

Original research

Mental health among UK university staff and postgraduate students in the early stages of the COVID-19 pandemic

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ABSTRACT

Objectives To characterise the baseline King's College London Coronavirus Health and Experiences of Colleagues at King's cohort and describe patterns of probable depression and anxiety among staff and postgraduate research students at a large UK university in April/May 2020.

Methods An online survey was sent to current staff and postgraduate research students via email in April 2020 (n=2590). Primary outcomes were probable depression and anxiety, measured with the Patient Health Questionnaire-9 and Generalised Anxiety Disorder-7, respectively. Secondary outcomes were alcohol use and perceived change in mental health. Outcomes were described using summary statistics and multivariable Poisson regression was used to explore associations with six groups of predictors: demographics and prior mental health, living arrangements, caring roles, healthcare, occupational factors and COVID-19 infection. All analyses were weighted to account for differences between the sample and target population in terms of age, gender, and ethnicity.

Results Around 20% of staff members and 30% of postgraduate research students met thresholds for probable depression or anxiety on the questionnaires. This doubled to around 40% among younger respondents aged <25. Other factors associated with probable depression and anxiety included female gender, belonging to an ethnic minority group, caregiving responsibilities and shielding or isolating. Around 20% of participants were found to reach cut-off for hazardous drinking on Alcohol Use Disorders Identification Test, while 30% were drinking more than before the pandemic.

Conclusions Our study shows worrying levels of symptoms of depression, anxiety and alcohol use disorder in an occupational sample from a large UK university in the months following the outbreak of the COVID-19 pandemic.

INTRODUCTION

The COVID-19 pandemic has brought about profound changes to staff and students at UK universities. Social distancing measures, campus closures and a shift to remote teaching and research have reshaped established working practices.¹ These changes may incur substantial psychological

Key messages

What is already known about this subject?

► Studies in the general population and among healthcare workers have shown increased levels of mental distress since the onset of the pandemic. Fewer studies have examined mental health among non-healthcare occupational cohorts.

What are the new findings?

► During the first period of national lockdown in the UK, we found high prevalence of probable depression and anxiety among participants measured via self-report questionnaires, particularly among young people. Other factors associated with probable depression and anxiety were female gender, caregiving responsibilities and shielding/isolating.

How might this impact on policy or clinical practice in the foreseeable future?

► Policymakers and employers need to be aware of the widespread mental distress during the pandemic, that in some cases correspond to a mental disorder. Mitigation will be particularly important for younger people and other disadvantaged groups, where monitoring will be essential to ensure that long-term consequences can be prevented or promptly addressed.

burdens.^{2,3} If increases in workplace demands are paired with a loss of resources, adverse psychological consequences such as burnout and common mental disorder may follow.⁴

There is growing evidence of the harmful effects of the pandemic on mental health.⁵⁻⁷ These accrue both from immediate impact of the infection and associated containment measures—such as increased anxiety, social isolation and loneliness—as well as wider financial and labour market repercussions including the loss of paid work and economic uncertainty. It is, therefore, important for employers and policymakers to understand the impact of the pandemic on employees and to target support at staff most needing support.^{8,9} To date, however, there have been few studies of mental

health in occupational cohorts and most have been restricted to healthcare settings.^{10 11}

Many studies of mental health during the pandemic have relied on online surveys with non-probability and convenience samples.¹² While enabling rapid data collection, these samples introduce issues of non-representativeness. Risk factors for mental disorders, such as lower socioeconomic position and genetic risk of schizophrenia, have been shown to reduce participation in online surveys.^{13–16} Without detailed information about characteristics of the target population—or better yet, a sampling frame and use of probability samples—findings from web-based ‘opt-in’ samples on mental health should be treated with caution.¹⁷

The King’s College London Coronavirus Health and Experiences of Colleagues at King’s (KCL CHECK) study is a research project established in April 2020 to understand the impact of the COVID-19 pandemic among staff and postgraduate research (PGR) students at King’s College London.¹⁸ The survey was conducted online with invitations sent via email. The survey drew on detailed administrative information about the target population (around 9800 staff members and 2500 PGR students) to describe and account for the representativeness of respondents versus the target population.

This paper aimed to (1) characterise the KCL CHECK baseline cohort, (2) describe the pattern of mental health outcomes, and (3) explore associations of probable depression and anxiety with COVID-19 and lockdown-related stressors. Our analysis considered factors previously associated with poor mental health, such as age, gender and ethnicity as well as factors introduced or amplified by the pandemic and lockdown.¹⁹

METHODS

King’s College London

King’s is a large university in the UK with around 30 000 students.²⁰ The university has campuses in central and south-east London and is partnered with three major trauma hospitals. Like other universities in the UK, on 23 March 2020, King’s closed its campuses to all but essential workers.

The KCL CHECK baseline survey (see online supplemental material) was an online survey of staff and PGR students at King’s who were invited to participate via email to their university email address. Reminders to participate were advertised via circulars and internal media. Between 15 April and 10 May 2020, 2590 participants (2106 staff; 484 PGR students) completed an online questionnaire covering demographic and occupational circumstances; work and home risk factors for COVID-19 and psychiatric outcomes.¹⁸ Participants were asked if they were either (1) a member of staff, (2) a PGR student or (3) both staff member and PGR student. This latter group ($\approx 4\%$) was categorised as staff.

Information on the demographic composition of staff and PGR student populations was obtained from centrally held administrative records. Aggregate information on age group, gender and ethnicity were used to describe the representativeness of the survey compared with the target population and construct weights, as detailed below.

A CHERRIES checklist (checklist for reporting results of internet e-surveys)²¹ is provided in online supplemental material.

Measures

Outcomes

The primary outcomes were reports of symptoms associated with depression and anxiety. Standard measures were used with cut-offs that are usually associated with clinically relevant

symptoms of major depressive episode and generalised anxiety disorder. ‘Probable depression’ was defined as a score of 10 or greater on the Patient Health Questionnaire (PHQ)-9.²² ‘Probable anxiety’ was defined as a score of 10 or greater on the Generalised Anxiety Disorder (GAD)-7.²³ Where participants partially completed measures, up to two items were person-mean imputed for PHQ-9 and one for GAD-7.²⁴

We considered four secondary outcomes:

1. Perceived change in depression was assessed by asking participants, immediately following items measuring PHQ-9 depression, ‘How different are these feelings to how you felt before the pandemic?’ Increased depressed feelings were indicated by responses of ‘a little worse’ or ‘much worse’ versus ‘no different’, ‘a little better’ or ‘much better’.
2. Perceived change in anxiety was assessed using the same question following the GAD-7 items.
3. Alcohol use was measured with the Alcohol Use Disorders Identification Test (AUDIT)²⁵ with ‘hazardous alcohol use’ defined at the clinical cut-off for hazardous or harmful alcohol use (a score of eight or greater) with up to a single missing item person-mean imputed.²⁴
4. Perceived change in alcohol use, compared with before the pandemic, was assessed by the question ‘Over the past week have you drunk alcohol more than you would usually, before the COVID-19 (coronavirus) pandemic?’ Responses were categorised as ‘more than usual’ versus ‘about the same’ or ‘less than usual’.

Predictors

We explored variables previously related to depression and anxiety as well as factors likely to be associated with increased vulnerability during the pandemic. All covariates were self-reported by participants at the baseline questionnaire and organised into six groups: (1) demographics (age, gender, ethnic group, birthplace) and prior mental health, (2) living arrangements, (3) caring roles, (4) healthcare, (5) occupational factors and (6) COVID-19 infection. These measures are detailed in online supplemental material.

Statistical analyses

Weighting

Weights were constructed using iterative proportional fitting (or ‘raking’) to account for differences in the composition of respondents compared with the population (all KCL staff and PGR students) in terms of age, gender and ethnicity.^{26 27} Please see online supplemental material for detail.

Descriptive analyses

We first summarised differences between survey respondents and the target population in terms of age, gender and ethnicity. Second, we calculated counts and weighted percentages for demographic variables separately for staff and PGR students. Third, prevalences of primary and secondary outcomes were summarised using weighted percentages stratified by role, age group, gender, ethnic group and birthplace.

Multivariable regression

We used multivariable Poisson regression to explore factors associated with the primary outcomes of probable depression and probable anxiety. A Poisson model with a robust error variance²⁸ was chosen over a binomial logistic model to avoid overestimating the relative risk (RR), given the high prevalence of outcomes in our sample.²⁹ Overdispersion was tested using the

method described in Gelman and Hill, p114.³⁰ No evidence of overdispersion was found for either probable depression ($\chi^2 = 1653.0$; dispersion ratio=0.824; p value=1.000) or probable anxiety ($\chi^2 = 1580.2$; 0.789; 1.000).

An initial model considered how probable depression and anxiety were associated with age. This model included linear and non-linear terms for age only and was estimated for staff and PGR students separately. All other regression models were restricted to staff only due to the small sample of PGR students and because many covariates (eg, occupational factors) were not measured among students. We considered six models for each outcome. An initial model (model 1) included continuous age, gender, ethnic group and prior mental health diagnoses. Subsequent models considered living arrangements (model 2), caring roles (model 3), healthcare access (model 4), occupational factors (model 5) and experiences of COVID-19 infection (model 6). Models 2–6 additionally included age, gender, ethnic group and prior mental health as confounding variables. All estimates were weighted. Models were summarised using RRs and 95% CIs.

Missing data

This was an exploratory analysis that aimed to characterise the cohort and describe differences in the primary and secondary outcomes. Descriptive statistics were calculated using complete cases to retain all available information. For regression models, missing covariate and outcome information was multiply imputed using Amelia II.³¹ The imputation model included all variables used in the analytical model. Estimates were based on 100 imputation sets.

RESULTS

Description of the cohort

The analytical sample comprised 2106 members of staff and 484 PGR students, representing 22% and 20% of KCL staff and PGR students, respectively. The sample was representative of the target population (KCL staff and PGR students) in terms of age, but female gender and White ethnicity were over-represented (online supplemental file 1). For example, 69% and 72% of staff and PGR students respondents were women, compared with 55% and 57% in the target population. Ethnic minority groups were substantially under-represented. Compared with the target populations, half as many respondents were of Asian ethnicity (staff: 6% vs 12%; PGR: 12% vs 23%) and less than half as many reported Black ethnicity (staff: 1% vs 5%; PGR: 2% vs 4%).

Table 1 presents weighted demographic characteristics of the KCL CHECK baseline cohort for staff and PGR students separately. Most respondents reported being in a partnership and living with others. Nearly 1/3 of staff and 1/10 PGR students had children living at home. Around 1/10 respondents reported a caregiving role (besides childcare) and 1/10 reported being a keyworker.

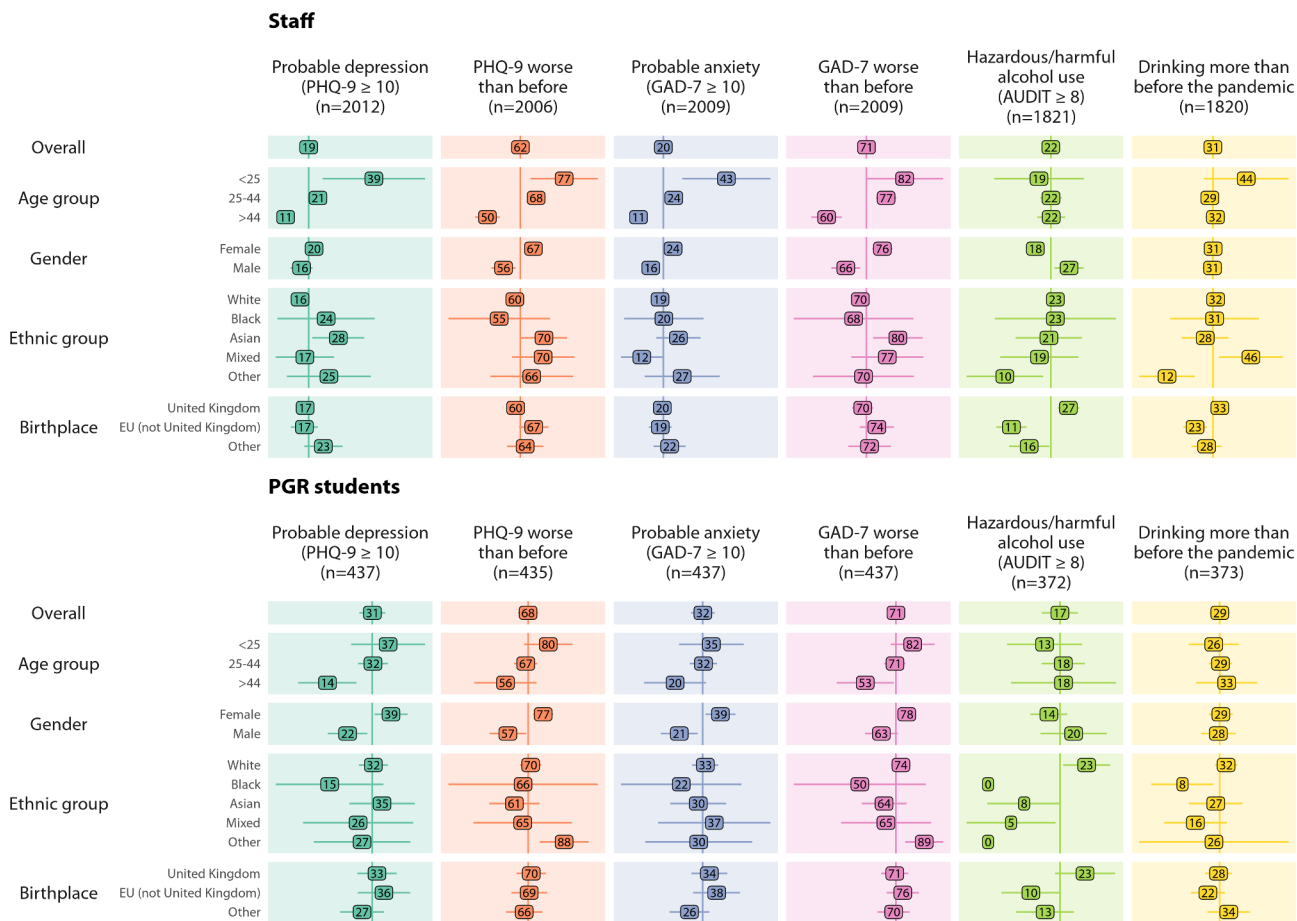
Outcomes by demographic characteristics

Figure 1 presents weighted percentages for the primary and secondary outcomes stratified by role (staff vs PGR student) and demographic characteristics. Among staff, 18% and 20% reported probable depression and anxiety, respectively (PHQ-9 or GAD-7 scores of 10 or greater), but this varied markedly by age. Among younger staff members (<25 years), 39% and 43% reported probable depression and anxiety, respectively, compared with 11% and 11% among staff aged >44. Among staff members, women were more likely than men to report

Table 1 Demographic characteristics of KCL CHECK baseline cohort

		Staff (n=2106)	PGR students (n=484)
		Count (weighted %)*	Count (weighted %)*
Gender	Female	1450 (56)	345 (56)
	Male	645 (43)	135 (43)
	Other	5 (0)	0 (0)
	Prefer not to say	5 (0)	5 (0)
	Missing	0 (0)	0 (0)
Age group	18–24	55 (3)	65 (17)
	25–34	670 (32)	310 (62)
	35–44	650 (31)	65 (15)
	45–54	390 (18)	20 (3)
	55–64	270 (13)	15 (3)
	65+	70 (3)	5 (1)
	Missing	0 (0)	0 (0)
Ethnicity	White	1740 (68)	335 (53)
	Black	30 (5)	10 (3)
	Asian	130 (13)	60 (23)
	Mixed	80 (4)	15 (6)
	Other	40 (7)	25 (7)
	Missing	85 (4)	45 (8)
Relationship	Single	390 (20)	130 (28)
	Civil partnership, married, cohabiting, non-cohabiting	1550 (73)	300 (63)
	Divorced, separated, widowed	80 (3)	10 (2)
	Missing	85 (4)	45 (8)
Birthplace	UK	1290 (60)	200 (37)
	EU (not UK)	385 (15)	110 (18)
	Other	335 (21)	125 (37)
	Missing	95 (4)	45 (8)
Housing arrangements	Privately owned (self)	940 (42)	75 (14)
	Rent (social)	35 (2)	5 (1)
	Rent (private, voluntary)	680 (33)	295 (64)
	Other	360 (19)	65 (13)
	Missing	90 (4)	45 (8)
Household members	Lives with others	1785 (85)	395 (83)
	Lives alone	230 (11)	45 (9)
	Missing	90 (4)	45 (8)
Number of children living with	0	1460 (69)	430 (86)
	1	275 (13)	20 (5)
	2+	370 (18)	30 (8)
	Missing	0 (0)	0 (0)
Age of youngest child	No children	1300 (62)	415 (84)
	<5	225 (11)	30 (9)
	5–11	205 (10)	10 (3)
	12–17	130 (6)	10 (1)
	18+	240 (11)	15 (3)
Missing	0 (0)	0 (0)	
Other caring responsibilities	None	1825 (87)	420 (86)
	Has other caring role	195 (9)	20 (7)
	Missing	85 (4)	45 (8)
Participant is keyworker	Not a keyworker	1695 (79)	375 (79)
	Keyworker	285 (15)	50 (11)
	Missing	130 (6)	60 (10)
Another household member is keyworker	Yes	400 (21)	90 (19)
	No	1530 (71)	330 (69)
	Missing	175 (8)	65 (12)

*Counts rounded to nearest five to avoid disclosing small numbers. Percentages weighted to account for non-representativeness in terms of age group, gender and ethnic group. KCL CHECK, King's College London Coronavirus Health and Experiences of Colleagues at King's; PGR, postgraduate research.



Notes. 'Missing' categories not shown. Percentages weighted to account for differences in age, gender, and ethnicity between sample and population.

Figure 1 Weighted percentages of primary and secondary outcomes by demographic characteristics. AUDIT, Alcohol Use Disorders Identification Test; GAD, Generalised Anxiety Disorder; PHQ, Patient Health Questionnaire; PGR, postgraduate research.

probable depression (16% vs 20%), anxiety (16% vs 24%) and were more likely to rate their anxiety and depression as worse than before the pandemic. Staff members reporting White ethnicity generally reported lower levels of probable depression and anxiety, compared with other ethnicities, but due to small group sizes, many of these are uncertain and did not reach statistical significance.

One-third of PGR students reported probable depression and anxiety. Differences by age and gender were similar to those for staff, with younger and female students being more likely to report probable depression and anxiety. Nearly twice as many female PGR students compared to men reported probable depression (39% vs 22%) and anxiety (39% vs 21%). There were differences in most outcomes by ethnicity, but these were uncertain due to small group sizes as above.

Regarding secondary outcomes, around two-thirds of respondents reported that their symptoms of depression and anxiety had worsened ('Much worse' or 'A little worse'), compared with before the pandemic (62% and 71% among staff; 68% and 71% among PGRs, for depression and anxiety, respectively). Hazardous alcohol use (an AUDIT score of 8+) was reported by 22% of staff and 17% of students. Around 30% of staff and students said that their alcohol intake had increased compared with before the pandemic.

Figure 2 provides a closer look at non-linear relationships between age and the primary outcomes using weighted Poisson regression models. For staff, there was a clear negative association

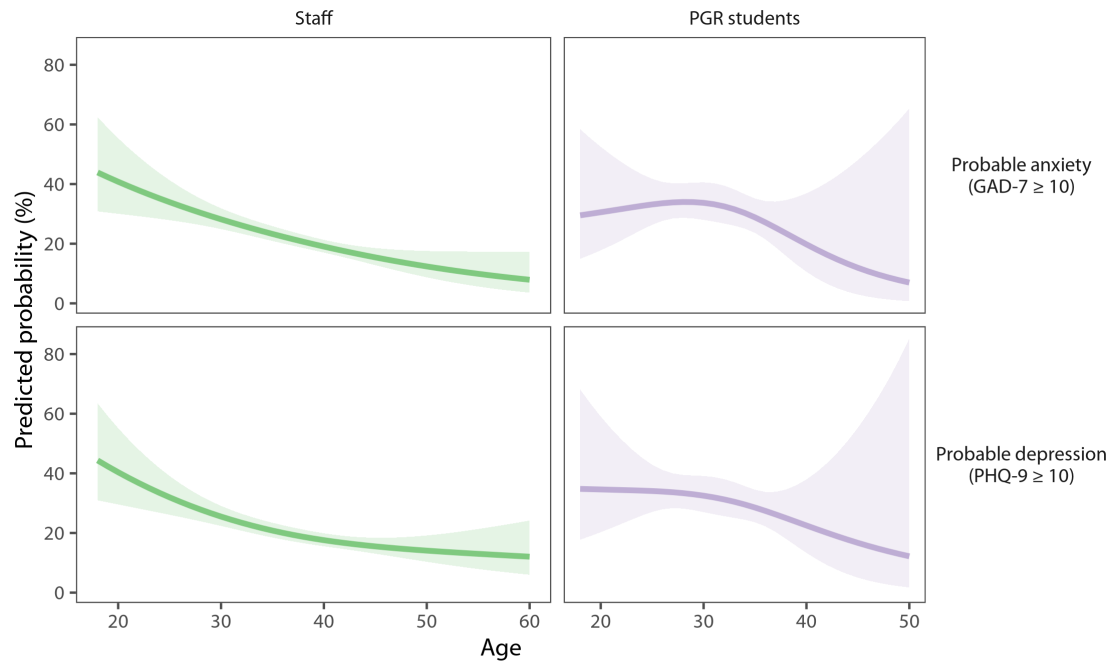
with age. The predicted probability of both probable depression and anxiety fell from 40% to 20% as age increased from 20 to 40 years. This negative trend was also seen among PGR students, but elevated rates of depression and anxiety were observed for a larger age range. In contrast to the steady decline seen for staff, higher rates of depression and anxiety persisted until age 35 and only declined after age 40.

Factors associated with probable depression and anxiety among staff

Tables 2 and 3 present, for staff only, associations between individual predictors and the relative risk of reporting probable depression and anxiety, respectively. We separately considered six groups of predictors.

Demographics

Staff reporting Black, Asian or other ethnicity were more likely, compared with staff reporting White ethnicity, to show probable depression (RR=1.26 to 1.74), but only associations for Asian ethnicity reached statistical significance after adjustment for age and gender. Staff reporting Asian ethnicity were nearly two times as likely to report depression, compared with staff of White ethnicity (RR=1.74; 95% CI 1.28 to 2.37). Staff living alone (RR=1.40; 95% CI 1.05 to 1.86) and staff living in rented accommodation (RR=1.24; 95% CI 0.97 to 1.57) were also more likely to show probable depression, compared with other



Notes. Predicted probabilities derived from Poisson regression models with a log link and robust error variance. Models were stratified by role. Each model contained restricted cubic splines terms for age (3 knots). Estimates weighted for non-representativeness vs. the population in terms of age, gender, and ethnicity. Shaded area represents 95% confidence intervals.

Figure 2 Predicted probability of reporting probable depression or anxiety by age, stratified by role. GAD, Generalised Anxiety Disorder; PHQ, Patient Health Questionnaire; PGR, postgraduate research.

household arrangements. These associations were not found for anxiety.

Mental disorder diagnosis

Prior diagnoses of depression or anxiety were strongly associated with probable depression (RR for prior depression=2.29; CI 1.79 to 2.93; RR for prior anxiety=1.46; CI 1.14 to 1.88) and probable anxiety (RR for prior depression=1.44; CI 1.13 to 1.82; RR for prior anxiety=1.91; CI 1.51 to 2.42).

Caring role

We found no evidence that having one or two children living at home was associated with increased depression or anxiety, compared with no children at home. Staff with three or more children at home were more likely to show probable depression (RR=1.41; CI 0.91 to 2.18) and anxiety (RR=1.59; CI 1.00 to 2.53), although only the association for anxiety reached statistical significance. Staff reporting other caregiving responsibilities (besides childcare) were more likely to show probable depression (RR=1.46; CI 1.09 to 1.95) and anxiety (RR=1.48; CI 1.11 to 1.98), after adjusting for demographic variables and prior mental health.

Healthcare

Staff who needed, but could not access, healthcare were more likely to show probable depression (RR=1.59; CI 1.14 to 2.22), compared with staff who did not need to access healthcare. This association was also observed for probable anxiety but did not reach statistical significance (RR=1.37; CI 0.96 to 1.97). Reporting a long-term health condition was positively associated with probable depression and anxiety, but these associations did not reach statistical significance. Staff members shielding or self-isolating were twice as likely to show probable anxiety (RR=2.24; CI 1.38 to 3.66), compared with staff not shielding or self-isolating.

Occupational factors

We found no evidence of associations between remote working or job role with probable depression or anxiety. Staff on fixed-term or casual contracts were more likely to report probable anxiety, compared with those on open-ended contracts (RR=1.25; CI 1.00 to 1.58).

COVID-19 status

We found no evidence of an association between self-reported COVID-19 infection in the past 2 months and probable depression or anxiety.

DISCUSSION

In a large occupational sample during the early stages of the pandemic, we found a high prevalence of depression and anxiety symptoms, particularly among young people. Around 1/5 staff members and 1/3 PGRs scored above cut-off for depression (PHQ-9) and anxiety (GAD-7) questionnaires, respectively, and most felt that symptoms of depression and anxiety had worsened since before the pandemic. Around 20% of participants scored above cut-off on the AUDIT for hazardous alcohol use, while 30% were drinking more than before the pandemic.

Younger respondents were considerably more likely to show probable depression and anxiety: around 40% of staff aged 18–24, compared with 11% of staff aged 44 or older. Besides age, factors associated with probable depression and anxiety included female gender, caregiving responsibilities and shielding or isolating. It is notable that male staff were more likely have hazardous alcohol use (27%) compared with anxiety (16%) or depression (16%), underlining the need to include this outcome when monitoring mental health.

Our results are consistent with other studies conducted during the early stages of the pandemic showing high prevalence of common mental disorder ((CMD) including depression or anxiety).^{32–34} For instance, Iob *et al* reported findings from an

Table 2 Associations of probable depression (PHQ-9 ≥10) with stressors estimated using multivariable Poisson regression (n=2106)

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age		0.97 (0.96 to 0.98)	0.97 (0.96 to 0.99)	0.97 (0.96 to 0.98)	0.97 (0.96 to 0.98)	0.97 (0.96 to 0.98)	0.97 (0.96 to 0.98)
Gender	Male	0.98 (0.77 to 1.23)	0.97 (0.77 to 1.22)	0.98 (0.78 to 1.23)	1.01 (0.80 to 1.28)	0.95 (0.76 to 1.20)	0.97 (0.77 to 1.22)
Ethnic group	White	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)
	Black	1.27 (0.74 to 2.18)	1.13 (0.66 to 1.92)	1.23 (0.73 to 2.08)	1.27 (0.74 to 2.17)	1.27 (0.74 to 2.20)	1.28 (0.75 to 2.20)
	Asian	1.74 (1.28 to 2.37)	1.75 (1.30 to 2.37)	1.73 (1.28 to 2.34)	1.73 (1.28 to 2.34)	1.73 (1.27 to 2.35)	1.73 (1.28 to 2.35)
	Mixed	0.83 (0.49 to 1.42)	0.82 (0.48 to 1.41)	0.84 (0.49 to 1.45)	0.84 (0.49 to 1.43)	0.83 (0.49 to 1.43)	0.83 (0.49 to 1.41)
	Other	1.26 (0.75 to 2.13)	1.22 (0.74 to 2.03)	1.19 (0.71 to 2.02)	1.24 (0.73 to 2.10)	1.26 (0.75 to 2.12)	1.26 (0.75 to 2.13)
Previous depression		2.29 (1.79 to 2.93)	2.21 (1.73 to 2.84)	2.25 (1.77 to 2.86)	2.25 (1.76 to 2.88)	2.29 (1.79 to 2.93)	2.28 (1.78 to 2.93)
Previous anxiety		1.46 (1.14 to 1.88)	1.45 (1.13 to 1.86)	1.45 (1.14 to 1.85)	1.44 (1.13 to 1.84)	1.46 (1.14 to 1.87)	1.46 (1.14 to 1.88)
Lives alone			1.40 (1.05 to 1.86)				
Housing tenure	Other tenure		(Ref.)				
	Renting		1.24 (0.97 to 1.57)				
Number of children	0			(Ref.)			
	1			0.80 (0.53 to 1.19)			
	2			0.78 (0.54 to 1.15)			
	3+			1.41 (0.91 to 2.18)			
Other caring responsibilities			1.46 (1.09 to 1.95)				
Access to healthcare	Not needed				(Ref.)		
	Needed, could access				1.16 (0.92 to 1.48)		
	Needed, but could not access				1.59 (1.14 to 2.22)		
Long-term health condition				1.18 (0.92 to 1.51)			
Currently shielding/isolating				1.74 (0.90 to 3.38)			
Key worker						0.91 (0.73 to 1.13)	
Started working remotely during pandemic						0.92 (0.76 to 1.13)	
Job role	Academic, specialist and management					(Ref.)	
	Research, clerical and technical					1.00 (0.78 to 1.27)	
	Teaching, facilities and clinical					0.85 (0.56 to 1.29)	
Contract type	Open-ended/permanent					(Ref.)	
	Fixed term/casual					1.04 (0.82 to 1.32)	
Thinks had COVID-19, past 2 months						1.05 (0.83 to 1.33)	

Estimates are reported as relative risks (95% CIs).

All estimates weighted to account for differences between sample and population in terms of age group, gender and ethnic group. Missing outcome and covariate information imputed using multiple imputations.

PHQ, Patient Health Questionnaire.

online survey answered by 51 000 people between March and May 2020³⁵ where 31% scored above cut-off for depression. Risk factors included being female, being younger and having a previous mental disorder. Henderson *et al*³⁶ used surveys in existing national cohort studies during May 2020 and found similar patterns of CMD by age and gender with nearly 35% of women aged 19 having probable depression or anxiety, decreasing to 20% (age 30) and 14% (age 50).

This was a cross-sectional survey and data collection started during the pandemic. Although we asked people to judge their comparative anxiety and depression, without prepandemic measures of mental health it was hard to know the extent to which elevated mental distress was attributable to the pandemic. Prevalence of CMD was considerable before the pandemic. For example, the 2014 APMS³⁷ found around 17%–18% of working age (16–64) respondents scored above cut-off for probable CMD, which rose to 26% among young women (ages 16–24). Longitudinal studies are needed to understand how high levels of mental distress are related to the pandemic.

In the UK, the UK Household Longitudinal Study provides longitudinal data from before and during the pandemic.⁵ Pierce *et al* found that probable CMD increased from 19% prepandemic to 27% in April to May 2020. The increase affected all

groups but particularly women, the young (ages 16–24) and those with young children. They also found that participants had increased alcohol drinking frequency.³⁸ Another study with longitudinal data was Avon Longitudinal Study of Parents and Children original cohort (mean age 28), which found an increase in probable anxiety (from 13% to 24%) but a decrease in probable depression (from 24% to 19%).³⁹

Risk factors for depression and anxiety in the first few months of the pandemic can be separated into general risk factors for CMD and specific stressors related to the pandemic.^{32–34} Some studies have suggested that the predictors of depression and anxiety have changed in the pandemic with increasing contributions from occupational factors and household composition.⁴⁰ For our sample, younger age and female gender were associated with a higher prevalence of probable depression and anxiety, while living alone increased the risk of probable depression.

We found temporary contracts to be associated with probable anxiety and rented housing was associated with probable depression. Caring for three or more children was associated with probable anxiety; caring for another adult was associated with both probable depression and anxiety. Of the specific COVID-19 stressors, suspecting recent COVID-19 infection was

Table 3 Associations of probable anxiety (GAD-7≥10) with stressors estimated using multivariable Poisson regression (n=2106)

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age		0.97 (0.96 to 0.98)	0.97 (0.95 to 0.98)	0.96 (0.95 to 0.97)	0.97 (0.96 to 0.98)	0.97 (0.96 to 0.98)	0.97 (0.96 to 0.98)
Gender	Male	0.81 (0.65 to 1.01)	0.81 (0.65 to 1.02)	0.81 (0.65 to 1.01)	0.84 (0.67 to 1.05)	0.79 (0.64 to 0.98)	0.80 (0.64 to 1.01)
Ethnic group	White	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)	(Ref.)
	Black	0.86 (0.42 to 1.76)	0.90 (0.44 to 1.83)	0.84 (0.43 to 1.64)	0.83 (0.41 to 1.67)	0.92 (0.45 to 1.85)	0.87 (0.42 to 1.77)
	Asian	1.29 (0.95 to 1.77)	1.29 (0.94 to 1.76)	1.25 (0.91 to 1.70)	1.28 (0.94 to 1.74)	1.26 (0.93 to 1.71)	1.29 (0.94 to 1.76)
	Mixed	0.55 (0.31 to 0.99)	0.55 (0.31 to 0.99)	0.55 (0.31 to 1.00)	0.54 (0.30 to 0.96)	0.55 (0.31 to 1.00)	0.55 (0.31 to 0.99)
	Other	1.12 (0.69 to 1.81)	1.14 (0.71 to 1.83)	1.09 (0.67 to 1.77)	1.12 (0.69 to 1.81)	1.08 (0.67 to 1.74)	1.12 (0.69 to 1.81)
Previous depression		1.44 (1.13 to 1.82)	1.45 (1.14 to 1.84)	1.41 (1.12 to 1.78)	1.43 (1.12 to 1.83)	1.45 (1.15 to 1.84)	1.43 (1.13 to 1.82)
Previous anxiety		1.91 (1.51 to 2.42)	1.93 (1.52 to 2.44)	1.90 (1.51 to 2.40)	1.90 (1.50 to 2.39)	1.93 (1.54 to 2.43)	1.91 (1.51 to 2.42)
Lives alone			0.91 (0.64 to 1.31)				
Housing tenure	Other tenure		(Ref.)				
	Renting		0.89 (0.72 to 1.10)				
Number of children	0			(Ref.)			
	1			1.14 (0.80 to 1.61)			
	2			1.03 (0.73 to 1.46)			
	3+			1.59 (1.00 to 2.53)			
Other caring responsibilities				1.48 (1.11 to 1.98)			
Access to healthcare	Not needed				(Ref.)		
	Needed, could access				1.06 (0.84 to 1.34)		
	Needed, but could not access				1.37 (0.96 to 1.97)		
Long-term health condition					1.10 (0.87 to 1.40)		
Currently shielding/isolating					2.24 (1.38 to 3.66)		
Key worker						1.19 (0.89 to 1.59)	
Started working remotely during pandemic						0.92 (0.76 to 1.13)	
Job role	Academic, specialist and management					(Ref.)	
	Research, clerical and technical					0.87 (0.69 to 1.09)	
	Teaching, facilities and clinical					0.91 (0.63 to 1.32)	
Contract type	Open-ended/permanent					(Ref.)	
	Fixed term/casual					1.25 (1.00 to 1.58)	
Thinks had COVID-19, past 2 months							1.06 (0.84 to 1.32)

Estimates are reported as relative risks (95% CIs).

All estimates weighted to account for differences between sample and population in terms of age group, gender and ethnic group. Missing outcome and covariate information imputed using multiple imputation.

GAD, Generalised Anxiety Disorder.

not associated with probable depression or anxiety, but currently self-isolating or shielding was associated with probable anxiety and being unable to access medical care was associated with probable depression and anxiety.

Gold-standard psychiatric diagnosis is via clinical interview. However, for research of this nature it is accepted practice to use validated questionnaires of symptoms of depression and anxiety, often in the preceding 2 weeks.⁴¹ However, it is not known how scores relate to clinical disorders during extremely adverse event such as pandemic and lockdown, when it is acknowledged that a normal reaction will include anxiety, anger and stress.⁴² We are not aware of any validation studies of the common questionnaires during the pandemic, nor any surveys in the UK that have used clinical interviews. The HUNT study in Norway⁴³ have a repeated cross-sectional psychiatric interview as part of the larger cohort study and found a decrease in the prevalence of CMD during the first wave of the pandemic.

Strengths and limitations

This was an exploratory study that sought to describe our cohort and their mental health outcomes at baseline. We benefited from a large sample capturing nearly a quarter of staff. In contrast to many online surveys, we were able to draw on administrative records to understand the representativeness of respondents compared with the population and construct weights. We accounted for several important covariates. However, our survey was cross-sectional and cannot distinguish between observed associations due to the pandemic and those that existed previously. Female gender and White ethnicity were over-represented in the sample compared with the target population. While weights were constructed to account for these differences, weights cannot make up for missing experiences from groups and intersectional groups that are present in very small numbers (such as non-binary gender and Black staff) and for which more focused studies are necessary. Within weights, extreme values were trimmed to reduce variability of the weights, which may

introduce bias. Another consideration is that occupational studies have previously been shown to report higher levels of psychological stress, compared with population studies,⁴⁴ which should be considered when interpreting our results. Finally, these data were collected during the first period of lockdown in the UK, and some observations may be specific to those unprecedented circumstances.

CONCLUSIONS

Our study shows worrying levels of symptoms of anxiety, depression and alcohol use disorder in an occupational sample from a large UK university in the months following the outbreak of the COVID-19 pandemic and the subsequent lockdown. It is not known how much anxiety and depression symptomatology represents true pathology in the extreme circumstances, but the high levels of distress may be important in themselves, especially for people who may already have been vulnerable to mental disorder. Distress may be a risk for adverse outcomes in the future, especially if stress and isolation continue for extended periods. KCL CHECK is well placed to look at these longer term risks, with mental health questionnaires repeated every 2 weeks for 18 months. As an occupational cohort, our findings may be useful to target support measures and occupational health provisions. Employers may also be motivated to change practices, for example, to extend fixed-term contracts and allow flexibility for people with caring responsibilities.

Contributors All authors contributed to the design of the study. EC carried out the data analysis. EC and KD wrote the manuscript. All authors made substantive revisions to and approved the final manuscript. KD, GB-C, GL, DL, CO, CP and AW carried out the data collection. SAMS, RR and MH supervised the project. EC is the guarantor of the study.

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Patient consent for publication Not applicable.

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