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Prevalence and psychiatric correlates of loneliness in UK university students

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University students remain vulnerable to the experience of loneliness and comorbid psychiatric difficulties, as evidenced in countries worldwide. In the present study, we examined the prevalence of loneliness among UK university students whilst assessing the association between multiple psychiatric risk factors. Here, $N = 1408$ students completed eight validated measures: Generalized Anxiety Disorder Scale; Patient Health Questionnaire; The Mood Disorder Questionnaire; The Sleep Condition Indicator; The Perceived Stress Scale; Suicidal Behaviours Questionnaire-Revised; The Prodromal Questionnaire 16; and the University of California Loneliness Scale. Moderate to severe levels of loneliness was reported by approximately two thirds of students (78.98%). Loneliness was significantly associated with each psychiatric symptom. After accounting for shared variance between symptoms, linear regression analyses determined loneliness to be significantly related to perceived stress, depression, psychotic like experiences and suicidal ideation. We demonstrate the exceedingly high prevalence of loneliness amongst large sample of UK university students, whilst highlighting the prominent role of depression, psychotic experiences, perceived stress, and suicidal ideation. Whilst highlighting the primacy of tailored interventions for lonely students, future work should explore contextual factors faced by UK university students.

Loneliness is an affective state, whereby a discrepancy exists between an individual's perceived social requirements and the extent to which these needs are satisfied through meaningful social interactions[1,2]. Here, the experience of loneliness in this population has been related to psychiatric and psychological symptoms including stress, anxiety, depression, insomnia, mania, paranoia, psychotic-like experiences, self-disgust, and suicidal ideation[3–8]. Similarly, socioemotional deficits are evidenced in lonely individuals in relation to the processing of social information, a crucial skill for successfully maintaining and developing social and interpersonal relationships[3,9,10], particularly in the context of the university lifestyle.

Whilst several studies have examined the role of loneliness in predicting mental health difficulties in UK university students, many fail to report the actual extent of loneliness experienced. Nevertheless, a handful of studies have provided prevalence data concerning the extent of loneliness experienced in the Uk student population. Based on a single-item question, data from the Student Academic Experience Survey evidenced 36% of UK university students experience weekly bouts of loneliness whilst 23% experience this feeling at a chronic level[7]. Moreover, estimates of loneliness in a small sample of UK university students have been comparable (64%)[5]. When sampling international students undertaking university-level study in the UK, Wawera and colleagues[11] evidenced the experience of loneliness to be highly prevalent (72%).

Retrospective Data from the UK government[12] sampling $N = 973$ university students aged 18–24 evidenced apprehension concerning loneliness in 54% of students prior to their first semester of study. Furthermore, when reflecting on the previous academic year, 24% of the sample reported feeling lonely most of the time, whilst 49% reported intermittent periods of loneliness. Taken together, reports of loneliness remain higher than those found in the UK general population. Indeed, data from the Community Life Survey[13] found 6% of the English general population reported feeling chronically lonely, whereas 19% periodically experienced such symptoms.

Formulating strong social bonds with other people remains a fundamental human need, providing intimacy, and belonging[14]. Here, the unmet need to belong often prompts cognitive processes that attempt to correct and facilitate the regulation of social behaviour in those experiencing loneliness[15,16]. In particular, cognitive biases of attention, interpretation and

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memory related to stimuli depicting social isolation and rejection[1]. In this context, hypervigilance of the social environment perhaps increases the likelihood of explicitly identifying social cues used to avoid rejection and gain inclusion (e.g., positive and/or negative emotional information in faces) whilst it also serves to increase the likelihood of these cues being interpreted in a threatening manner[17]. Consequently, lonely individuals experience an impaired opportunity to develop positive social relationships by avoiding situations perceived to be threatening in nature[1]. With that in mind, co-occurring psychiatric symptoms may theoretically serve to further perpetuate these cognitions both in the context of loneliness and the nature of symptom expression. Indeed, many key cognitive models of psychiatric disorders implicate the role of disorder-congruent cognitive biases in the development and maintenance of anxiety[18], depression[19], insomnia[20], suicidal ideation[21], stress[22], and psychotic-like experiences[23].

The current work sought to further examine the prevalence and psychiatric factors related to the experience of loneliness amongst a sample of UK university students. More specifically, we aimed to examine a) the prevalence of loneliness in the UK student population; b) possible relationships between loneliness and psychiatric symptoms of perceived stress, anxiety, depression, insomnia, mania, psychosis, and suicidal ideation; and c) the individual role of each psychiatric symptoms in predicting the experience of loneliness after accounting for shared variance.

Methods

The current work provides secondary analysis of pre-existing data made openly available in the journal Scientific Data[4].

Sample and procedure

In accordance with the British Psychological Society's Code of Human Research Ethics and the host institution's Research Ethics Policy, the study was approved by the Sheffield Hallam University's Research Ethics Committee (Protocol number: ER7368595), and all participants provided online informed consent prior to data collection. A cross-sectional online questionnaire-based study was implemented comprising of questions designed to assess the prevalence of loneliness and dimensional experiences of psychiatric symptoms which included: perceived stress, anxiety, depression, insomnia, mania, psychosis, and suicidal ideation. Demographic information regarding age, gender, ethnicity, student status (i.e. undergraduate or postgraduate) was also collected. Students from five UK universities were recruited through institutional course participation schemes (e.g., SONA Research Participation), student social media pages, and faculty emails. Only complete cases were used in the analysis due to the ethical right to withdraw from the survey at any time. The data were also examined for duplicate responses based on matching IP addresses, where none were found. This resulted in a sample of $N = 1841$ individuals who clicked a hyperlink to the survey landing page, which was delivered using the Qualtrics platform (Qualtrics, Provo, UT), and 1408 respondents (mean age = 20.94 ± 4.42, range 18–56, 83% female) providing complete data (final response rate = 76.5%) for analysis. Students who requested course credit were remunerated on completion.

Measures

The third version of the University of California Loneliness Scale (UCLAv3) was used to measure loneliness[24]. Here, 20 items (e.g., "I am unhappy doing so many things alone", "I feel completely alone", and "I feel isolated from others") are rated on a 4-point scale of (1=never, 4=often). Loneliness scores are calculated by summing the items (after reverse scoring) and ranged from 20 to 80, with higher scores indicating increased loneliness levels. Purported in the systematic review by Deckx[25], studies typically group the UCLAv3 grouped based on the following scores: 20–34 indicating a low degree of loneliness, 35–49 a moderate degree, 50–64 a moderately high degree, and 65–80 a high degree of loneliness. Indeed, previous work categorising the experience of loneliness based on this method determined satisfactory level of internal consistency ($\alpha = 0.89$–0.94) and test-retest reliability ($\alpha = 0.73$)[26–29]. The Cronbach's alpha for the UCLAv3 in the current study was $\alpha = 0.94$.

The Perceived Stress Scale: examined appraisal of stress levels over the past month[30]. Fourteen items, scored on a 5-point Likert type scale (0–4), are summed to provide total scores ranging between 0 and 56. Higher scores indicate higher levels of perceived stress. The internal consistency of the scale in the present study was 0.88.

The 7-item Generalized Anxiety Disorder Scale (GAD-7)[31] is a validated practical self-report anxiety questionnaire used in primary care. The tool asks respondents how often, during the last 2 weeks, they have been bothered by each of the seven core symptoms of generalized anxiety disorder. Responses choice are 0 = "not at all"; 1 = "several days"; 2 = "more than half the days"; and 3 = "nearly every day". Total scores range between 0 and 21 with cut offs of ≥5, ≥10, and ≥15 indicating mild, moderate, and severe anxiety levels, respectively. The GAD-7 has been shown to exhibit good reliability, as well as criterion, construct, factorial, and procedural validity[31]. Cronbach's alpha in the current study was $\alpha = 0.92$.

The 9-item patient health questionnaire (PHQ-9)[32] is a brief self-report depression scale used to assess depressive symptoms in the general population. Each of the nine depressive symptoms corresponds to the depression criteria of the DSM-5[33]. Respondents are required to indicate how much, during the previous 2 weeks, the symptom has bothered them on a scale of: 0 = "not at all", 1 = "several days", 2 = "more than half of the days" or 3 = "nearly every day". Total scores indicate depression severity and range from 0 to 27 with higher scores indicating higher levels of depression. The scale has been shown to demonstrate good criterion and construct validity[32]. Cronbach's alpha in the current study was $\alpha = 0.91$.

The sleep condition indicator (SCI)[34] examined insomnia symptoms against the DSM-5 criteria for Insomnia Disorder. The scale consists of eight items, each scored between 0 and 4, designed to examine insomnia symptomology during the last month. Specifically, questions pertain to sleep onset latency, awakenings during the night, perceived sleep quality, impairment of daytime functioning and symptom persistence. Items are summed to create a total score between 0 and 32, with lower scores indicating greater insomnia symptom severity. Previous large-scale studies show an excellent degree of reliability ($\alpha = 0.89$) and concurrent validity of the SCI[34]. Likewise, the current assessment of internal consistency (Cronbach's alpha) yielded a value of $\alpha = 0.89$.

The Mood Disorder Questionnaire: (MDQ)[35] dimensional symptom count was used to examine symptoms of mania (range 0–13). Here, participants provide yes/no responses to a prompting question "*Has there ever been a time when you were not your usual self and…*" followed by 13 responses such as "*…you had much more energy than usual*". Higher scores indicate higher levels of manic symptoms. The internal consistency of the scale in the present study was 0·83.

The Prodromal Questionnaire 16(PQ16)[36] was administered to assess psychotic experiences. Sixteen yes/no items evaluate the occurrence of positive/negative symptoms and avolition. Yielding a score between 0 and 16, higher scores indicate an increased presence of psychotic symptoms, with ≥6 suggesting an at-risk mental state. The internal consistency of the scale in the current study was 0.85.

Suicide risk was examined using the four-item self-report Suicidal Behaviours Questionnaire-Revised (SBQR)[37]. Specifically, four items examine lifetime ideation/attempt, frequency of ideation over the past 12 months, telling someone else about ideation, and likelihood of attempting suicide in the future. Items can be analysed individually and summated to create a total score ranging between 3 and 18. Higher total scores indicate greater risk of suicidal ideation. A score of ≥7 indicates significant risk for suicidal behaviour (Sensitivity, 93% and Specificity 91% in the adult general population)[37]. The internal consistency (Cronbach's alpha) of the scale in the present study was 0·84.

Statistical analysis

All analyses were carried out using IBM SPSS v.29.0 (IBM Corp., Armonk, NT, USA). Descriptive statistics (mean scores and standard deviations) were

calculated first. Next, participants were stratified by their extent of reported loneliness (low, moderate, moderately high, high). Following, a series of one-way analysis of variance (ANOVA) tests explored possible differences in the experience of loneliness based on gender and student status (under vs. postgraduate). Correlational analysis examined the relationship between participant age and loneliness, and inter-relationships between all variables. Finally, a hierarchical linear regression analyses (enter method), with bootstrapping (1000 resamples) and 95% bias-corrected and accelerated confidence intervals, was used to determine which specific psychiatric symptoms were associated with increased reports of loneliness (dependant variable) after controlling for age and sex. Bootstrapping is a robust alternative to standard parametric estimates when the assumptions around the latter may be violated, allowing for a more robust estimation of regression coefficients[38]. Significance was considered at the $p < 0.05$ level.

Results

Mean scores for each psychiatric symptom amongst the sample as a whole and split by loneliness status are presented in Table 1. The results determined that 21.02% ($N = 296$) of the sample were categorised as experiencing low levels of loneliness; 39.06% ($N = 550$) indicated moderate levels; 32.60% ($N = 459$) indicated moderately high levels; whereas 7.32% ($N = 103$) indicated high levels of loneliness. No gender differences (females: 46.02 ± 12.38; males: 45.20 ± 12.10) were observed in total UCLA3 scores ($F(2,1405) = 0.84$, $p = 0.43$). Likewise, no differences were observed between those studying at undergraduate (45.76 ± 12.33; $N = 1213$) and postgraduate level (46.70 ± 12.37; $N = 195$: $F(1,1405) = 0.97$, $p = 0.32$). Finally, increased age was significantly related to greater reports of loneliness ($r = 0.08$, $p = 0.002$). Figure 1 visually depicts the distribution of total UCLA3 loneliness scores.

Between-groups analysis demonstrated that increased group severity of loneliness was related to significantly greater symptoms of perceived stress, anxiety, depression, insomnia, mania, psychotic-like experiences and suicidal ideation (all p's < 0.001: see Table 1). Correlational analysis yielded similar outcomes where the experience of loneliness was significantly associated with greater reports of perceived stress, anxiety, depression, insomnia, mania, psychotic-like experiences and suicidal ideation (all p's < 0.001: see Table 2).

Hierarchical linear regression analysis was used to evaluate the direct and multi-variate association between loneliness and psychiatric symptoms of perceived stress, anxiety, depression, insomnia, mania, psychotic-like experiences and suicidal ideation. The analysis was completed in two steps: the first comprised of age and sex; with the second including each psychiatric symptom. Each variable's variance inflation factor remained below a score of five, ruling out severe multicollinearity between psychiatric variables in each model (see Table 3). Whilst both models were statistically significant (step1: $F = 5.75$, $p = 0.003$; step2: $F = 154.83$, $p = 0.001$), age and sex predicted <1% of the variance in loneliness whereas psychiatric symptoms in the second step predicted 50% (adjusted R^2) with a large multivariate effect size: Cohen's $f^2 = 2.45$[39]. As demonstrated in Table 3, the results evidenced greater levels of loneliness to be significantly related to higher symptoms of perceived stress (βCa = 0.46 [95% CI = 0.34–0.57], $t = 8.52$, $p = 0.001$,), depression (βCa = 0.44 [95% CI = 0.29–0.58], $t = 6.21$, $p = 0.001$), psychotic like experiences (βCa = 0.76 [95% CI = −0.59–0.92], $t = 8.66$, $p = 0.001$) and suicidal ideation (βCa = 0.45 [95%CI = −0.27–0.62], $t = 5.36$, $p = 0.001$).

Discussion

This work adds to the limited body of literature surrounding the prevalence and psychiatric correlates of loneliness in the underexamined population of university students in the UK. More crucially, after accounting for shared variance amongst psychiatric symptoms, we provide additional evidence that depressive symptoms, psychotic experiences, perceived stress and suicidal thoughts and behaviours are associated with greater loneliness. More specifically, we found that 78.98% of students reported moderate to high levels of loneliness.

Depressive symptoms, psychotic experiences, perceived stress and suicidal thoughts and behaviours were related to increased levels of loneliness. Evidence to date consistently describes the predictive role of loneliness in relation to symptoms of depression[40–42], psychotic experiences[42,43], perceived stress[6,42], and suicidal ideation both in the student and general populations[35,40,41]. With that in mind, university-level study typically presents substantial academic and psychosocial stressors which may accentuate vulnerability to psychiatric distress[43–46]. The presentation of depression involves blunted affect occurring alongside social, occupational, and inter-personal impairments typically manifesting in reduced concentration, fatigue, hopelessness, perceived worthlessness and disturbed sleep[47]. Due to diminishing the ability to adequately manage academic, social and interpersonal stressors, these symptoms likely interfere with the university lifestyle in a way that accentuates pre-existing withdrawal, social isolation and ultimately loneliness[7]. When paired with physiological and psychological effects of acute (e.g., gastrointestinal discomfort, headaches, and cognitive impairments)[42] and chronic stress (e.g., risk of diabetes, cardiovascular disease, fatigue, anxiety, disturbed sleep)[48–52], the overwhelming sensation of distress may serve to precipitate the onset of suicidal thoughts and behaviours[53].

Epidemiological data evidenced the experience of loneliness, lack of social contact and perceived dissatisfaction with social support networks to

Table 1 | Mean scores for each psychiatric measure for the whole sample and separated by loneliness status, alongside four-way group differences between loneliness groups and each measure

		Loneliness groups					
	Whole sample	Low ($N = 296$)	Moderate ($N = 550$)	Moderate high ($N = 459$)	High ($N = 103$)	Sig.	
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	*F*	*p*
Loneliness (UCLA3)	45.89 ± 12.33	28.99 ± 3.70	42.29 ± 4.31	56.10 ± 4.16	68.17 ± 3.14	3849.69	<0.001**
Stress (PSS)	20.88 ± 7.21	15.01 ± 6.53	19.56 ± 5.84	24.37 ± 5.78	29.24 ± 5.04	222.74	<0.001**
Anxiety (GAD-7)	9.25 ± 6.09	5.00 ± 4.24	7.95 ± 5.37	12.02 ± 5.58	16.03 ± 4.79	180.42	<0.001**
Depression (PHQ-9)	10.16 ± 6.73	5.17 ± 4.18	8.34 ± 5.39	13.37 ± 5.96	19.95 ± 5.08	278.52	<0.001**
Insomnia (SCI)	17.72 ± 7.47	21.01 ± 6.42	19.13 ± 6.87	15.47 ± 7.25	10.73 ± 6.77	81.55	<0.001**
Manic symptoms (MDQ)	5.46 ± 3.67	3.94 ± 3.32	5.39 ± 3.66	6.14 ± 3.57	7.17 ± 3.61	31.57	<0.001**
Psychotic experiences (PDQ-16)	4.21 ± 3.46	1.93 ± 1.83	3.49 ± 3.01	5.68 ± 3.38	8.14 ± 3.60	164.13	<0.001**
Suicidal Ideation (SBQ-R)	6.24 ± 3.70	4.24 ± 2.23	5.23 ± 2.81	7.61 ± 3.90	11.23 ± 3.60	172.02	<0.001**

± Standard Deviation, *UCLA3* University of California Loneliness Scale, *PSS* Perceived Stress Scale, *GAD-7*, Generalized Anxiety Disorder 7 Questionnaire, *PHQ-9*, The Patient Health Questionnaire 9, *SCI* Sleep Condition Indicator, *MDQ* The Mood Disorder Questionnaire, *PDQ-16* The Prodromal Questionnaire 16, *SBQ-R* Suicide Behaviours Questionnaire Revised.
**Sig at <0.001.

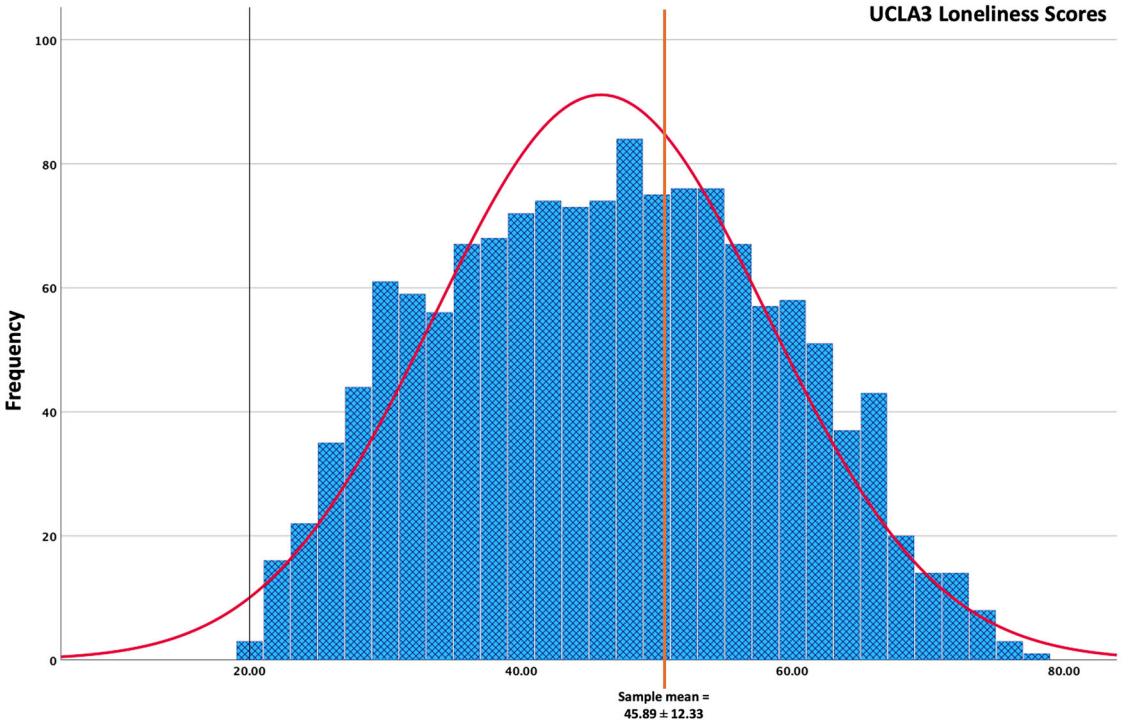

Fig. 1 | Distribution of Total UCLA3 Loneliness scores in the current sample ($N = 1408$ participants), which range between 20 and 80 where greater scores indicate increased severity of loneliness.

Table 2 | Correlations between the experience of loneliness and psychiatric symptoms for all participants

	1.	2.	3.	4.	5.	6.	8.
1. Loneliness (UCLA3)							
2. Stress (PSS)	0.61**						
3. Anxiety (GAD-7)	0.55**	0.74**					
4. Depression (PHQ-9)	0.64**	0.75**	0.77**				
5. Insomnia (SCI)	−0.40**	−51**	−0.54**	−65**			
6. Manic symptoms (MDQ)	0.27**	0.25**	0.27**	0.32**	−0.24**		
7. Psychotic experiences (PDQ-16)	0.53**	0.46**	0.47**	0.55**	−0.37**	0.44*	
8. Suicidal Ideation (SBQ-R)	0.53**	0.52**	0.50**	0.63**	−0.41**	0.31**	0.48**

UCLA3 University of California Loneliness Scale, *PSS* Perceived Stress Scale, *GAD-7* Generalized Anxiety Disorder 7 Questionnaire, *PHQ-9* The Patient Health Questionnaire 9, *SCI* Sleep Condition Indicator, *MDQ* The Mood Disorder Questionnaire, *PDQ-16* The Prodromal Questionnaire 16, *SBQ-R* Suicide Behaviours Questionnaire Revised.
*Sig at <0.05; **<0.01.

be reliable in predicting psychotic like experiences[43,54]. Whilst after controlling for sociodemographic factors, cross-sectional data found increased odds of psychotic like experiences (ratio = 1.32) amongst US university students classified as being lonely[55]. An effect consistent across subtypes of delusions, hallucinations and lifetime prevalence. In the US general population, Jaya and colleagues' found depression to mediate the relationship between psychotic experiences and loneliness[56]. Here, loneliness was strongly related to paranoia but not additional positive symptoms such as hallucinations and disorganised behaviour. Relatedly, previous work sampling individuals with schizophrenia evidenced loneliness to be related to a reduced perception of social support but not social contact[57]. Whereas, members of the general population indicating a perceived lack of social support displayed a fourfold risk of being lonley[58]. Taken together, co-occurring depressive symptoms and loneliness may perpetuate distortions of reality in situations of an isolated or social nature which consequently precipitates psychotic like experiences. As such, in the context of establishing preventative targets, future work should examine the relative roles of psychotic experiences, perceived social support, social contact, and symptoms of depression[59] to better understand the emergence of loneliness amongst the student population. Indeed, when left untreated, loneliness and comorbid psychiatric symptoms frequently predict the onset of suicidal ideation amongst university students[4,36,40,60].

Several limitations of the current work should be highlighted. The cross-sectional approach leaves the current outcomes vulnerable to inflation bias, and limits conclusions about causal relationships. Moreover, the sample was not comprised of a homogeneous population as white female young adults were overrepresented. However, whilst large scale data collection typically involves single item of bespoke questions which may fail to capture symptom severity and specificity[61], we opted to use well validated scales with robust psychometric properties. Finally, as complete case analysis was used, it is possible the outcomes may not be extrapolated to all students[62].

To summarise, the current outcomes demonstrated that a substantially large proportion of university students reported concerning levels of loneliness, which was independently related to greater reports of perceived stress, anxiety, depression, insomnia, mania, psychosis, and suicidal ideation. After accounting for shared variance, symptoms of depression, psychotic experiences, perceived stress and suicidal

Table 3 | Linear regression analyses with loneliness as the dependant variable, psychiatric symptoms as predictors

	R^2	βCa [95% CI]	*t*	Sig.	VIF
Predictors	0.007				
Step 1:					
Age		0.24 [0.11–0.38]	3.24	0.003*	1.00
Sex		0.86 [−1.07–2.60]	0.99	0.332	1.00
Step 2:	0.497				
Age		0.17 [0.07–0.26]	3.17	0.001**	1.03
Sex		−1.94 [−3.21–−0.61]	−2.98	0.004*	1.09
Stress (PSS)		0.46 [0.34–0.57]	8.52	0.001**	2.75
Anxiety (GAD-7)		0.06 [−0.07–0.20]	0.99	0.355	2.94
Depression (PHQ-9)		0.44 [0.29–0.58]	6.21	0.001**	4.22
Insomnia (SCI)		0.06 [−0.03–0.15]	1.41	0.179	1.78
Manic symptoms (MDQ)		−0.07 [−0.22–0.09]	−0.96	0.351	1.29
Psychotic experiences (PDQ-16)		0.76 [−0.59–0.92]	8.66	0.001**	1.68
Suicidal Ideation (SBQ-R)		0.45 [−0.27–0.62]	5.36	0.001**	1.76

Bootstrapped at 1000 resamples.

βCa Bias-corrected accelerated, *UCLA3* University of California Loneliness Scale, *PSS* Perceived Stress Scale, *GAD-7* Generalized Anxiety Disorder 7 Questionnaire, *PHQ-9* The Patient Health Questionnaire 9, *SCI* Sleep Condition Indicator, *MDQ* The Mood Disorder Questionnaire, *PDQ-16* The Prodromal Questionnaire 16, *SBQ-R* Suicide Behaviours Questionnaire Revised.

*Sig at <0.01; **<0.001.

thoughts and behaviours were related to greater reports of loneliness. Whilst reducing the experience of loneliness may offer a novel preventative target in the student population, additional research remains a priority in the UK.

Data availability

The dataset (demographics, psychiatric measures) has been anonymised and both individual datapoints for each psychometric measure and the scored data are available in CSV and SAV formats on Figshare [https://doi.org/10.6084/m9.figshare.24052236.v2].

Code availability

Please revise the original work for access to the original dataset and detailed information related to code availability[4].

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Author contributions

U.A., J.D., K.I., S.A., A.A., J.C.S. and M.G. to developing the design of this study and data collection. Data was analysed by U.A. Interpretation of results was conducted by U.A. An initial version of the manuscript was written by U.A. Following, input was sought from J.D., K.I., S.A., A.A., J.C.S. and M.G. who approved the final version of the manuscript.

Competing interests

U.A. is an Associate Editor for npj Mental Health Research. No other conflicts of interest are declared in relation to this paper.

Additional information

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