SCIENTIFIC LITERATURE

Research Article

Prevalence and Correlates of Depression during the COVID-19 Epidemic among Undergraduate Students in the United Kingdom

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ARTICLE INFO

ABSTRACT

Received Date: June 25, 2022 Accepted Date: July 20, 2022 Published Date: July 22, 2022

KEYWORDS

Depression Undergraduate University COVID-19 Qualitative Eating disorders

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Citation for this article: Ruby Scarlett and Clive Kelly. Prevalence and Correlates of Depression during the COVID-19 Epidemic among Undergraduate Students in the United Kingdom. Anxiety And Depression Journal. 2022; 3(1):127

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Clive Kelly, Department of Psychology, University of Newcastle upon Tyne, UK, Email: cliveryton@gmail.com **Background:** Previous prevalence estimations of depression among undergraduate students average around 30%. Thus far, there are no estimations of the prevalence of depression among UK undergraduate students during the UK COVID-19 epidemic and few published data on the effects of the epidemic on student mental health. This study addresses these issues and explores the effects of financial hardship, disordered eating, and social support on low mood.

Methods: An online survey was completed by 633 undergraduate students. The survey comprised SRQ-20 and SCOFF questionnaires, along with questions relating to the factors influencing their mental health. We used a mixed-methods approach to collect and analyse quantitative and qualitative data.

Results: The prevalence of depression was found to be 81.5%. Disordered eating and financial hardship were significantly positively associated with the presence of depression. Social support was a significant negative correlate. The impact of COVID-19 was significantly positively associated with depression scores. Among the themes which emerged, socialisation and university response were identified as important factors affecting student mental health during the epidemic.

Conclusion: The increased prevalence of depression is unsurprising given the huge changes that have occurred due to the COVID-19 epidemic. Disordered eating and social isolation were strongly associated with student depression. Financial hardship and area of degree study were also related to mood. These results should influence the future provision of student mental health support, particularly during times of national adversity.

INTRODUCTION

Depression is a common mental health problem and 9.7% of adults in the United Kingdom (UK) are estimated to experience it in their lifetime [1]. Possible symptoms of depression include anhedonia, negative internal monologue, changes in sleep pattern, and hopelessness. This may lead to self-harm and suicide attempts [2]. Calculating the prevalence and contributing factors of depression is important in the student population, who typically intersect adolescence and adulthood and are especially vulnerable to psychological distress [3]. Recent estimates suggest approximately one third of undergraduate students are depressed worldwide [4-6]. This figure is said to be rising [7], amplifying the need to identify associated factors. This study aims to delineate the current prevalence of depression among undergraduate students in the UK during the covid epidemic and define which factors most influenced this.



SCIENTIFIC LITERATURE

The link between poor mental health and depression is evident worldwide. Lugata et al. [8] found an association between disordered eating behaviours and symptoms of depression among Tanzanian undergraduate students. Farrer et al. [9] reported similar results and demonstrated that Australian students with body image issues also exhibited a greater risk of depression. These studies suggest that disordered eating influences the prevalence of depression. Likewise, Dawood et al. [10] found a family history of depression was one of the largest contributing factors to depression amona undergraduate students in Saudi Arabia. These findings suggest pre-existing mental ill-health is associated with depression among students globally.

Access to social support is strongly associated with severity of depression among students [4,10]. Given that social isolation is strongly linked to depression [11], such findings are to be anticipated. Support specifically from family and friends decreases the risk of depression and increases psychological quality of life [4]. Financial hardship is associated with depression worldwide, especially among students [12,13]. A longitudinal study of British undergraduate students revealed those viewing their student loan as debt were more depressed than those seeing it as an extra tax [14]. Conversely, student depression in Tanzania was not specifically associated with a student loan [8], suggesting this trend may depend on individual cultural norms.

Depression may be influenced by gender, as females experience a higher prevalence of depression [5,13,15]. However, not all studies show gender association with student depression [12,16]. Age, year of study, and degree subject may also influence the presence of depression. Higher prevalence rates of depression occur in earlier years of study and among younger students [5,15,13]. Social and political sciences students are more likely to have depression than those studying basic sciences, medicine, or engineering [12], although a distinction between medical and non-medical students is not always observed [17].

The Severe Acute Respiratory Syndrome epidemic in 2003 greatly affected the mental health of the UK population [18]. Thus, the current Coronavirus Disease 2019 (COVID-19) epidemic is also likely to have had a negative impact on population mental health. A correlation between the perceived

risk of COVID-19 and severity of depression [15], combined with reduced mental health support, may lead to an increased prevalence of depression. For students, end-of-year assessments may intensify this effect [8]. Correspondingly, during Cyprus' COVID-19 lockdown, undergraduate students exhibited the highest levels of depression [19]. Over the last year, access to cinemas, clubs, and sports venues was limited and such restrictions may have increased the prevalence of depression. As many students returned home for the first UK lockdown and university courses moved online, such social limitation could have precipitated an increase in student depression. The Bank of England [20] reported one in five people experienced financial hardship as a consequence of COVID-19. This could drastically effect the population's mental well-being, as depression scores are positively associated with loss of income due to the virus [15].

There have been no published estimations of the prevalence of depression in UK undergraduate students during the COVID-19 epidemic, and little exploration of the mental health impact of the epidemic on undergraduate students. This study addresses these gaps and further investigates the effects of financial hardship, disordered eating, and socio-demographic factors on depression among UK undergraduates. We theorised that the prevalence of depression in UK undergraduate students would be increased over previous estimates and suspected that financial hardship would be a significant factor. We hypothesised that disordered eating would be associated with the presence of depression, and that students directly impacted by COVID-19 would be more depressed than others. We also wished to investigate associations with race, gender, age, year of study, degree subject, and perceptions of social support.

METHODS

Materials

Participants comprised of 668 UK undergraduate students voluntarily responding to an online survey. The data of 37 participants was removed due to partial survey incompletion, leaving 631 data sets to analyse (487 females, 134 males, 9 non-binary, and 1 undeclared). A descriptive and correlational mixed-methods design was used. Participants' depression scores were outcome variables and factors associated with depression were the predictor variables. Possible confounding variables included respondents' environment and fatigue

02



SCIENTIFIC LITERATURE

effects, which were counteracted by random question order. Qualtrics (version November 2020) was used to design the survey. Social media and Newcastle University's Research Participation Scheme were used to distribute the survey via a Qualtrics hyperlink. All participants provided informed consent and were appropriately debriefed. This study was approved by Newcastle University's Faculty of Medical Sciences Research Ethics Committee, reference 7673/2020.

Eligibility criteria required informed consent, enrolment on a UK undergraduate degree, and a minimum age of 18. The survey comprised six sections: information and consent, demographics, questions on factors influencing depression for quantitative and qualitative analysis, Self-Reporting Questionnaire (SRQ-20) [21], the Sick, Control, One-stone, Fat, and Food scale (SCOFF) [22], and final debrief. Demographic data collected included age, self-reported gender, ethnicity, year of study, and area of study. Participants rated their financial situation on a fivepoint Likert scale from 1 (hardship and no financial security) to 5 (no hardship and full financial security). Participants assessed whether their financial situation had changed because of the COVID-19 epidemic on a four-point Likert scale from 1 (large funding decrease) to 4 (large increase in funds).

Social support was assessed identically, on a scale of 1 (no social support) to 5 (all social support available). Likewise, change in access to social support during the pandemic was assessed on a Likert scale of 1 (large decrease) to 4 (large increase). Participants confirmed whether they or a loved one had been infected with Coronavirus and if so, were invited to rate the mental health impact of this on a five-point Likert scale from 1 (no mental health impact) to 5 (the biggest factor impacting mental health). 'Free-text' responses were invited for participants to describe the mental health effects of the COVID-19 epidemic and any other factors influencing their mental well-being. The SCOFF questionnaire consists of five questions used to assess the presence of eating disorders [22]. Each question is answered with 'yes' or 'no', with each 'yes' scoring the participant one point. The maximum score is five. A score of two or over suggests the presence of anorexia nervosa or bulimia nervosa. The scale correctly identifies participants with eating disorders [22] and provides a concise, reliable, and valid screening tool for eating disorders [23].

The SRQ-20 is a 20-item questionnaire scale assessing psychological distress across one month [21]. The current study and others [8,24] used this to measure the presence of depression. This scale was chosen in particular to replicate Lugata et al.'s [8] methodology alongside its good internal reliability and consistency (Cronbach's alpha of 0.78) [25], and high sensitivity and specificity [26]. Each question in the SRQ-20 is answered using 'yes' or 'no', with each 'yes' scoring one point. The maximum score is 20 and a threshold is used to indicate the presence of depression. In this study, we used a threshold score of six or over to diagnose depression as this threshold has high sensitivity and specificityfor detecting cases [24].

Analysis

Quantitative data was analysed in SPSS (version 26.0). Data from both the SCOFF and SRQ-20 were shown to be normally distributed from the skew and kurtosis figures using the Omnibus K-squared normality test. Pearson's correlation was used to test relationships between factors of depression ratings and SRQ-20 scores. Independent t-tests and one-way ANOVAs were used to determine differences in SRQ-20 scores between demographic groups as well as factors of depression ratings. These tests also assessed the impact of COVID-19. Tukey's Honest Difference (THD) was used to delineate significant relationships in ANOVA tests. An alpha value of 0.05 was adopted during all statistical analyses.

Researchers adopted a critical realist approach, interpreting qualitative data as each participant's subjective experience of an objective reality [27]. Inductive thematic analysis was used; data was compiled and read by researchers to ensure familiarity and understanding, before being semantically coded. All coding was data driven. Codes were collated and tallies placed on recurring codes to identify frequency. Themes were created to define groups of similar codes and were refined until determined as accurately depicting the data. This process was repeated by both researchers until agreement was reached, to ensure inter-rater reliability.

RESULTS

Quantitative

516 (81.5%) respondents scored six or above on the SRQ-20. 269 (42.5%) respondents scored two or more on the SCOFF questionnaire. There was a significant difference in SRQ-20



SCIENTIFIC LITERATURE

scores between those with eating disorders and those without, t(631) = -9.81, p<0.001. Participants scoring two or above on the SCOFF scale had higher mean SRQ-20 scores (13.05) than those who scored below two (9.38) [p=0.003]. Additionally, there was a significant positive correlation between SCOFF and SRQ-20 scores, r(631) = 0.42, p<0.001, showing a strong relationship between disordered eating and depression (Figure



Note: SRQ-20 = Self-Reporting Questionnaire 20. SCOFF = Sick, Control, One stone, Fat, and Food scale. aDark line indicates the fit line. bLighter lines indicate mean confidence intervals of the fit line.

There was no significant difference in SRQ-20 scores between white and non-white respondents (t(628) = -0.30, p = 0.58), nor between males and females (t(619) = 3.62, p = 0.53). Neither participants year of study (F(5,627) = 1.78, p = 0.13), nor their age (F(4,628) = 0.49, p = 0.74) had a significant effect on SRQ-20 scores. Although these variables did not influence depression among undergraduate students in this study, degree subject did significantly impact on depression scores, F(4,628) = 4.48, p = 0.001. THD indicated those studying Arts, Culture, and Education had significantly higher SQR-20 scores than Medical and Health Science students (mean difference = -0.22, p = 0.12). This suggests the type of degree studied can influence the prevalence of depression in undergraduate students.

There were significant differences in SRQ-20 scores between ratings of financial security and support (F(4,628) = 5.39, p<0.001). THD confirmed that these differences lay between the lower and higher ratings, implying that those who felt less financially secure also felt more depressed. Moreover, there was a significant negative correlation between finance ratings

and SRQ-20 scores, r(631) = -0.18, p<0.001, further supporting the relationship between perceptions of limited financial support and symptoms of depression. Among those who reported a change in their finances due to the COVID-19 epidemic, there was a significant negative correlation between the level of change and SRQ-20 scores, r(639) = -0.13, p =0.009, suggesting that those who experienced a decrease in funds due to COVID-19 were more depressed.

ANOVA testing showed significant differences in SRQ-20 scores between social support ratings (F(4,628) = 27.20, p < 0.001). THD confirmed that these differences lay between the lower and higher ratings. Those who perceived less support had higher mean depression scores and this is reflected by the significant negative correlation between social support ratings and SRQ-20 scores, r(631) = -0.38, p < 0.001. Among those who reported a change in their social support due to the COVID-19 epidemic, there was a significant negative correlation between the level of change and SRQ-20 scores, r(459) = -0.193, p < 0.001), suggesting those who experienced a decrease in social support due to COVID-19 were also more depressed.

369 respondents (58.3%) reported a previous confirmed COVID-19 infection, 216 (34.1%) had not been infected, with 48 (7.6%) unsure. SRQ-20 scores were significantly different between these groups, F(2,630) = 3.70, p = 0.025, with those with confirmed infection more depressed than those not infected. Finally, there was a significant positive correlation between the mental health consequences of confirmed or unknown infection status and SRQ-20 scores, r(415) = 0.24, p<0.001, suggesting that those who felt their mental health had been impacted by COVID-19 experienced more symptoms of depression.

Qualitative

Nine themes emerged from the datain answer to both 'freetext' questions (Table 2). Themes relating to the effect of the COVID-19 epidemic on students' mental health comprised of (1) worsened mental health; (2) reduced social interaction; (3) reduced motivation and (4) changes to university teaching and support. Themes relating to general influences on students' mental health were (5) socialisation; (6) environment; (7) stress; (8) university and (9) freedom. Socialisation and university related themes were the factors most consistently identified.

04



University can be a stressful environment with mounting pressure to perform well academically. Many participants reported university stressors as affecting their mental health. Students' statements suggested that their concerns about maintaining a manageable workload contributed significantly to stress. This was also related directly to the effects of the COVID-19 epidemic. COVID-19 restrictions on education were perceived to have amplified this influence by moving teaching online, reducing academic support, and limiting access to educational and support resources. Reduced socialisation appeared to have a substantial negative influence on students' mental health. Respondents' statements described how, through the reduction in social support, lack of socialising opportunities and physical distancing, feelings of loneliness and despair increased. COVID-19 restrictions and the consequences of stretched healthcare systems also negatively influenced people's mental health, resulting in recorded thoughts of suicide or self-harm among 19 (3.0%) respondents.

Table 1: Participant demographics with total number ofparticipants and percentages.					
Participant characteristic		Number of participants	Percentage of total participants		
Gender	Male	134	21.20		
	Female	487	76.90		
	Non-binary	9	1.40		
	Other	1	0.20		
	18-19	308	48.70		
Age	20-21	252	39.80		
	22-23	49	7.70		
	>23	22	3.50		
Ethnicity	Caucasian	540	85.30		
	Black	11	1.70		
	Asian	52	8.20		
	Mixed or multiple ethnicities	21	3.30		
	Hispanic	2	0.30		
	Other	4	0.60		
] st	134 487 9 1 308 252 49 22 540 11 52 21 2 4 245 196 139 46 4 276 95	38.70		
V	2 nd	196	31.00		
Year of study	3 rd	139	22.00		
	4 th	46	7.30		
	≥5 th	4	0.60		
Area of study	Humanities and Social Sciences	276	43.60		
	Medical and Health Sciences	195	30.60		
	Natural Sciences and Engineering	80	12.60		
	Arts, Culture, and Education	73	11.50		

DISCUSSION

This study revealed a much higher prevalence of undergraduate depression when compared to previous estimates [6,13], with over 80% of respondents experiencing depression. A recent Office for National Statistics report found worsening mental health among 63% of university students during the pandemic [28], a result entirely consistent with our data.

Table 2: Themes identified from qualitative danta. Definition of					
theme and frequency of appearance are shown.					
	Theme	Definition	Frequency		
How the COVID-19 epidemic effected mental health	Worsened Mental Health	Decreased mental well- being. Includes eating disorders, panic attacks, anxiety, depression, dissociation, self-harm, and suicidal thoughts.	159		
	Reduced Social Interaction	Decreased time spent with others, especially physically, resulting in feelings of isolation and loneliness.	204		
	Reduced Motivation	Inability to find motives or drive, feelings of apathy, and decreased productivity.	41		
	University Changes	Introduction of online teaching, changes to exams, and concerns surrounding academic results and workload.	27		
General factors impacting mental health	Socialising	Time spent with loved ones (friends and family), ability to see them, and feeling socially supported.	247		
	Environment	The collective of weather, seasons, and immediate surroundings, as well as global events.	28		
	Stress	The presence of stress, anxiety, and uncertainty within an individual's life.	58		
	University	The experience of attending university, including deadlines, exams, teaching, and pressure to succeed.	113		
	Freedom	Having autonomy over how you live including routine, and the ability to go outside.	36		

As hypothesised, we found financial hardship to be a significant factor. Students who felt less financially secure also felt more depressed. However, the correlation between SRQ-20 scores and financial hardship was less strong than other influences. This may be explained by the continuation of student loans and the furlough scheme compensating for the loss young people's part-time jobs [1]. Our findings support some previous literature, evidencing a relationship between low income and depression [14,20]. Differences in definition of financial prosperity may account for some variability; the current study used perceptions of wealth whereas Lugata et al. [8] used the presence of a student loan.

We found disordered eating to be strongly associated with the presence of depression, reflecting previous studies [4,10]. Although causality cannot be determined, it is plausible that eating disorders may have emerged due to, or pre-existing eating disorders exacerbated by the stresses associated with COVID-19 pandemic. The consequences of the epidemic may have mediated the association between eating disorders and





SCIENTIFIC LITERATURE

depression, as restrictions on leaving home and the closure of exercise facilities reduced accessibility of health-related activities connected to body image and weight. However, even students unlikely to have eating disorders (SCOFF scores below two) exhibited a mean SRQ-20 score well above six. This means, irrespective of disordered eating, that they exhibited symptoms of depression. This confirms that additional factors contributed to the high prevalence of depression.

Students directly impacted by COVID-19 were more depressed than those who were not. The quantitative results revealed important links between COVID-19 impact ratings and low mood. The qualitative data described how both university changes and restrictions on social contact had large negative effects on student mental health. COVID-19 restrictions on education were perceived to have amplified low mood by moving teaching online, reducing academic support, and limiting access to educational and support resources. These findings mirror others who all highlighted the negative mental health impacts of COVID-19 [15,18,19], while demonstrating that those most impacted exhibited greater depression. Qualitative themes explaining the mental health effects of COVID-19, and general factors impacting students' mental health were mainly psychosocial, including socialisation, university, and the environment. Interpersonal factors have previously been identified as potential causal factors for depression in adolescents or young adults (Cairns et al., 2018) as have other psychosocial factors (Pilkington et al., 2013). Genetics have previously been qualitatively reported as a contributing factor to depression (Pilkington et al., 2013), but the current study did not replicate this. Students may not have acknowledged genetics as a factor influencing their mental health, or they may perceive other factors as more influential (such as the changes to society and lifestyle due to COVID-19). We found no significant associations between depression and ethnicity, age, gender, or year of study. These findings support previous publications [12], while contradicting others [13,15]. However, the influence of the pandemic may have reduced the effects of these variables. Degree subjects also exhibited an influence on depression scores, with Arts and Education students reportedly more depressed than those studying medicine or science subjects. This supports Bayram and Bilgel's [12] findings and challenges those of Thiemann et al. [16]. The consequences of the COVID-19 epidemic are likely to have accentuated differences, as access to arts and humanities resources were more limited than those related to science in most universities. The perception of reduced social support was strongly negatively associated with SRQ-20 scores and reflected the findings of others [4,10]. Although social support may have increased due to the intimacy of 'lockdowns', many students found their social circles shrank due to physical distancing and online teaching. This raises challenging questions about the extent that universities should be considered responsible for the welfare of their students' mental and physical well-being in

addition to their educational role.

A considerable strength of our study is the mixed-methods design, producing a comprehensive overview of 631 students' mental health using validated assessments [22]. This allowed us to investigate undergraduate depression during the COVID-19 epidemic. While other European countries have already addressed this issue [19], this is the first such study from the UK. However, the correlational design limits the extent to which cause-and-effect relationships can be inferred and, despite a large sample size, a modern university cohort is not necessarily represented. Our results were disproportionately drawn from white, female undergraduate students meaning ethnic minority groups were under-represented. These groups have been disproportionately affected by COVID-19 [29], so further research should be considered to fully address the effects of race on mood during the pandemic. Netsreab et al. [25] found optimal SRQ-20 thresholds differed between males and females, introducing the possibility of false negatives for male participants. However, our chosen threshold's sensitivity remained high [24], and no significant difference in SRQ-20 scores between genders emerged.

These results highlight several implications and general future research directions. Understanding the prevalence and triggers encourages steps to increase student engagement with university mental health services. Our study revealed a tendency towards self-harm and suicidal thoughts during the pandemic, in keeping with concerns expressed by others [30]. However, despite fears of a rise in suicide and self-harm amongst students during the pandemic [31], the latest figures suggest that there was no significant increase in suicide among young people over the last two years [32]. Increased

06



engagement could improve the safety of undergraduate student and this concept could be extended to a COVID-19 recovery plan for the entire student population. Such an approach has already been advocated for NHS workers [33], employing protective measures for current and future emotional well-being during the return to normality. For example, future research could explore the link between eating disorders and depression during the epidemic, aiming to prevent negative long-term mental health impacts.

In conclusion, our study demonstrates a greatly increased prevalence of depression among undergraduate students in the UK during the COVID-19 pandemic, revealing disordered eating and social isolation as major factors. Financial hardship and degree subject studied were also related to student mood levels. This work highlights the urgent need to address the wellbeing and safety of undergraduate students and could help inform the future provision of student mental health support at university, particularly during times of national adversity.

CONFLICT OF INTEREST

Neither author has any conflicts of interest or other disclosures to make

FUNDING

No sources of funding were procured for the puroses of this study

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