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ABSTRACT

In this study, we investigated the links between distance education students' mental health, connectedness, and academic performance during COVID-19, using a mixed-methods sequential explanatory design. Online survey responses with a sample of 208 distance education students—aged 18–84, 144 females, 60 males, three nonbinary individuals, most (163) self-identified as White British—were analyzed using multiple regression, mediation, and content analysis. Connectedness (loneliness and a sense of connection to university) mediated links between mental health (wellbeing and anxiety) and academic performance. A subsample analysis with students who met clinical concern thresholds of anxiety and wellbeing ($n = 123$) revealed that poorer wellbeing was associated with less emotional intimacy, more loneliness, and poorer self-reported academic performance. Anxiety was associated with less emotional intimacy and higher relational intensity with one person, and poorer self-reported academic performance. These pathways were triangulated and contextualized within students' experiences of connectedness. Future research using a longitudinal design is needed to establish causal links.

Introduction

Distance education has seen an important acceleration in response to the COVID-19 pandemic, becoming widespread in traditional campus-based universities. Consequently, illustrations of distance education students' experiences are now key to improving processes in education more widely. In addition, the pandemic has also created new pressures on mental health across global populations, but also more specifically for students, as is evident in multiple reports of rising mental health concerns among university students from an international body of literature (Cao et al., 2020;

Grubic et al., 2020; Xiong et al., 2020). The role of universities in respect to their students' mental health has not always been clear—with questions around how, and to what extent, universities should take on, alongside their core of providing education, responsibility for students' mental health (Hughes, 2021). The regulatory body for universities in England has encouraged universities to develop a whole- institution response that spans initiatives to support student wellbeing (prevention) as well as mental health and counselling services (Office for Students, n.d.). Yet, there is a lack of research, and particularly in distance education, on what universities could do "to reduce environmental stressors and promote protective factors in the university environment" (Baik et al., 2019, p. 676). This paper examines one potential locus for interventions to improve student mental health, namely students' relationships at university, and does so within the context of the largest United Kingdom distance education institution (The Open University, 2021).

Poor mental health in students clearly matters in and of itself but also due to its academic consequences. Both depression and anxiety have been found to negatively impact the academic performance of university students (e.g., DeRoma et al., 2009; M. Richardson et al., 2012). A report from the United Kingdom Office for Students (2019) found worrying evidence of a statistically significant difference in award outcomes for students with mental health disabilities compared to students with no disabilities. Mental health difficulties have been found to negatively impact level of attainment and progression (Hughes & Spanner, 2019; Thorley, 2017a) and whether students completed individual modules (Mojtabai et al., 2015); as well as their degrees (Thorley, 2017b).

One factor that could potentially be leveraged by universities as a protective factor for student mental health is the fostering of a sense of connectedness. The rationale for this has come from the longstanding research literature on the impact of relationships and social support (or their lack) on physical and mental health (e.g., Holt-Lunstad et al., 2015). There is evidence to suggest that university-based relationships have offered similar health impacts for students. For example, peer mentoring schemes were found to improve student wellbeing (Akinla et al., 2018; Collings et al., 2014) and reduce stress and anxiety (Kachaturoff et al., 2020). Good relationships with first-year personal tutors were also found to positively impact the wellbeing of students (Woolhouse & Nicholson, 2020). Research also suggests that a sense of belonging to a university community has contributed to a high level of wellbeing, satisfaction with life and a sense of meaning in life (Haslam et al., 2009).

As well as its link with mental health, there is evidence that a sense of connectedness at university impacts academic engagement and achievement. A large meta-analytic study found that students' emotional engagement, including their feelings about staff and peers as well as their sense of belonging in the educational institution, impacted their academic achievement (Lei et al., 2018). Furthermore, student retention was related to successfully making friends who provided emotional support (Wilcox et al., 2006) while peer relationships and a broader sense of institutional belonging and social integration promoted adjustment to university and student retention (Swenson et al., 2008; Thomas, 2000). Connectedness to the university is associated with degree completion (Hausmann et al., 2007; Wilson & Gore, 2013) as well as higher class attendance and better academic achievement, higher sense of efficacy and

competence when studying, higher motivation to study, and a greater amount of time devoted to studying (Freeman et al., 2007, Zumbrunn et al., 2014).

In a distance education context, there is evidence that mental health impacts academic performance, for instance, academic attainment, progression, and retention (e.g., Lister et al., 2021; J. T. E. Richardson, 2015; Waterhouse et al., 2020). In one recent study, Giusti et al. (2021) warned of the negative impact of distance education on the mental health of students, which they identified as the strongest predictor of poor academic performance. They concluded that more research is needed to identify students' psychological needs in distance education particularly during and post pandemic.

In a distance education context, there has been limited research on connectedness and how it may be a protective factor to support mental health and academic performance (Slagter van Tryon & Bishop, 2012). Connectedness in distance education has been constructed as *transactional presence*—defined as sensing the availability and/or connectedness with peers and tutors (Shin, 2003). Furthermore, Moore's (2018) theory of transactional distance similarly suggested that psychological distance could be bridged by dialogue and structure to overcome the disconnection of geographical distance. One study that examined students' sense of institutional connectedness and student community in online learning contexts found that it impacted student persistence in an online collaborative learning environment (Laux et al., 2016). Similarly, distance education students' perceptions of transactional presence with their peers and tutors were significant predictors of their learning as assessed with perceived learning achievement, satisfaction, and their intent to persist (Shin, 2003).

The present study

Despite the rise in distance education, the evidence of the impacts of mental health on academic performance, and the potential benefits of connectedness for academic performance, no study has directly investigated the links between connectedness, mental health, and academic performance in a distance education context. This mixed-methods study aimed to investigate these links, and in particular how connectedness might be a mechanism of action in the relationship between mental health and academic performance.

The three main variables in this study were assessed using nine brief and well-validated measures (Di Malta, Raymond-Barker, et al., in press; Topp et al., 2015; Spitzer et al., 2006). For mental health outcomes, we selected a wellbeing scale—the World Health Organization Well-being Index (WHO-5; Topp et al., 2015)—and a mental health scale—the Generalized Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006)—in order to cover both wellbeing and mental health and due to these measures being and having norms which allow for comparison with other populations in the United Kingdom (e.g., Jones et al., 2019). Anxiety was specifically targeted as a mental health variable because of its role in academic performance (Duncan et al., 2021). There were five scales selected to assess connectedness in students, which covered two areas of connectedness that have typically been associated with wellbeing and mental health. These were the Campus Connectedness Scale (Lee & Davis, 2000; Lee, et al., 2002) and the Relational Depth Frequency Scale-General (RDFS-g; Di Malta, Evans, et al., 2020), to

assess types of *collective connectedness*—characterized by a sense of belonging to a larger group or community (Cacioppo & Cacioppo, 2012); the Emotional Intimacy Scale (EIS; Sinclair & Dowdy, 2005) and the Relational Depth Frequency Scale-Specific (RDFS-s; Di Malta, Evans, et al., 2020) were used to assess aspects of *intimate connectedness*—characterized by the presence of a significant person or close friend (Cacioppo & Cacioppo, 2012; Di Malta, Bond, et al., in press); and the De Jong Gierveld Loneliness Short Scale (Gierveld & VanTilburg, 2006; Moeller & Seehuus, 2019) to assess disconnection. Academic performance was assessed using students' mean module scores (self-reported), and with a subjective assessment of students' self-reported satisfaction with their result. Our research questions were as follows:

1. Does connectedness mediate the relationship between mental health and academic performance? (RQ1)
2. For students who meet clinical thresholds for low wellbeing or anxiety disorders, how is connectedness associated with mental health? (RQ2)
3. What are students' experiences of connection and disconnection, which are associated with academic performance? (RQ3)

Materials and methods

An ethical review was obtained according to The Open University's code of practice and procedures on 17 December 2020, with the reference number HREC/3751/MOLLER.

Design

This study adopted a mixed-methods sequential explanatory design, which involved a quantitative phase followed by a qualitative phase (Creswell, 2014). In the quantitative phase, we explored relationships between the two mental health variables (wellbeing and anxiety), the five connectedness variables (campus connectedness, emotional intimacy and relational depth with a significant person at university, relational depth with all people at the university, and loneliness) and the two academic variables (mean academic grade and self-reported academic performance) (RQ1 & RQ2). The qualitative phase aimed to allow better understanding of the relationships between variables and contextualization of the statistical results (RQ3). More specifically it provided triangulation for the quantitative findings as well as illustrations of students' experiences of connectedness and disconnection based on their satisfaction with academic performance.

Distance education context

The study was conducted at The Open University—the world's first higher education distance learning institution, according to the Times Higher Education (2022). It is the largest academic institution in the United Kingdom with approximately 200,000 registered students, with most of them studying off-campus. Teaching is delivered via module tutors, using a blended design with a variety of online approaches to

communications technology, both synchronous and asynchronous (The Open University, 2021). Data collection started in the first quarter of the academic year 2020-2021 and lasted for a period of 6 months; this was at the time the UK government was imposing its third national lockdown in response to the COVID-19 pandemic (UK Parliament, 2021).

Procedure

The data was collected via an anonymized online survey using the data collection software Qualtrics (Baker, 2013). Eligible participants were those aged 18+ studying at The Open University. Participants were recruited via institutional email drives. Emails were sent to a pool of approximately 2000 students in the Faculty of Arts and Social Sciences. All participants were studying their second module and beyond and had had at least 1 year of study prior to completing the survey. The survey consisted of self-report scales and open-ended questions. One of the questions asked respondents to select a relationship at the university that had felt significant for them, on which responses to two of the connectedness scales were based (EIS; Sinclair & Dowdy, 2005; RDFS-s; Di Malta, Evans, et al., 2020). When selecting a significant relationship at university, over half the participants nominated an institutional tutor as their referent ($n = 117$; 56%), though nominated referents also included another student ($n = 41$; 20%), an individual in the student support team ($n = 7$; 3%), another individual at the institution ($n = 8$; 4%), or any other person with whom that individual had a relationship within the university ($n = 35$; 17%).

Measures

Mental health outcomes

- WHO-5 (Topp et al., 2015): 5 items, $\alpha = .90$. It included a stem statement reading "Please indicate for each of the five statements which is closest to how you have been feeling over the last two weeks. Notice that higher numbers mean better wellbeing." followed by a series of items (e.g., "I have felt cheerful and in good spirits") using response options from 0 (*at no time*) to 5 (*all of the time*). Higher scores indicate higher levels of wellbeing. Scores ≥ 50 indicate above average wellbeing levels (Topp et al., 2015).
- GAD-7 (Spitzer et al., 2006): 7 items, $\alpha = .92$. It included a stem statement reading "Over the last two weeks, how often have you been bothered by any of the following problems?" followed by seven items (e.g., "Feeling nervous, anxious or on edge") using response options from 0 (*not at all*) to 3 (*nearly every day*). Higher scores indicate higher levels of anxiety. Scores ≥ 10 indicate clinical anxiety (Spitzer et al., 2006).

Connectedness

- Campus Connectedness Scale (Lee & Davis, 2000; Lee, et al., 2002): 14 items (8 reversed), $\alpha = .92$. A self-report measure with items such as "There are people on campus with whom I feel a close bond") and response options from 1 (*strongly*

disagree) to 6 (*strongly agree*). The instrument was adapted for use in a distance learning context: the phrase "on campus" was replaced with "in the university". Higher scores indicate higher levels of connectedness at university.

- RDFS, comprising RDFS-g and RDFS-s (Di Malta, Evans, et al., 2020): 6 items, $\alpha = .93$. Di Malta, Cooper, et al. (2020) and Di Malta, Evans, et al. (2020) initially developed and validated the RDFS to measure relational depth between psychotherapist and client, a construct associated with improved mental health outcomes and satisfaction (e.g., Di Malta, Raymond-Barker, et al., in press; Kim et al., 2020). Di Malta, Bond, et al. (in press) later adapted the RDFS to assess close relationships in the community and found that it was significantly related to psychological wellbeing and moderated by emotional intimacy. This latter version of the RDFS was used in this study. Items included "We were deeply connected to one another," and response options ranged from 1 (*not at all*) to 5 (*most of the time*). The RDFS-g ($\alpha = .93$ in this study) assessed the frequency of relational depth with people using the modified stem "When considering my interactions with all the people I know at The Open University over the last academic year, there were moments where …". The RDFS-s ($\alpha = .91$ in this study) assessed relational depth in a chosen significant relationship at university using the modified stem "In my interactions with _____ there were moments where …". Higher scores indicate greater frequency of relational depth.

- EIS (Sinclair & Dowdy, 2005): 5 items, $\alpha = .87$. This is a self-report measure which began with the stem "Consider how well the following statements describe your current experience with < the referent>. Think in terms of the quality of your relationship with < the referent > in answering these items." Items included "This person completely accepts me as I am," and response options ranged from 1 (*strongly disagree*) to 6 (*strongly agree*). Participants were instructed to rate the same referent as the one chosen for the RDFS-s. Higher scores indicate a stronger sense of emotional intimacy with referents.

- De Jong Gierveld Loneliness Short Scale (Gierveld & Van Tilburg, 2006): 6 items, $\alpha = .78$. This is a self-report measure of emotional loneliness (3 items) (e.g., "I experience a general sense of emptiness"); and social loneliness (3 items, 3 reversed, e.g., "I miss having people around"). Response options were 2 (*yes*), 1 (*more or less*) and 0 (*no*). Higher scores indicate higher levels of loneliness. For this scale, scores ≥ 3 indicate loneliness (Gierveld & Van Tilburg, 2006). Our sample included 141 individuals with clinically relevant above-threshold levels of loneliness (67.8% of overall sample).

- Open-text questions. There were three open-text questions in the survey to elicit students' accounts and personal experiences of connectedness and disconnection with people at the university, and what they believed might improve their sense of connection at the university. The open-text questions were as follows:
  - Can you recall particular events or moments in the last academic year when you have felt emotionally connected to people at The Open University and/or to The Open University community? Please describe one to three of these instances. (Please do not name any individual when you refer to them.)
  - Can you recall particular instances in the last academic year at The Open University where you have felt alone or disconnected? Please describe one to

three of these instances. (Please do not name any individual when you refer to them.)
- Do you have ideas about what would make you personally feel more connected to The Open University? Please give as many ideas as you can think of.

Academic performance

- Mean module scores for previous academic year. Self-reported mean module scores for the prior academic year were recorded.
- Satisfaction with academic performance. Self-reported free-text academic performance data was available from 200 respondents. These free-text responses were recorded in response to the statement "In your view, how did you do in your modules overall in the last academic year?". This data was coded by the first author into inductively derived scale data ranging from scores of 0 (*not pleased*), 1 (*ambivalent*), and 2 (*pleased*). This data was then coded as either "not pleased," "ambivalent," or "pleased" by an additional independent coder blinded to the first coder's codes. Coding revealed good inter-rater agreement (91% agreement, $K = 0.85$). The 18 instances of coding differences reflected that the second coder, compared to the first coder, gave more positive ratings by one category in 12 instances (16.7% overall codes), by two categories in one instance (0.5% overall codes), and more negative ratings by one category in five instances (2.5% overall codes). Discrepancies between coder judgements were reviewed and allocated a definitive final code by a third coder to ensure the validity of final assumed categories.

Participants

There were 382 students who accessed the survey and, of these, 208 completed it. The response rate was approximately 10.4%. In total, 174 incomplete responses were excluded from analyses (55% complete responses). Most students had studied at least one module ($n = 155$; 77.5%). Where students had studied two ($n = 44$; 21.2%) or three modules ($n = 3$; 1.3%), average cross-module achieved scores were calculated. Of the 208 students in the study, 39.9% scored below 5 (low anxiety) on the GAD-7, 26.4% scored between six and 10 (mild anxiety), 20.7% scored between seven and 15 (moderate anxiety), and 13% scored above 16 (severe anxiety). For wellbeing, 36.5% scored below 37.5% (likely need some professional help), 24.1% scored between 37.5% and 52% (might need an assessment of professional health needs), 19.2% scored between 52.1% and 74.9% (below average wellbeing), and 20.2% scored above 75% (average or above wellbeing). Overall, there were 78 students above the clinical threshold for anxiety disorder (GAD7 $\geq$ 10; 37.5% overall sample), and 114 students were below clinical threshold levels for wellbeing (WHO-5 $\leq$ 49; 55% overall sample). Participants' demographics are reported in Table 1.

Analytic approach

Quantitative analysis

First, we sought to establish whether links were present between connectedness, mental health, and academic performance variables at a statistically significant bivariate

Table 1. Student characteristics ($n = 208$).

Study variables	Mean (*SD*) [score range]	N	% total sample
Age (years)	44.4 (14.69) [18–84]		
18–40		96	46
41–60		77	37
61+		34	16
Gender			
Female		145	70
Male		60	29
Nonbinary		3	1
Ethnicity			
White British		163	78
White other		30	14
Black British		7	3
Asian British		4	2
Mixed ethnicity		3	1
Disability status			
Identified disability		44	21
Mental health and autism		20	10
Musculoskeletal		8	4
Pain-related and fatigue		5	2
Sensory impairment		3	1
Neurological		3	1
Other disability		5	2
No identified disability		160	77
Learning mode			
Full-time		40	19
Part-time		159	76
Learning needs			
Identifiable learning needs			
Unspecified learning needs		22	11
Dyslexia		9	4
Needs linked to learning mode		2	1
No identified learning needs		169	81
Study variables			
WHO-5	51.2 (14.7) [0–100]		
GAD-7	8.1 (5.94) [0–21]		
Campus Connectedness Scale	2.9 (1.34) [1–6]		
RDFS-s	2.2 (1.06) [1–5]		
RDFS-g	1.89 (0.93) [1–5]		
EIS	2.8 (1.01) [1–6]		
Loneliness Short Scale	3.5 (1.91) [0–6]		
Academic scores (average for previous year)	75.1 (12.60) [20–95]		
Self-rated academic performance (% pleased)	1.35 (0.79) [0–2]		

level. Second, we conducted multiple regression as an exploratory assessment of whether connectedness and academic achievement variables were predictive of each mental health outcome when demographic variables are controlled for. Third, we explored mediation pathways between connectedness, mental health, and academic achievement variables where evidence of links between variables was apparent at earlier stages of analysis.

Mediation analyses were conducted to address whether connectedness mediates the relationship between academic performance and mental health (addressing RQ1 and RQ2). Mediation analyses were conducted using bootstrapping as a resampling method to estimate model parameters. Model 4 of Hayes' PROCESS version 3.4 was used for all bootstrapping mediation analyses (5,000 bootstrap samples were generated). Indirect pathways were specified in a parallel process model to assess possible

mediation of mental health and academic achievement variables via connected-ness measures.

We then tested correlations for the subsample of 123 individuals self-reporting clin-ical levels of high anxiety or low wellbeing or both high and anxiety and low well-being. Descriptive statistics indicated high subsample variability for mental health outcomes including for anxiety ($M_{Subsample}$ = 11.37, SD = 5.23) and wellbeing ($M_{Subsample}$ = 33.0, SD = 14.8). Given this variability, we reran previously specified mul-tiple regressions on the 123 "of-clinical-concern" participant subsample.

Qualitative analysis

Following this, open-text survey questions were analyzed to illustrate the relationships identified in the quantitative part of the study: students' experiences of connectedness depending on their self-reported academic performance. In order to do this, the first author initially split cases in two groups based on self-rated academic performance. She then used content analysis to systematically categorize open-text responses to determine the existence and frequency of particular themes within students' experien-ces of significant moments of connection, moments of loneliness, and suggestions for improvement (Coe & Scacco, 2017). The analysis was focused on the level of themes, or the level of meaning for segments of texts, and allowed flexibility to add categories through the coding process (Neuendorf, 2018). Themes were audited by the third author to increase validity and ensure that the coding adequately represented the specified phenomena.

Results

Phase 1: quantitative

Preliminary analyses

Given our sample's unequal ratio of men and women (70% female), gender differences were considered (see Table 2).

Regression and mediation analyses (RQ1)

Mann-Whitney U tests were run as a non-parametric equivalent test to explore gender differences in core study variables. These tests revealed nonsignificant differences between women and men on both academic variables, $p = \geq .594$; and on all five connectedness variables, $p = \geq .301$. However, female students reported higher anx-iety levels (U = 5439, $p < .01$, $\eta^2 = .05$) and lower levels of wellbeing than male stu-dents (U = 3114, $p < .001$, $\eta^2 = .05$).

At the bivariate level, close links were found between mental health variables and loneliness ($rs \geq \pm 0.36$), anxiety and academic performance ($rs \leq -0.18$), and between academic performance and campus connectedness ($rs \geq \pm 0.16$) (see Table 2). Better (more connected) campus connectedness was associated with bet-ter mental health outcomes and better academic performance (in both cases, as defined above).

We next ran multiple regression models (Table 3) to establish whether (and how well) connectedness, controlling for demographic and academic performance,

Table 2. Correlations between demographic and psychological variables.

Variables	1	2	3	4	5	6	7	8	9	10	11
1 Age	—										
2 Gender	−0.27***	—									
3 WHO-5 wellbeing	0.24**	−0.23**	—								
4 GAD-7 anxiety	−0.28***	0.22**	−0.67***	—							
5 Campus connectedness	0.04	0.06	0.27***	−0.20**	—						
6 RDFS-g	0.06	0.04	0.10	−0.07	0.60***	—					
7 RDFS-s	0.03	−0.02	0.13	0.03	0.41***	0.72***	—				
8 Emotional intimacy	−0.07	0.02	0.16*	−0.06	0.37***	0.58***	0.68***	—			
9 Loneliness	−0.21**	0.08	−0.54***	0.36***	−0.34***	−0.23**	−0.15*	−0.11	—		
10 Mean module scores (previous academic year)	0.05	0.02	0.16	−0.19**	0.03	0.09	0.06	−0.02	−0.24**	—	
11 Self-rated academic performance	0.00	0.02	0.15*	−0.18*	0.21**	0.23**	0.16*	0.12	−0.28***	0.43***	—

Note. $n = 170–208$; *$p < .05$ **$p < .01$ ***$p < .001$.

Table 3. Regression of mental health outcomes on age and gender, academic performance, and connectedness.

		WHO-5 Wellbeing Index			GAD-7 Anxiety		
Step	Variables entered	β	β	β	β	β	β
1.	Age	.20*	.17*	.10	−.22**	−.19*	−.16*
	Gender	−.14	−.17*	−.17*	.16	.19*	.22**
2.	Mean module scores	—	.16	.09	—	−.17*	−.17*
	Self-rated academic performance	—	.12	.01	—	−.15	−.15
3.	Campus connectedness	—	—	.21*	—	—	−.20*
	RDFS-s	—	—	−.02	—	—	.26*
	RDFS-g	—	—	−.21	—	—	.12
	Emotional intimacy	—	—	.17	—	—	−.23*
	Loneliness	—	—	−.43***	—	—	.22**
R^2		.08	.13	.35	.10	.16	.28
Model F		6.44**	5.82***	8.88***	8.04***	7.48***	6.24***

Note. *p < .05 **p < .01 ***p < .001

predicted mental health outcomes. All regression analyses were tested for lack of multicollinearity (VIF analysis), independence of associations (Durbin-Watson analysis), homoskedacity (Breusch-Pagan and Kenfer analyses) and lack of overly influential cases (Cook's statistic). No significant issues were found with any of these assumptions. WHO-5 wellbeing and GAD-7 anxiety were predicted independently by campus connectedness ($\beta = \geq \pm 0.21$, $ps < .05$) and loneliness ($\beta = \geq \pm 0.22$, $ps \leq .01$), and GAD-7 anxiety was also predicted independently by connectedness variables ($\beta = \geq \pm 0.23$, $ps < .05$).

Psychological predictors were reexamined in regression models with loneliness recoded as a dichotomous variable (below vs. at and beyond clinical threshold of scores ≥ 3). Results suggested that loneliness was a highly significant independent predictor of WHO-5 wellbeing ($\beta = -.37$, $p < .001$). GAD-7 Anxiety was independently predicted by loneliness ($\beta = .21$, $p < .01$), and at a $p < .05$ level by connectedness ($\beta = -.20$), relational depth frequency (specific) ($\beta = .23$), and intimacy ($\beta = -.24$). Psychological predictors were also reexamined in logistic regression models with recoded dichotomous outcome variables (and loneliness included as a binary predictor variable). WHO-5 wellbeing (below vs. at and beyond clinical threshold of scores ≥ 50) was independently predicted by connectedness (odds ratio = 1.64, 95% CI 1.124, 2.384), relational depth frequency (general) (odds ratio = 0.43, 95% CI .213, .850) and intimacy (odds ratio = 0.20, 95% CI .086, .460). GAD-7 anxiety (below vs. at and beyond clinical threshold of scores ≥ 10) was independently predicted by loneliness (odds ratio = 2.92, 95% CI 1.186, 7.195).

We subsequently sought to establish whether connectedness mediated the relationship between academic achievement and mental health (i.e., evidence addressing RQ1). Loneliness mediated the relationship between both WHO-5 wellbeing (95% CI .138, .417) and GAD-7 anxiety (95% CI −.071, −.014) and mean academic grade. Loneliness also mediated the relationship between both WHO-5 wellbeing (95% CI 2.185, 7.318) and GAD-7 anxiety (95% CI −1.318, −.286) and self-reported academic performance. We also found evidence that campus connectedness mediated the relationship between self-reported academic performance and WHO-5 wellbeing (95% CI .136, 3.284).

Initial evidence implicated loneliness as key to both academic performance and mental health. Accordingly, we next sought to establish whether connectedness mediated the relationship between loneliness and mental health (i.e., evidence addressing RQ2). Campus connectedness mediated the relationship between loneliness and both WHO-5 wellbeing (95% CI −1.499, −.096) and GAD-7 anxiety (95% CI .007, .411).

Clinical concern subsample regression analyses (RQ2)

Clinical subsample ($n = 123$) analyses revealed that lower levels of WHO-5 wellbeing were independently predicted by lower self-rated academic performance ($\beta = .23$, $p < .05$), lower emotional intimacy ($\beta = .29$, $p < .05$) and higher loneliness levels ($\beta = −.35$, $p < .01$).

Clinical subsample ($n = 123$) analyses also revealed that higher levels of GAD-7 anxiety were independently predicted by lower self-rated academic performance ($\beta = −.23$, $p < .05$), higher relational depth frequency (specific) ($\beta = .38$, $p < .05$), and lower emotional intimacy ($\beta = −.28$, $p < .05$). Taken together, the most consistent findings suggested that worse mental health outcomes were associated with lower levels of emotional intimacy and less favorable self-ratings of academic performance.

Phase 2: qualitative (RQ3)

The content analysis resulted in 17 main themes within three overarching domains. Frequencies for the two student groups and example quotes are presented in Table 4 and the Appendix.

Comparisons of students who were satisfied with their academic achievement ($n = 115$) with those who were ambivalent or dissatisfied ($n = 88$) suggested differences in experiences of connection and disconnection. Students less satisfied with their academic performance appeared to experience less connection via tutorials, student communities, and forums but tended to rely more on connection via their tutor relationships than students who were satisfied with their academic performance. Students appeared more likely to experience a general disconnection with the university and poorer interactions with their tutors when they were less satisfied with their academic performance.

Discussion

We sought to examine the relationships between mental health, connectedness, and academic performance in a distance education context. In this context, we found that student connectedness is associated with less anxiety and better academic performance. Furthermore, lack of connectedness (loneliness) is a mechanism of action in the link between mental health (wellbeing and anxiety) and academic performance. In other words, being lonely increases the chances of poor academic performance in students with worse mental health. A sense of connection to university, on the other hand, mitigates the experience of loneliness and its impact on mental health (wellbeing and anxiety). These findings are consistent with the extensive literature, which has identified relationships as protective factors for both mental health and academic performance in campus-based education contexts (e.g., M. Richardson et al., 2012;

Table 4. Moments of connectedness and disconnection among academically satisfied and dissatisfied students.

Emergent themes/subthemes relating to connection and disconnection	Satisfied with academic performance ($N = 115$) N (%)	Ambivalent or dissatisfied with academic performance ($N = 85$) N (%)	Illustration
1. Reports on moments of connection			
1.1. No moments of connection	35 (26)	46 (44)	"I have not felt emotionally connected to anyone during my OU studies"
1.2. Tutorials a. face-to-face b. online c. quiz nights and events	32 (24)	17 (16)	"The only time I've felt in any way connected is when we had an online tutorial and I mentioned something to do with baking and others were supportive and enthusiastic about it."
1.3. Student community a. WhatsApp group b. support on social media c. peer feedback/support d. friendship e. emotional sharing	29 (21)	11 (10)	"There was a personal group on WhatsApp where we would zoom call and support each other in a more personal way than some of the bigger groups"
1.4. Relationship with tutor/staff a. personal and supportive contact with staff b. kind, friendly, approachable, available, tutor c. encouraging feedback d. phone call	26 (19)	24 (23)	"I have felt highly appreciated by my tutor whilst I was struggling mentally with assignments and just being stressed in general"
1.5. Connection through forums a. provide support b. share frustration c. normalise feelings	14 (10)	7 (7)	"Trying to offer messages of support to people who are struggling on the OU forums makes me feel emotionally connected to my tutor group"
2. Reports on moments of disconnection	34 (28)	16 (17)	"I can honestly say that there isn't a time where I have felt completely alone and disconnected."
2.1. No moments of disconnection	31(25)	15 (16)	
2.2. Impact of COVID a. Exam cancellation b. Cancellation of tutorials c. Abrupt end, left adrift d. Lack of face-to-face contact			"during lockdown I felt alone"
2.3. Personal circumstances a. Not able to get to face-to-face events b. Mental health issues c. Family situations d. Writing assignments alone e. Not knowing students nearby f. Age gap	17 (14)	17 (18)	"The people in my current tutor group are much older than me and therefore I find it difficult to relate to them and be able to join in with their conversations in the forum".
2.4. Poor interactions with tutors or staff a. Cold, confusing or sarcastic emails b. deflecting queries c. unapproachable d. little contact/no response	16 (13)	22 (23)	"I don't feel like there was any effort made by my tutors to reach out to me, and I was too afraid to make contact with them too, and so I felt very disconnected."
2.5. Mostly disconnected all the time a. No particular instance	14 (11)	22 (23)	"Most of the year. Often sat at my computer and felt alone and unsure"

Table 4. Continued.

Emergent themes/subthemes relating to connection and disconnection	Satisfied with academic performance (N = 115) N (%)	Ambivalent or dissatisfied with academic performance (N = 85) N (%)	Illustration

2.6. Limitations with forum
  a. Lack of engagement or time to contribute
  b. Overwhelmed to see other students are ahead
	10 (8)	3 (3)	"When seeing all the comments on module forum - overwhelmed by the number of comments and not having the energy to read them all, yet wondering if I was missing out"

Woolhouse & Nicholson, 2020), but they extend the limited evidence that connectedness can support academic achievement in distance education (Shin, 2003; Slagter van Tryon & Bishop, 2012). An alternative explanation is that students who are both less anxious and doing well academically tend to form higher quality relationships, reaching out to create and maintain connection at university due to their confidence and self-efficacy (Lane et al., 2004). Another hypothesis is that the associations between student academic performance, mental health and relational connectedness in a distance university context are bidirectional.

In participants of clinical concern, worse wellbeing is associated with less emotional intimacy, more loneliness, and lower self-reported academic performance; increased anxiety is associated with high relational depth but in the context of low emotional intimacy with one selected individual at university (typically a tutor or another student), and lower self-reported academic performance. The latter finding is somewhat surprising in the light of previous evidence linking relational depth to overall positive psychological outcomes (e.g., Di Malta, Raymond-Barker, et al., in press; Kim et al., 2020). However, recent evidence has suggested that emotional intimacy moderates the impact of relational depth on wellbeing in close relationships in the community (Di Malta, Bond, et al., in press). Thus, in a distance education context, its association with anxiety and poor subjective academic performance is likely due to low levels of emotional intimacy.

Furthermore, these findings make the link between mental health and academic achievement in the context of distance education during COVID-19. As per Giusti et al.'s (2021) study—conducted in Italy during this period—we found that student mental health in our sample was particularly poor; with over half with low wellbeing and almost 40% at clinical levels of anxiety. However, these rates of wellbeing are comparable to those of distance-based law students prior to the pandemic starting (Jones et al., 2019). Thus, it is possible that distance education students' wellbeing and mental health is poorer independently of the pandemic context. Based on internal data from The Open University, the majority of students have been juggling study alongside work and/or caring responsibilities and may be carrying significant stress as a result. Also, the university has a significant number of students who have declared a mental health-related disability. Thus, it is possible that students choose to study with a distance education provider because they have preexisting mental health conditions that, they feel, would preclude or prevent them from studying at a campus-based university.

Our findings corroborate with those of Giusti et al. (2021), suggesting that poor mental health may be a significant predictor of poor academic performance. This research, however, also brings a potential answer to Giusti et al.'s recommendations for the need to identify students' psychological needs in order to refine educational offerings and improve mental health in distance education; that is, students' needs for connectedness as identified in our study: having a sense of connectedness to university and emotional intimacy with at least one significant person at university.

Finally, our qualitative findings provide descriptions of students' experiences of connectedness and triangulation for the quantitative findings. These suggest that students appeared less likely to have had significant moments of connection at university when they were less satisfied with their self-rated academic performance. Students' descriptions of connectedness in a distance education context are consistent with Moore's (2018) theory that transactional distance involves the psychological (rather than geographical) distance between learners and the teacher (Moore & Kearsley, 2011). Furthermore, students appeared more likely to report on experiences of general disconnection with the university and poorer interactions with their tutors when they were less satisfied with their academic performance. Students' descriptions of their experiences of connectedness suggest that those less satisfied with their academic performance may experience less connection via tutorials, student communities, and through forums, on the other hand, they may rely more on connection via their tutor relationships. These findings illustrate quantitative findings by offering insights into how aspects of connectedness can support mental health and academic performance. Although better students seem to thrive on social connectedness (e.g., via group forums, group tutorials and student communities), poorer students, on the other hand, may rely more on a one-to-one connection with their tutor in order to feel connected. This is consistent with the psychotherapy literature, which has suggested that individuals who are more vulnerable are also more dependent and thrive better on having a deeper connection with another person (e.g., Mearns & Cooper, 2017). As per students' reports within this distance education context, some students chose to maintain a distance from the university and have made a choice not to connect with others. This is reflected in the qualitative findings, where some students suggested they did not expect or want a close connection with the university (Appendix).

Our study is limited in several ways. First, relative to recently documented demographic characteristics of the general population of students in UK higher education, our participants included a large proportion of female students (70% vs. 57% nationally) and of students self-identifying as White (92% vs. 75% nationally) and a much lower proportion of younger students (7% vs. 69% nationally aged 18–24 years) (Higher Education Statistics Agency, 2019). Second, the study design was cross-sectional, and thus we cannot draw conclusions about causation between variables. Third, samples were small and significance levels were only at the level of $p < .05$; thus, these results must be taken with caution. As stated, data collection occurred mid-COVID-19 pandemic, which may have strengthened the links between our variables and may have particularly emphasized students' high levels of loneliness and mental health difficulties. As a result, these findings may be generalizable to students in distance education in times of crisis or particular conditions of isolation but also provide insights into what distance education may be like for individuals who are at risk of isolation (e.g., elderly people).

Future research should explore the impact of connectedness on mental health and academic performance using a longitudinal design in order to assess potential causal links. Such study would provide evidence, which could support the implementation of new distance education policies, as well as practical implications such as the creation of tutor and staff training, or guidelines for best practice in distance education.

Implications for distance education

At the start of this paper, we discussed the lack of research on what universities could do to promote protective factors in the university environment for student mental health. This study highlights the particularly important mental health needs of distance education students. Based on our findings, we propose the following recommendations for distance education providers:

1. Universities need multiple solutions to enable moments of connection to occur. This includes clear visible routes to these potential connections outside of the formal timetabled teaching events.
2. Students would benefit from opportunities for connection through access to personal contact with their tutors, such as 1-to-1 phone calls, personal emails, and ad hoc communication.
3. University staff might benefit from guidelines on the benefits of making opportunities for connection as well as how to be helpful to students who approach them. Tutors may need support on being proactive and reaching out to those students who do not make contact with the university.
4. Finally, universities should consider increased opportunities for connections to peers and the university in both academic and social aspects of the university environment. This may be through targeted peer support through peer mentoring (both in and out of a course) and community programs outside of the formal learning environment. In a distance learning environment, these opportunities for connection may need to occur through online interaction.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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Appendix: Students' suggestions to improve connectedness at university

Satisfied with academic achievement (N = 115)			Dissatisfied or ambivalent with academic achievement (N = 88)		
	N	%		N	%
More tutorials	49	37	More tutorials	24	29
• Face-to face	31		• Face-to-face	12	
• Online	18		• Online (with video)	12	
Contact with tutors	33	25	Contact with tutors and OU staff	34	41
• More emails/checking in			• Continued contact		
• Reminders of support available			• More contact		
• Introductory/welcome phone call			• Engagement/responding to emails		
• Someone at the end of the phone			• Phone calls		
• Regular phone calls			• One-to-one support		
• Contact via OU app			• One educational advisor/ mentor throughout studies		
• Tutors to engage in forum discussions			• Regular video conference to check in		
• Regular wellbeing check-in			• Empathetic tutor		
• More one-to one contact			• To encourage engagement with forum		
• Posting at least once a week			• Occasional personal emails to check in		
• Regular group emails			• Regular, relevant, and upbeat communication from OU		
• New year email					
• Being friendly and polite			• Tips for mental health and working alone		
• Employing tutors who genuinely care			• Smaller tutor groups		
• Scheduled video calls					
• Tutors proactively engaging in making personal contact					
Connectedness to peers	31	24	Connectedness to peers	19	23
• Annual social evening with music, food, drinks			• Social events		
• Graduation ceremony			• Interest/similarity groups		
• Local meet ups			• Local tutorials		
• Zoom/online socials			• Opportunities for teamwork		
• Book clubs			• In-person meeting		
• Social events for each region			• Assigned study partners		
• Official WhatsApp group			• Cluster group Zoom days		
• Official social media groups			• Team meeting style get-together/catch up		
• Voluntary buddy system			• Creating student teams at start of each module		
• Small peer support groups			• Forums for people of similar age groups		
• Group activities					
• Tailored Q&A peer support forums			• Study rooms other than forums		
• Informal coffee mornings			• Support groups		
• Small study groups			• Sharing writing		
• Special interest groups and forums			• Mandatory introductory meeting		
Happy as it is and/or OU doing enough	10	8	Happy as it is and/or OU doing enough	2	2.4
Technology	8	6	Technology	3	3.6
• OU app to interact with students and tutors			• Chat base interface		
• Opening tutor forum sooner for students to start interacting before course starts			• WhatsApp group		
			• Reminders for lectures		

(*continued*)

Continued.

Satisfied with academic achievement (N = 115)			Dissatisfied or ambivalent with academic achievement (N = 88)		
	N	%		N	%
• OU platform used as social media instead of Facebook • Reformatting forums to make them more user friendly • Use of avatars in forums/ emoticons					
Other • Mental health team • Student association • Interesting area outside of module	7	6	Other • Support person outside of module • Informal communication • OU merchandise	2	3