.

Notes: 1 = February half-term 2020. 2 = Week prior to lockdown. 3 = Easter holiday. 4 = Reopening date of schools announced. 5 = Half-term. 6 = Primary schools partially reopen. 7 = Summer holidays. 8 = Schools fully open for in-person teaching. 9 = Third national lockdown announced. 10-14 = School holidays. Dashed vertical lines represent where online instruction was occurring nationwide. Figures refer to average work-related anxiety scores on the 0 (not at all anxious) to 10 (extremely anxious) scale. Sample includes all teachers who responded to the work-related anxiety question at least 10 times over the period.

replicated throughout this period; unsurprisingly, teachers feel much less anxious about work during school holidays.

The biggest spike in teachers' work-related anxiety throughout the pandemic occurred on 17/03/2020 (point 2). This was the day after the then Prime Minister (Boris Johnson) issued work from home guidance and advised against non-essential travel. Yet, despite COVID spreading rapidly, no announcement was made at this point about schools. (This did not occur until the day after the survey question was asked – 18/03/2020 – when it was announced schools would close from 20/03/20). It is hence likely the large spike at this point was due to teachers' concerns about the spread of the virus in the workplace.

However, after this large spike, teachers' work-related anxiety was slightly lower than "normal" (the pre-pandemic period) for the remainder of the 2019/20 academic year. There were again notable dips during school holidays (points 3, 5 and 7) along with a small peak when plans to reopen schools were announced (point 4). But, otherwise, the work-related anxiety of teachers between March and August 2020 – including the period when remote instruction was taking place – was slightly lower than usual.

This situation changed, however, at the start of the 2020/21 academic year (point 8). This coincides with when schools fully reopened, at the time leading to concerns this would help the virus spread, and with no vaccine yet available. Work-related anxiety levels during September-December 2020 (~4.5 out of 10) were thus notably higher than during the comparable pre-pandemic quarter in 2019 (~3.75 out of 10).

The final major spike in work-related anxiety amongst teachers occurred at the start of January 2021 (survey date 05/01/2021). Throughout the December 2020 Christmas holidays, the UK government insisted schools would continue to be open in the new year.

Many pupils and teachers had started to return to classrooms the preceding day (04/01/2021) only for the government to perform a dramatic U-turn. A third nationwide lockdown was announced, schools would be returning to online instruction until at least mid-February and national examinations were once again cancelled. This spike (point 9) therefore likely reflects the immediate work-related challenges that such sudden announcements from government bring.

However, from this point onwards, the work-related anxiety of teachers remained broadly stable. There were the usual troughs during school holidays (points 10–14) but, otherwise, average work-related anxiety scores remained around the same level (just above four out of ten) through to the end of July 2022. This suggests that, following the final national lockdown and widespread vaccination, work-related anxiety of teachers largely returned to "normal" (pre-pandemic) levels – including during the disruption caused by the Omicron wave (December 2021–February 2022).

> Research Question 2. How did the work-related anxiety of headteachers change throughout the pandemic and in comparison, to pre-COVID anxiety levels? Does this differ compared to more junior staff?

Figure 2 turns to differences between classroom teachers (solid grey line) and headteachers (dashed black line).

Before the pandemic, the work-related anxiety of headteachers was only slightly above that of classroom teachers; prior to March 2020, the dashed black line in Figure 2 is only slightly above the solid grey. Yet, when the pandemic hit England (first vertical red dashed line) the situation changed dramatically. Whereas class teachers were generally feeling slightly less anxious about work in the second and third quarter of 2020 than during

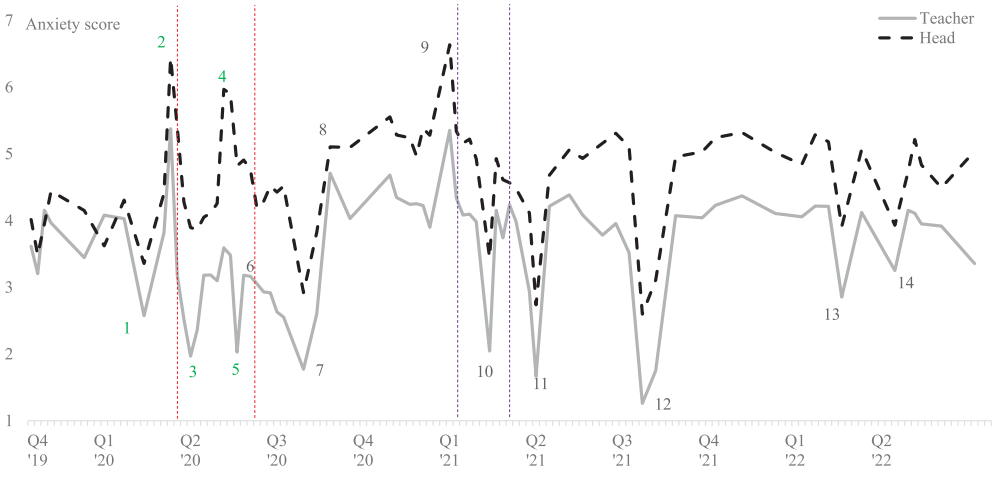

Figure 2. A comparison of work-related anxiety for regular classroom teachers compared to headteachers throughout the COVID-19 pandemic.

Notes: 1 = February half-term 2020. 2 = Week prior to lockdown. 3 = Easter holiday. 4 = Reopening date of schools announced. 5 = Half-term. 6 = Primary schools partially reopen. 7 = Summer holidays. 8 = Schools fully open for in-person teaching. 9 = Third national lockdown announced. 11-14 = School holidays. Dashed vertical lines represent where online instruction was occurring nationwide. Figures refer to average work-related anxiety scores on the 0 (not at all anxious) to 10 (extremely anxious) scale. Sample includes all teachers who responded to the work-related anxiety question at least 10 times over the period.

the pre-pandemic period, school leaders were feeling more anxious – particularly at certain time points (e.g. when plans to reopen schools were announced in May 2020 – corresponding to point 4 in the Figure 2). This likely reflects the managerial responsibilities of senior staff, having to swiftly implement a raft of changes to comply with COVID protocols, coping with uncertainty in government policy and managing the well-being of staff.

The difference in work-related anxiety levels between teachers and headteachers continued throughout the 2020/21 academic year; particularly during the first half when there was great uncertainty surrounding whether schools would remain open and the need to implement COVID bubbles and testing regimes. The difference in their work-related anxiety during this period reached around one full point on the 0–10 scale (an average of ∼4 for teachers versus ∼5 for headteachers). Indeed, at its peak in January 2021, two-thirds of headteachers in England felt highly anxious about work (compared to 42% of class teachers). Yet what is perhaps even more notable is that this difference in anxiety levels between headteachers and classroom staff continued after widespread vaccination and into the 2021/22 academic year. Specifically, while the anxiety of classroom teachers by this point had returned to "normal" pre-pandemic levels, it remained elevated for school leaders. This includes during the return of schools in September 2021 following the summer holidays, and the subsequent Omicron wave between December 2021 and February 2022. It is likely this difference was driven by, on the one hand, school leaders attempting to return to "business as usual", while on the other having to deal with the lasting fallout of the pandemic (e.g. managing increased behavioural issues and learning loss), along with continued high absence levels (amongst both students and staff). Moreover, although the gap between headteachers and classroom

Table 2. The association between teacher characteristics and work-related anxiety during the pandemic.

	Mar–Aug20		Sep20–Aug21		Sep21–Feb22		Feb22–Jul22	
	Diff	SE	Diff	SE	Diff	SE	Diff	SE
Job role (ref = Class teacher)								
Middle leader	0.12	0.07	0.12	0.08	0.24*	0.12	0.26*	0.13
SLT	0.48*	0.07	0.14	0.09	0.27*	0.13	0.24	0.14
Headteacher	1.44*	0.11	0.93*	0.14	1.02*	0.18	0.70*	0.21
Gender (ref = Male)								
Female	0.29*	0.06	0.38*	0.08	0.31*	0.11	0.00	0.11
Children (ref = None)								
Under 5	0.27*	0.08	0.12	0.10	−0.02	0.14	−0.13	0.15
In primary school	0.26*	0.09	0.25*	0.11	0.19	0.16	0.09	0.15
In secondary school	−0.29	0.15	−0.11	0.18	0.03	0.24	−0.25	0.23
Over 16	0.09	0.14	0.07	0.17	−0.09	0.22	−0.13	0.22
Age group (ref: 20s)								
30s	0.24*	0.09	0.11	0.11	0.24	0.17	0.15	0.18
40s	0.41*	0.10	0.20	0.13	0.25	0.19	0.45*	0.19
50+	0.38*	0.15	0.20	0.18	0.15	0.24	0.13	0.25
N	**4737**		**3937**		**2384**		**2054**	

Notes: Figures in the "Diff" column refer to the difference in average anxiety scores on the 0–10 scale in comparison to the reference group (conditional on the other covariates included in the model). "SE" refers to the standard errors. The pandemic has been split into four periods (e.g. March – August 2020) with the outcome measure taken as the average anxiety score during the period. Estimates based upon an OLS regression model controlling for school phase, Ofsted rating, private / state school and pre-pandemic anxiety levels. Sample includes all teachers who responded to the work-related anxiety question on at least 10 occasions. * indicates statistically significant difference from the reference group at the five percent level.

staff narrowed following the Omicron wave (point 13 in Figure 2 onwards) a difference in their work-related anxiety – which was not there prior to the pandemic – remained. One potential explanation for this finding is that headteachers may feel under pressure to navigate and maintain a "new normal" that emerged during the pandemic.

The top panel of Table 2 formalises these results by presenting estimates from our regression models. These compare average work-related anxiety scores during four stages of the pandemic across teachers, middle leaders, senior leadership team members and headteachers. As these models control for differences in pre-pandemic anxiety levels (along with other background characteristics) the estimates illustrate whether differences between these groups are bigger than "usual".

Table 2 confirms that average anxiety levels of headteachers were much higher than for class teachers throughout the pandemic, over and above pre-pandemic anxiety levels. This difference was greatest following the first lockdown (a difference of ~1.4 points on the 0–10 anxiety scale) but remained at ~0.7 points even following the Omicron wave in the latter part of the 2021/22 academic year. Interestingly, the gap between headteachers and other senior leadership team members is also large and statistically significant, indicating that the pandemic has taken the greatest toll on the most senior of staff. Indeed, differences in work-related anxiety between class teachers, middle leaders and the senior leadership team (excluding the headteacher) were quite modest during the pandemic, particularly outside the first lockdown. Similar findings are obtained when we restrict the sample to only those teachers who responded to the work-related anxiety questions on at least 60 occasions (see Appendix Table C1).

Table 3. Average (mean) working hours of classroom teachers and headteachers in England during the COVID-19 pandemic.

	Question date	Classroom Teacher	Headteacher	Difference
2019/20	21/04/2020	25	42	17
	19/05/2020	27	51	25
	23/06/2020	30	49	19
2020/21	22/09/2020	46	57	11
	20/10/2020	43	56	13
	24/11/2020	46	57	11
	08/12/2020	45	56	10
	05/01/2021	42	58	17
	26/01/2021	43	53	11
	23/02/2021	41	53	12
	09/03/2021	44	55	10
	23/03/2021	45	55	10
	20/04/2021	46	54	9
	25/05/2021	45	56	10
	22/06/2021	44	56	12
2021/22	21/09/2021	46	55	9
	02/11/2021	46	56	10
	07/12/2021	45	55	10
	25/01/2022	45	55	10
	01/03/2022	46	55	9
	29/03/2022	45	56	11
	26/04/2022	44	55	10

Notes: Figures refer to the mean working hours reported by classroom teachers and headteachers in England. The difference refers to the figures for headteacher minus the figures for classroom teachers. See Appendix Table C4 for an alternative version of this table including all staff category groups.

Table 3 provides some further insight into this issue by documenting differences in average working hours between headteachers and classroom teachers. During the first lockdown, headteachers were working around 20 h more than classroom teachers per week. However, this was being driven by classroom teachers tending to work fewer hours than usual, rather than headteachers working more. For instance, between April and June 2020, class teachers were working an average of around 25–30 h per week, compared to around 47 h during a "normal" academic year.[9] It is therefore perhaps unsurprising that the work-related anxiety dropped amongst this group during the first lockdown, given that their average working week was on average 15–20 h shorter than usual. However, from September 2020 onwards, the working hours of class teachers returned to their pre-COVID levels (around 45 h per week). Headteachers were continuing to work around 10 h more per week than class teachers, but this difference is close – according to TALIS 2018 data – to pre-pandemic norms. The longer working hours of headteachers relative to class teachers during the 2020/21 and 2021/22 academic years hence cannot explain why they had such elevated levels of work-related anxiety over such a prolonged period of time.

Research Question 3. Did work-related anxiety increase more for male or female teachers during the pandemic? How was this related to childcare responsibilities?

Figure 3 begins by presenting average work-related anxiety scores for male (solid grey line) and female (dashed black line) teachers.

Even before the pandemic, women had higher levels of work-related anxiety than men (equivalent to around 0.5 points on the 0–10 scale). Yet Figure 3 also illustrates how the gender "anxiety gap" grew further during the pandemic. It is most noticeable throughout

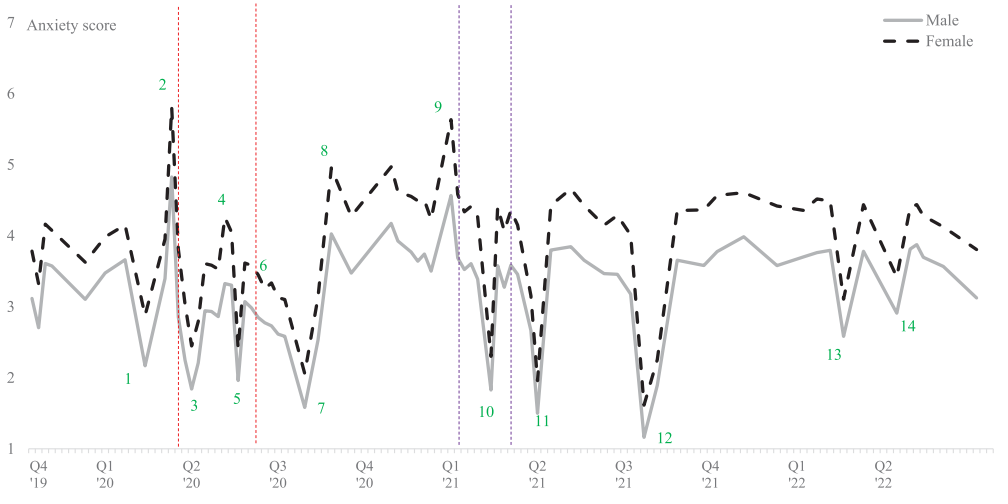

Figure 3. A comparison of work-related anxiety by gender throughout the COVID-19 pandemic.

Notes: 1 = February half-term 2020. 2 = Week prior to lockdown. 3 = Easter holiday. 4 = Reopening date of schools announced. 5 = Half-term. 6 = Primary schools partially reopen. 7 = Summer holidays. 8 = Schools fully open for in-person teaching. 9 = Third national lockdown announced. 11-14 = School holidays. Dashed vertical lines represent where online instruction was occurring nationwide. Figures refer to average work-related anxiety scores on the 0 (not at all anxious) to 10 (extremely anxious) scale. Sample includes all teachers who responded to the work-related anxiety question at least 10 times over the period.

the 2020/21 academic year (between points 8 and 11 in Figure 3) and during the first half of the 2021/22 academic year, until the end of the Omicron wave (i.e. between points 12 and 13). However, post-Omicron (i.e. after point 13) the size of the gender gap in work-related anxiety largely returned to pre-pandemic levels.

These descriptive patterns are formalised in the second panel of Table 2. During the first three stages of the pandemic – between March 2020 and February 2022 – the work-related anxiety of female teachers was ~0.3-0.4 points higher than for male teachers on the 0–10 anxiety scale. These figures are conditional on teacher and school characteristics, as well as average pre-COVID anxiety levels. In other words, the gender gap in work-related anxiety was around 0.3-0.4 points above "normal" (pre-COVID) throughout this two-year period. Post February 2022, however, the gender gap in teacher anxiety returned to pre-COVID levels.

How might this increased gender gap in work-related anxiety be linked to childcare responsibilities? Before answering this question, Figure 4 documents the trend in average work-related anxiety scores by age of youngest child at home (no children, under 5, primary-age child) without separating the results by gender. Somewhat surprisingly, differences between these groups are relatively muted. Outside of the first lockdown (dashed red lines) there is little clear difference between the "no children" and "under 5" groups throughout the period. Moreover, although the average anxiety levels of those with primary age children tend to be higher than the other two groups during the pandemic (which was not the case beforehand), the difference – outside the first lockdown – was relatively small.

However, in Table 4 we illustrate how anxiety levels varied when looking at the combination of gender and age of youngest child at home. All estimates refer to differences

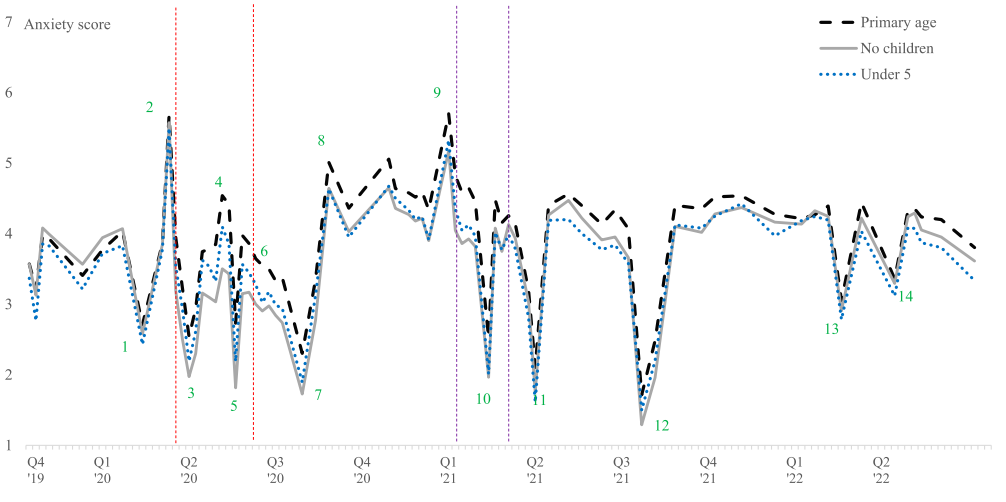

Figure 4. A comparison of work-related anxiety by age of youngest children at home throughout the COVID-19 pandemic.

Notes: 1 = February half-term 2020. 2 = Week prior to lockdown. 3 = Easter holiday. 4 = Reopening date of schools announced. 5 = Half-term. 6 = Primary schools partially reopen. 7 = Summer holidays. 8 = Schools fully open for in-person teaching. 9 = Third national lockdown announced. 11-14 = School holidays. Dashed vertical lines represent where online instruction was occurring nationwide. Figures refer to average work-related anxiety scores on the 0 (not at all anxious) to 10 (extremely anxious) scale. Sample includes all teachers who responded to the work-related anxiety question at least 10 times over the period.

Table 4. The association between teacher gender, age of youngest child at home and work-related anxiety during the pandemic.

	Mar–Aug20		Sep20–Aug21		Sep21–Feb22		Feb22–Jul22	
	Diff	SE	Diff	SE	Diff	SE	Diff	SE
Ref = Male, no children								
Female no children	0.23*	0.09	0.28*	0.11	0.07	0.15	−0.23	0.17
Male with under 5	0.06	0.11	−0.06	0.15	−0.47*	0.20	−0.45	0.23
Female with under 5	0.63*	0.12	0.50*	0.15	0.29	0.21	−0.19	0.23
Male with primary age child	0.33*	0.15	0.14	0.20	−0.09	0.27	−0.21	0.25
Female with primary age child	0.46*	0.12	0.55*	0.15	0.34	0.20	−0.06	0.21
Male with secondary age child	−0.33	0.20	−0.29	0.36	−0.06	0.53	−0.51	0.43
Female with secondary age child	−0.06	0.18	0.20	0.21	0.14	0.28	−0.41	0.29
Male with child over 16	0.07	0.26	0.05	0.30	−0.29	0.40	−0.53	0.41
Female with child over 16	0.33*	0.16	0.36	0.20	0.03	0.25	−0.27	0.27
N	**4,737**		**3,937**		**2,384**		**2,054**	

Notes: Figures in the "Diff" column refer to the difference in average anxiety scores on the 0–10 scale in comparison to the reference group (male teacher with no children) conditional on the other factors controlled for in the model. "SE" refers to the standard errors. The pandemic has been split into four periods (e.g. March – August 2020) with the outcome measure taken as the average anxiety score during the period. Estimates based upon an OLS regression model controlling for age, job role, school phase, Ofsted rating, private / state school and pre-pandemic anxiety levels. Sample includes all teachers who responded to the work-related anxiety question on at least 10 occasions. * indicates statistically significant difference from the reference group at the five percent level.

in average work-related anxiety scores, adjusting for teacher/school characteristics and pre-COVID anxiety levels, compared to men with no children as the reference group. This is complemented by Appendix D which visually illustrates the trends over time.

The first notable point is that, during March–August 2020 and September–August 2021, men with children under age 5 were no more anxious about work than men without children. Moreover, between September 2021 and February 2022 (encompassing the Omicron wave) their anxiety levels were around 0.5 points *lower* than in comparison to this reference group. The situation is rather different for female teachers with pre-school children. During the first wave (March–August 2020) they were more anxious about work than men with no children and men with an under 5 (difference of around 0.6 points). A similar difference is observed for the 2020/21 academic year and, to some extent, during the first half of 2021/22.[10] Table 4 thus provides evidence – supported by Appendix D – that, amongst teachers with pre-school children, it was mainly women who became more anxious about work.

The second key feature of Table 4 concerns those with primary age children. During the first stage of the pandemic (March–August 2020) both male and female teachers in this group felt the impact, with average anxiety levels increasing amongst both in comparison to the male-no children reference group (over and above pre-pandemic norms). This situation changed however come the 2020/21 academic year, when only female (and not male) teachers with primary age children had significantly elevated work-related anxiety scores. This, along with the descriptive results presented in Appendix D, points towards a pattern where – amongst teachers with primary age children – work-related anxiety increased by more amongst females (at least at some key time points).

Research Question 4. Was there a particularly large increase in work-related anxiety amongst teachers working at certain types of school? Did this relationship change during the pandemic?

Table 5. The association between school characteristics and work-related anxiety during the pandemic.

	Mar–Aug20		Sep20–Aug21		Sep21–Feb22		Feb22–Jul22	
	Diff	SE	Diff	SE	Diff	SE	Diff	SE
Phase (Ref: Primary)								
Secondary	0.02	0.06	0.20*	0.07	0.03	0.11	−0.15	0.11
Ofsted rating (Ref: Good)								
Outstanding	0.04	0.07	−0.06	0.10	0.16	0.14	0.18	0.13
RI / Inadequate	−0.12	0.08	−0.02	0.10	−0.01	0.14	−0.18	0.17
FSM quartile (Ref: Low % FSM)								
Q2	−0.06	0.08	−0.03	0.10	0.09	0.14	−0.06	0.14
Q3	−0.15	0.08	−0.19	0.10	−0.04	0.15	0.04	0.15
Q4 (high % FSM – most deprived)	−0.07	0.09	0.01	0.11	0.00	0.16	−0.10	0.16
Funding (Ref: Independent school)								
State school	−0.64*	0.08	−0.13	0.11	0.01	0.14	0.18	0.16
N	**4,453**		**3,714**		**2,247**		**1,941**	

Notes: Figures in the "Diff" column refer to the difference in average anxiety scores on the 0–10 scale in comparison to the reference group, conditional on the other factors controlled for in the model. "SE" refers to the standard errors. The pandemic has been split into four periods (e.g. March – August 2020) with the outcome measure taken as the average anxiety score during the period. Estimates based upon an OLS regression model controlling for gender, job role, number of children, age and pre-pandemic anxiety levels. Sample includes all teachers who responded to the work-related anxiety question on at least 10 occasions. * indicates statistically significant difference from the reference group at the five percent level.

Table 5 presents the association between a range of school characteristics and teachers' work-related anxiety, controlling for teacher demographics and pre-COVID anxiety levels. Most differences are small and/or do not reach statistical significance at conventional thresholds. This holds true at most timepoints for the difference between primary and secondary schools[11], schools with different inspection ratings and those with different socio-economic intakes. The one exception is the difference between independent and state schools during the first lockdown. Between March and August 2020, the average work-related anxiety score of state schoolteachers was around 0.6 points below that of teachers working in independent schools (having accounted for pre-COVID differences). Appendix D further demonstrates how (a) state schoolteachers had higher levels of work-related anxiety than independent schoolteachers before the pandemic; (b) this situation reversed during the first lockdown and (c) after which, the anxiety levels of these two groups remained similar for the rest of the pandemic.

Table 6 provides a potential explanation for this result, illustrating differences in the learning activities independent and state schoolteachers were doing during the first (top panel) and second (bottom panel) set of school closures. Those working in independent schools were early adopters of live online lessons; most (~60%) were providing this during the first lockdown compared to only a few (~5%) working in state schools. Independent schoolteachers were also much more likely than their state school counterparts to be spending the first lockdown creating remote learning resources for pupils and interacting with them via video calls. They were also working around ten hours more per week (see Appendix Table C5 for further details). These longer working hours of independent schoolteachers – and their more rapid response to alternative ways of work – are thus likely related to why they felt more anxious about work than their state school counterparts during England's first lockdown.

Interestingly, the gap in instructional activities and working hours between state and independent school staff narrowed during the second period of school closures in

Table 6. Difference between state and independent schoolteachers in activities with or for pupils during the COVID-19 pandemic in England.

		Live online lessons		Created learning resources		Video call with pupil	
	Survey date	Private	State	Private	State	Private	State
2019/20	23/03/2020	23%	4%	73%	50%	23%	4%
	30/03/2020	16%	3%	49%	54%	16%	8%
	22/04/2020	62%	6%	76%	43%	35%	14%
	05/05/2020	69%	6%	76%	44%	38%	15%
	30/06/2020	55%	13%	50%	38%	24%	13%
	08/07/2020	21%	14%	13%	33%	10%	12%
	09/07/2020	13%	11%	11%	34%	10%	13%
	14/07/2020	3%	10%	8%	27%	3%	10%
2020/21	07/01/2021	65%	43%	64%	61%	49%	34%
	12/01/2021	84%	58%	26%	37%	42%	26%
	19/01/2021	85%	62%	27%	39%	40%	27%
	01/03/2021	87%	64%	21%	36%	31%	19%

Notes: Figures refer to the percent of teachers who undertook the activity on the date. Sample size is approximately 500 independent/private school teachers and 6,000 state schoolteachers at each survey date.

England in early 2021 (see Table 6). Although those working in independent schools were still more likely to be holding live lessons and video calls with pupils, those in state schools were now more likely to be developing distance learning resources (with average working hours now also similar – see Appendix Table C5). This is consistent with the fact that work-related anxiety levels remained similar amongst these two groups for the rest of the pandemic (i.e. after the first lockdown).

Research Question 5. How was work-related anxiety during the pandemic linked to working onsite and provision of different remote instructional activities?

Table 7 presents estimates of the association between working onsite (at school) at various points during the pandemic and teachers' work-related anxiety. Figures refer to the difference in average anxiety scores for teachers working on site zero or one day

Table 7. Difference in work-related anxiety between teachers who were working at home versus working on site.

Academic year	Date	Difference in mean anxiety scores	SE	N
2019/20	24/03/2020	1.11*	0.14	4470
	31/03/2020	0.47*	0.16	4562
	28/04/2020	0.04	0.14	4663
	02/06/2020	0.58*	0.14	4335
	09/06/2020	0.45*	0.11	4259
	16/06/2020	0.39*	0.10	4237
	23/06/2020	0.19	0.10	4166
	30/06/2020	0.12	0.11	4063
	07/07/2020	0.19	0.11	3978
	14/07/2020	0.35*	0.10	3912
2020/21	26/01/2021	0.01	0.12	2857
	02/02/2021	0.07	0.13	2896

Note: "Working from home" refers to those teachers who reported working on site zero or one day per week at the respective survey date. Working "on site" refers to those teachers who reported being on site at least two days per week during the respective survey week. Estimates based upon OLS regression models controlling for teacher job role, gender, age group of youngest child, teacher age, primary/secondary teacher, whether work in independent or state school and average pre-COVID work-related anxiety scores. SE refers to the standard error. * indicates statistically significant at the five percent level.

that week (reference group) versus two days or more, conditional on the other factors included in the model.

During the first wave of the pandemic, working on site at school (to teach the children of key workers, for instance) was associated with an increase in teachers' work-related anxiety. The difference was particularly large on 24th March 2020 – standing at more than one point on the 0–10 scale – soon after the first lockdown was announced, and schools were shut to most pupils. Yet a difference of around 0.2–0.6 anxiety points occurred until at least mid-June 2020, after which schools began to gradually start re-opening. In contrast, there was essentially no association between working onsite and anxiety at the two time points where we have data available during the second period when schools were shutdown (26/01/2021 and 02/02/2021). We thus conclude that, overall, working onsite during the pandemic was associated with an increase in work-related anxiety amongst teachers, but only during the initial wave.

Table 8 turns to how the work-related anxiety of teachers was related to three instructional activities they could have undertaken during the pandemic (delivering online lessons, creating learning resources and holding video calls with pupils). Estimates refer to differences in mean anxiety scores associated with the teacher performing that activity during the week in question. The upper/lower panel of Table 8 refers to survey dates during the first/second period of school closure.

All three activities were linked to higher anxiety scores amongst teachers when schools were first shut. For instance, those teachers who delivered live online lessons between March and July 2020 had average work-related anxiety scores around half a point higher than those who did not.[12] A similar finding holds for teachers who created new learning resources during the first wave, with their work-related anxiety scores around 0.3 points higher.[13] Although estimates for holding video calls with pupils are more mixed, they again point towards an association with higher anxiety levels. This is complemented by additional analysis presented in Appendix Table C7, illustrating how each 10 h increase in working hours during the pandemic was linked to around a 0.3 point increase

Table 8. Difference in work-related anxiety between teachers undertaking different learning activities with pupils during the pandemic.

		Online lessons		Create learning resources		Phone / video call pupils		N
		Difference	SE	Difference	SE	Difference	SE	
2019/20	23/03/2020	0.65*	0.23	0.03	0.12	0.34	0.25	4412
	30/03/2020	0.83*	0.20	0.34*	0.10	0.57*	0.17	4523
	22/04/2020	0.75*	0.20	0.31*	0.09	0.18	0.14	4746
	05/05/2020	0.47*	0.17	0.32*	0.09	0.50*	0.12	4896
	30/06/2020	0.52*	0.12	0.24*	0.09	0.30*	0.14	4353
	08/07/2020	0.37*	0.14	0.50*	0.10	−0.06	0.16	3796
	14/07/2020	0.43*	0.15	0.39*	0.10	0.59*	0.16	4159
2020/21	12/01/2021	0.16	0.14	0.36*	0.13	0.01	0.14	3241
	19/01/2021	0.20	0.14	0.25*	0.12	0.18	0.13	3190
	01/03/2021	0.10	0.14	0.00	0.12	0.04	0.14	2869

Notes: "Difference" column refers the difference in average work-related anxiety scores associated with a teacher doing that activity during the week of the survey date. SE refers to the standard error. Estimates based upon OLS regression models controlling for teacher job role, gender, age group of youngest child, teacher age, primary/secondary teacher, whether work in independent or state school and average pre-COVID work-related anxiety scores. See Appendix Table C6 where these three variables are included in the same model. * indicates statistical significance at the five percent level.

in work-related anxiety scores. It hence seems that teachers whose working patterns changed quickly in response to the pandemic saw the greatest immediate increase in their anxiety levels.

It is again interesting that the associations observed in the lower panel – corresponding to the second period when schools were shut down – are much weaker. The estimates for delivering online lessons and holding video calls with pupils are small and not statistically significant at conventional thresholds. On the other hand, an association between creating learning resources and increased anxiety levels is still apparent during this period (around a 0.3 difference in average scores) but only soon after school closures were announced (i.e. during January 2021). Thus, consistent with the findings presented in Table 7, a link between changing working conditions and teachers' work-related anxiety was only clearly present during the initial COVID wave.

4. Conclusions

The COVID-19 pandemic led to very sudden changes to the working conditions of teachers. Many had to quickly transition to remote instruction during the initial lockdown, potentially at the same time as having to care for their own children at home. Such disruption continued on-and-off for the next two years, with educators having to deal with a combination of exam cancellations, COVID testing, COVID "bubbles", ever changing government policy and dealing with pupils' learning loss. Such challenges are likely to have impacted some teachers' mental health, including their wellbeing at work.

A relatively small number of previous studies have investigated this issue. Most have been limited by their small-scale, cross-sectional nature, with few longitudinal investigations exploring changes in the wellbeing of teachers at different time points, including in comparison to before the pandemic started. This paper thus contributes to the existing literature by using large scale longitudinal data tracking how the work-related anxiety of teachers varied before, during and towards the conclusion of the COVID-19 pandemic in England. In doing so, we present a uniquely detailed insight into the link between the pandemic and the wellbeing of teachers in the workplace.

Our findings suggest that, after an initial sharp peak just before schools were first shut down, teachers' work-related anxiety was (on average) slightly lower during the first wave of the pandemic than before. This may be related to the fact that teachers were working, on average, around 10 h less than usual per week. However, the work-related anxiety of teachers then rose above pre-COVID levels throughout the 2020/21 academic year, with headteachers and female teachers – most notably those with young children – amongst the most affected. We also find evidence that the work-related anxiety of teachers during the first wave of the pandemic was associated with whether they were delivering direct instruction on-site or at home, if they were providing live lessons and the total number of hours worked.

These findings have helped to push forward our understanding of teacher and school leader wellbeing, particularly during a time of crisis. They illustrate how much of the burden when a school is facing a challenging period is carried by headteachers and senior leaders. Indeed, our findings may illustrate how headteachers are generally quite good at protecting more junior colleagues from workplace stresses and strains when times are tough. At the same time, our findings also highlight the unequal burdens

placed upon different groups, highlighting how some – such as those with caring responsibilities – may require further support.

For governments, our results demonstrate how schools need policymakers to have a clear plan that can be stuck to when such difficult circumstances occur. The to-and-fro schools in England experienced during the pandemic was clearly very difficult for senior staff. Stronger, more decisive leadership from government and associated policymakers is needed in the future. Now, governments need to have a plan to ensure headteachers do not leave the profession; many have been through a prolonged period of strain, with their anxiety levels raised over a sustained period of time. It is likely that many now feel burnt out and are considering leaving the education sector for pastures new. To retain the best school leaders, the government must ensure they are not put under such extremely difficult circumstances in future, and that they are given the opportunity to properly recharge after the upheaval of the last few years. It is thus important that steps are taken to ensure their working conditions and wellbeing returns to more "normal" (pre-pandemic) levels.

For schools, a key issue to emerge from the pandemic is their preparedness to utilise digital technology. Ideally, this would be carefully thought through and planned – something that was not possible for many schools during the pandemic. However, moving forward, a strong case can be made for digital technology to become a routine part of instructional practise used in schools. Not only would this ensure pupils, parents and teachers are better prepared in the future for times when schools must close, but would also build upon many of the initial foundations that had to be quickly built during the pandemic.

Such recommendations should be considered given the limitations of our study. First, the Teacher Tapp panel is a self-selecting sample rather than a random draw from the teacher population. This is true of most studies into the COVID-19 pandemic, given the obvious challenges with conducting fieldwork during such a difficult period. Second, there is some attrition from our sample, with not all teachers responding to the work-related anxiety question at each time point. Appendix C does illustrate, however, that our key findings remain largely intact when restricting the sample to those who responded on the vast majority ($\geq$ 80%) of occasions the work-related anxiety question was asked. Third, our analysis has focused specifically on the work-related anxiety of teachers. Although anxiety is correlated with other aspects of mental health (e.g. depression, stress, happiness), these may have been impacted by the pandemic in subtly different ways. Fourth, our data refers to the situation in England. Although other countries experienced similar disruption to their education system – and enacted similar policy responses (e.g. school closures, remote instruction) – some specific issues may have impacted the work-related anxiety of teachers in England more than elsewhere (e.g. the timing and frequency of government U-turns). Finally, as we use observational data, it is prudent to treat our estimates as conditional associations, rather than necessarily capturing cause and effect.

Notes

1. Appendix B provides a timeline of key events during the COVID-19 pandemic in England. Broadly speaking, schools in England were shut from mid-March until the end of the academic year (July) in 2020. Schools were then shut again between January and March 2021. Appendix B also includes the dates it was announced that England's end of primary school

(Key Stage 2 Statutory Assessment Tests) and end of secondary school (General Certificate of Secondary Education - GCSEs) assessments would not take place in 2020 or 2021. These are national examinations sat by all state school pupils, and are widely used for school accountability.
2. Teacher Tapp is a survey app that has been designed to survey a panel of teachers in England over time. It is a commercial enterprise, owned by Education Intelligence Limited. Researchers can commission Teacher Tapp to ask its panel questions, as has been done in this study.
3. A list of surveys that use this question can be found at https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/surveysusingthe4officefornationalstatisticspersonalwellbeingquestions
4. When testing this question for day-of-week effects, we found that work-related anxiety of teachers peaked Monday afternoon and then gradually fell through to Saturday afternoon, before rising again.
5. Estimates from our regression models are based on fewer observations – between 2,000 and 4,000 teachers – as these require pre-COVID anxiety scores to also be available. Hence our regression models tend to use long-standing members of the Teacher Tapp cohort.
6. This follows the cut-off used by the ONS (ONS, 2021).
7. This is also done for the pre-pandemic period in our data, spanning October 2019 to February/early March 2020.
8. This is due to the other school characteristics (e.g. FSM quartiles) not being available for independent schools.
9. Authors' calculations using the TALIS 2018 data for England.
10. Between September 2021 and February 2022, females with an under 5 had average anxiety scores almost 0.9 points higher than male teachers with an under 5, conditional on the factors controlled in the model.
11. One exception is that, between September 2020 and August 2021, average anxiety scores of secondary teachers were around 0.2 points above those of primary teachers.
12. This is consistent with the findings presented under research question 4, where teachers working in independent schools were found to be much more likely to deliver online lessons, but who also saw more elevation in their anxiety scores.
13. Appendix Table C6 illustrates how such differences remain intact even when both these variables are included in the model simultaneously.

Acknowledgements

The Nuffield Foundation is an independent charitable trust with a mission to advance social wellbeing. It funds research that informs social policy, primarily in Education, Welfare, and Justice. It also funds student programmes that provide opportunities for young people to develop skills in quantitative and scientific methods. The Nuffield Foundation is the founder and co-funder of the Nuffield Council on Bioethics and the Ada Lovelace Institute. The Foundation has funded this project, but the views expressed are those of the authors and not necessarily the Foundation. Visit www.nuffieldfoundation.org. We are grateful for their support. Helpful comments have been received on the draft from our project advisory group, whom we would like to thank for their input and support.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Nuffield Foundation: [Grant Number EDO/43626].

References

Antoniou, A. -S., Polychroni, F., & Vlachakis, A. -N. (2006). Gender and age differences in occupational stress and professional burnout between primary and high-school teachers in Greece. *Journal of Managerial Psychology, 21*(7), 682–690. https://doi.org/10.1108/02683940610690213

Benson, T., Sladen, J., Liles, A., & Potts, H. (2019). Personal wellbeing score (PWS)—A short version of ONS4: Development and validation in social prescribing. *BMJ Open Quality*, *8*(2), e000394. https://doi.org/10.1136/bmjoq-2018-000394

Brady, J., & Wilson, E. (2021). Teacher wellbeing in England: Teacher responses to school-level initiatives. *Cambridge Journal of Education*, *51*(1), 45–63. https://doi.org/10.1080/0305764X.2020.1775789

Chan, M.; Sharkey, J.; Lawrie, S.; Arch, D. and Nylund-Gibson, K. 2021. Elementary school teacher well-being and supportive measures amid COVID-19: An exploratory study. *School Psychology 36*(6): 533–545. https://doi.org/10.1037/spq0000441

Eşici, H., Ayaz, A., Yetim, D., Yastı, SÇ, & Bedir, N. (2021). Teachers in COVID-19 period: Psychological effects, practices and career needs. *Turkish Journal of Education*, *10*(2), 157–177. https://doi.org/10.19128/turje.855185

Fernández-Batanero, J. M., Román-Graván, P., Reyes-Rebollo, M. M., & Montenegro-Rueda, M. (2021). Impact of educational technology on teacher stress and anxiety: A literature review. *International Journal of Environmental Research and Public Health*, *18*(2), 548. https://doi.org/10.3390/ijerph18020548

Gonzalez, A., Peters, M. L., Orange, A., & Grigsby, B. (2017). The influence of high-stakes testing on teacher self-efficacy and job-related stress. *Cambridge Journal of Education*, *47*(4), 513–531. https://doi.org/10.1080/0305764X.2016.1214237

Gutentag, T. and Asterhan, C. 2022 Burned-out: Middle school teachers after one year of online remote teaching during COVID-19. *Frontiers in Psychology*. 13:802520. https://doi.org/10.3389/fpsyg.2022.802520

Hascher, T., Beltman, S., & Mansfield, C. (2021). Swiss primary teachers' professional well-being during school closure due to the COVID-19 pandemic. *Frontiers in Psychology*, *12*, 687512. https://doi.org/10.3389/fpsyg.2021.687512

Hidalgo-Andrade, P., Hermosa-Bosano, C., & Paz, C. (2021). Teachers' mental health and self-reported coping strategies during the COVID-19 pandemic in Ecuador: A mixed-methods study. *Psychology Research and Behavior Management*, *14*, 933–944. https://doi.org/10.2147/PRBM.S314844

Jellis, C., Williamson, J., & Suto, I. (2021). How well do we understand wellbeing? Teachers' experiences in an extraordinary educational era. *Research Matters*, *32*, 45–66.

Jenkins, M., Lee, C., Houge Mackenzie, S., Hargreaves, E. A., Hodge, K., & Calverley, J. (2022). Nature-based physical activity and hedonic and eudaimonic wellbeing: The mediating roles of motivational quality and nature relatedness. *Frontiers in Psychology*, *13*, 783840. https://doi.org/10.3389/fpsyg.2022.783840

Jerrim, J., & Sims, S. (2019). *The Teaching and Learning International Survey (TALIS) 2018*. London: Department for Education.

Kim, L., & Asbury, K. (2020). 'Like a rug had been pulled from under you': The impact of COVID-19 on teachers in England during the first six weeks of the UK lockdown. *British Journal of Educational Psychology*, *90*(4), 1062–1083. https://doi.org/10.1111/bjep.12381

Kim, L., Leary, R., & Asbury, K. (2021). Teachers' narratives during COVID-19 partial school reopenings: An exploratory study. *Educational Research*, *63*(2), 244–260. https://doi.org/10.1080/00131881.2021.1918014

Kim, L., Oxley, L., & Asbury, K. (2022). "My brain feels like a browser with 100 tabs open": A longitudinal study of teachers' mental health and well-being during the COVID-19 pandemic. *British Journal of Educational Psychology*, *92*(1), 299–318. https://doi.org/10.1111/bjep.12450

Nabe-Nielsen, K., Christensen, K., Fuglsang, N., Larsen, I., & Nilsson, C. (2022). The effect of COVID-19 on schoolteachers' emotional reactions and mental health: Longitudinal results from the CLASS study. *International Archives of Occupational and Environmental Health*, *95*(4), 855–865. https://doi.org/10.1007/s00420-021-01806-8

NEU. (2020). Education unions' statement on the safe reopening of schools. Accessed 14/08/2022 from https://neu.org.uk/press-releases/education-unions-statement-safe-reopening-schools.

ONS. (2015). Harmonised concepts and questions for social Data sources. Interim harmonised principle. Personal well-being. Accessed 05/08/2022 from https://gss.civilservice.gov.uk/wp-content/uploads/2016/03/S14-INTERIM-PRINCIPLE-Personal-Well-being-V1.1-June-16.pdf.

ONS. (2019). Summary of results from testing of experimental Subjective Well-being questions - December 2012. Accessed 15/08/2022 from https://webarchive.nationalarchives.gov.uk/ukgwa/20160105160709/http://www.ons.gov.uk/ons/guide-method/user-guidance/well-being/about-the-programme/advisory-groups/well-being-technical-advisory-group/testing-of-experimental-subjective-well-being-questions—3-december-2012.pdf.

ONS. (2021). Personal well-being in the UK: April 2020 to March 2021. Accessed 05/08/2022 from https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/bulletins/measuringnationalwellbeing/april2020tomarch2021.

Paulus, D. J., & Zvolensky, M. J. (2017). Negative affectivity. In V. Zeigler-Hill & T. Shackelford (Eds.), Encyclopedia of personality and individual differences. Springer, Cham. https://doi.org/10.1007/978-3-319-28099-8_1255-1

Perryman, J., & Calvert, G. (2020). What motivates people to teach, and why do they leave? Accountability, performativity, and teacher retention. *British Journal of Educational Studies*, *68* (1), 3–23. https://doi.org/10.1080/00071005.2019.1589417

Redondo-Flórez, L., Tornero-Aguilera, J. F., Ramos-Campo, D. J., & Clemente-Suárez, V. J. (2020). Gender differences in stress- and burnout-related factors of university professors. *BioMed Research International*, 1. https://doi.org/10.1155/2020/6687358

Rosli, A., & Bakar, A. (2021). The mental health state and psychological well-being of school teachers during COVID-19 pandemic in Malaysia. *Bisma The Journal of Counseling*, *5*(3), 182–195. https://doi.org/10.23887/bisma.v5i3.42015

Stengård, J., Mellner, C., Toivanen, S., & Nyberg, A. (2022). Gender differences in the work and home spheres for teachers, and longitudinal associations with depressive symptoms in a Swedish cohort. *Sex Roles*, *86*(3-4), 159–178. https://doi.org/10.1007/s11199-021-01261-2

Teacher Tapp. (2018). How we 'weight' the Teacher Tapp sample. Accessed 15/08/2022 from https://TeacherTapp.co.uk/some-tappers-are-worth-more-than-others-how-we-weight-the-teacher-tapp-sample/.

Teacher Tapp. (2020). Who is on Teacher Tapp? (And why?!). Accessed 15/08/2022 from https://TeacherTapp.co.uk/not-like-others-teacher-tapp-who-sample-representative-reweights/.

Weißenfels, M., Klopp, E., & Perels, F. (2022). Changes in teacher burnout and self-efficacy during the COVID-19 pandemic: Interrelations and eLearning variables related to change. *Frontiers in Education*, *6*, 736992. https://doi.org/10.3389/feduc.2021.736992

Zadok-Gurman, T., Jakobovich, R., Dvash, E., Zafrani, K., Rolnik, B., Ganz, A. B., & Lev-Ari, S. (2021). Effect of inquiry-based stress reduction (IBSR) intervention on well-being, resilience and burnout of teachers during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, *18*(7), 3689. doi:10.3390/ijerph18073689