COVID-19 and Loneliness in Higher Education: a UK-based cohort comparison study

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Abstract. COVID-19 changed university life worldwide as campuses closed or offered restricted in-person teaching. Whilst early evidence suggests that educational experiences were satisfactory, concerns were raised about the impact of COVID-19 on social and psychological elements of university including student loneliness. We conducted a UK-wide cross-sectional cohort comparison study using an anonymous online survey measuring loneliness and the factors which may predict it: belonging (need to belong and achieved belonging), social support, and social identity. We found that students who began their studies at the height of the pandemic (2020/21) or after restrictions largely lifted (2021/22) had a reduced sense of belonging compared to those who started earlier (2019/20), suggesting some long-lasting effects on students. Whilst there were no significant cohort differences in loneliness, need to belong, sense of belonging, and social support were significant predictors of loneliness, suggesting these factors could be targeted to reduce loneliness in students going forward.

Keywords: loneliness, social identity, belonging, pandemic, university

Introduction

The World Health Organization declared COVID-19 a pandemic in March 2020 (World Health Organization, 2020) and subsequently university campuses around the world closed, resulting in unprecedented disruption to Higher Education (Daniel, 2020). The campus closures occurred close to the end of the 2019/20 academic year and, therefore, most undergraduate students had completed or near-completed their formal teaching but experienced disrupted assessment including examinations. However, as the pandemic continued, university campuses remained largely closed, or offered only

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limited access for students due to social distancing in the following academic year (2020/21), which was punctuated by lockdown periods, a 'stay at home' mandate, and tight controls on social activities including group sizes to reduce spread of the virus. It was only in the 2021/22 academic year that teaching returned to full campus offerings with no social distancing, but use of face masks in classes. The change to university education during this time, whilst a fast and unexpected transition, could be considered a rapid acceleration of, until then, a slower pace of change towards greater use of technology enhanced learning and online learning platforms (Murphy, 2020). Correspondingly, early research studies suggest that students were satisfied with the online learning offered during the pandemic (Bingimlas, 2021; Jiang et al., 2021).

Although the research into teaching and learning suggests that the effects of COVID-19 on the educational experience were reasonably well-mitigated (Alghamdi, 2021), concerns have been raised about the impact of the pandemic on the wellbeing and mental health of students (Savage et al., 2020). This is unsurprising and necessary given that there has been a sense of crisis building around the mental health and wellbeing of young adults, and particularly university students in the years immediately prior to the pandemic. This has been conspicuous in the media, government briefings and interest group reports (Equality Challenge Unit, 2015; Higher Education Policy Institute, 2016; Institute for Public Policy Research, 2017). Additionally, demand for mental health services within universities has been consistently rising with 25% of students being seen or on waiting lists for university counsellors at some institutions (Institute for Public Policy Research, 2017). Against this backdrop of concern about student mental health, researchers and students themselves identified concerns about the impact of the lack of in-person social contact and interaction that arose because of online learning combined with the social restrictions caused by COVID-19, on students' mental health (Lyons et al., 2020). These concerns have also been echoed in the general media (Blackall & Mistlin, 2021). It is suggested that the lack of in-person social contact is likely to have increased levels of loneliness in students, as has been found for the general population during the pandemic (Killgore et al., 2020) with research indicating that loneliness varied with the time spent in lockdown (Carollo et al., 2021a, 2021b). Loneliness can arise when social connections are considered to be insufficient or unfulfilling (de Jong Gierveld & Havens, 2004). Whilst social isolation itself does not need to be a problem, loneliness can be associated with mental health concerns along with poorer health behaviour, educational attainment, and social mobility (Matthews et al., 2016). Research has established links between loneliness and mental illnesses including depression (Lapierre & Poulin, 2020), suicidal ideation (Killgore et al., 2020), schizotypal traits, and paranoia (Wong et al., 2021). Moreover, evidence suggests that, for doctoral students at least, existing mental health concerns were associated with poorer coping skills during COVID-19 (Sideropoulos et al., 2021), which could leave them more vulnerable to loneliness. Critically for undergraduate students, research suggests that the transition from adolescence to adulthood, which typically co-occurs with the transition into university at undergraduate level, is a high-risk period for loneliness (Office for National Statistics., 2018) and points of life transition are recognised as risks

(Child & Lawton, 2019; Siva, 2020). Crucially, students often expect university to be a sociable environment where they can make friends and join in with a range of group activities, outside of teaching, meaning that this is a period of naturally high expectations, which could increase the risk of an expectation-reality mismatch. Furthermore, research shows that not all students are impacted equally. For example, international students experience greater levels of loneliness with greater perceived discrimination, with lower host culture acculturation most associated with loneliness (Neto, 2021). Interaction with university support services is thought to be important in expanding social networks for non-home students (Wawera & McCamley, 2020), and this is likely to have been negatively impacted by the pandemic.

Although loneliness can arise when social connections are not perceived as adequate or fulfilling, exactly which constructs underpin loneliness is not fully understood. In adolescence, loneliness is known to vary according to context and who forms the company we keep, with friends being more important than family in reducing loneliness during this developmental period (van Roekel et al., 2014). The transition into university is typically a period in which new friendships are sought and created as old connections are disrupted with students moving to new places and starting new activities as part of their studies. Indeed, the friendships held during the first year of university have been found to significantly reduce loneliness (Jimenez-Bush, 2015; Pressman et al., 2005). It is plausible that the pandemic disrupted students' abilities to create these meaningful relationships, especially for those who started university in 2020, at the height of the pandemic. These relationships would typically provide social support, and, therefore, the lack of them may have contributed to loneliness both in the short and longer term. In addition, the inability to attend the university campus and interact in person with peers could have impacted on whether an individual sees themselves as a student, that is their sense of social identity as a student. Indeed, this has been previously recognised as an issue for companies using remote working (Krug et al., 2021) and noted to be a predictor of psychological resilience in adolescence (Koni et al., 2019). The Social Identity Approach to Health suggests that the groups we belong to give us a sense of belonging and meaning which, in turn have beneficial effect on health and wellbeing (Jetten et al., 2017). As such, the pandemic could have impacted on students' social identity as a student and their sense of belonging within the university-context, both of which might have impacted on loneliness beyond the acute transition period. Given the potential for the pandemic to impact on loneliness in students we aimed to investigate whether students who transitioned into university at the height of the pandemic (2020/21) (i.e., when campuses were largely closed or restricted due to distancing), experienced greater loneliness, and scores on measures related to loneliness, than those who transitioned either before (2019/20) or after the height of the pandemic (i.e., when campuses fully re-opened, with masks required) (2021/22). Specifically, we hypothesised that those starting university during the 2020/21 academic year would have higher levels of loneliness, underpinned by reduced social identity, sense of belonging, and perceived social support, in comparison to students who transitioned into university either prior to the pandemic (2019/20) or after it (2021/22).

Methods

Participants

To participate in this study, individuals had to be aged 18 years or older and current full-time undergraduate students registered to study at a UK university on a campus-based degree programme, i.e., one which under normal circumstances would have in-person or face-to-face teaching. They must have started their studies in one of the following academic years: 2019/20; 2020/21; 2021/22. Participants were recruited via social media adverts, university research volunteer circulars, and research participation platforms. Adverts contained a direct link to an anonymous online survey which took approximately 15-minute to complete. Data were collected between November 2021 and February 2022. Power analysis for the planned MANOVA (G*Power; $\alpha = .05$, $f = .25$, $\beta = .95$) indicated 251 participants would be needed in total. The same parameters were used to calculate the sample size for a regression analysis of loneliness with 16 predictors, demonstrating a sample of 129 would be sufficient. Based on this, we aimed for a final sample size of 251. Given the lack of existing data on this topic it was not possible to be certain of the expected effect size. However, previous a meta-analysis focusing on young people and looking at predictors of loneliness, including social support measures similar to the current study, had found medium effect sizes (Mahon et al., 2006)

Survey

The online survey was divided into four sections. Section 1 assessed demographic characteristics asking participants to indicate age, gender, ethnicity, and disability status. Section 2 collected information regarding their studies including: academic discipline, student or fee status (home i.e., a UK citizen or resident/EU/International), and start year. Students were also given the option of identifying their university but could choose not to. Section 3 contained four measures of the variables we expected to be related to, and predict, any differences in loneliness between the three cohorts, which are detailed below. Firstly, the 11-item Social Identity Scale (SIS) (Cameron & Lalonde, 2001) was adapted for students (e.g., 'I often think about the fact that I am a university student'). Items were positively worded and ranked on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). This scale can be used as a single average score ($\alpha = .758$) or divided into three subscales measuring ingroup ties ($\alpha = .861$), ingroup affect ($\alpha = .762$), and centrality ($\alpha = .728$), which refers to the enduring relative importance given to a particular identity component or domain, in this case being a student. Higher scores indicate a stronger social identity. Secondly, we used a modified version of the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988) in which participants also rate statements (e.g., 'I have friends with whom I can share my joys and sorrows') on a 7-point Likert Scale (1 = strongly

disagree, 7 = strongly agree). This scale can be broken down into support from friends, family and a significant other, each measured by four items. To modify the scale, four items were added to focus specifically on university friends (e.g., 'I can count on my university friends when things go wrong.') where university friends were defined as those who are either met through studies or university-related activities (e.g., societies, clubs, halls, student union, fresher's events, etc.) in contrast to all other friends you have outside this. This scale can be used as a whole (α = .907) or as individual subscales for friends (α = .888), family (α = .908), significant other (α = .948), and, in this adapted version, university friends (α = .927). In all cases higher scores indicate greater social support. Thirdly, the 12-item General Belongness Scale (GBS) (Malone et al., 2012) was used to measure how much students felt they belonged by ranking statements (e.g., 'When I am with other people, I feel included') on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Half of the items were reversed scored such that higher overall scores indicate a greater sense of belonging. As with the SIS, this scale can be considered as a single averaged score (α = .915), or divided into two subscales, measuring acceptance/inclusion (α = .887) and rejection/exclusion (α = .883) where higher scores indicate greater acceptance and less rejection, respectively. Given that how much an individual perceives themselves to belong may partly relate to how much they need to belong (Malone et al., 2012), we also used the Need to Belong Scale (NBS), a 10-item scale in which participants rate statements (e.g., 'If other people don't seem to accept me, I don't let it bother me.') on a 5- point Likert scale (1 = strongly disagree, 5 = strongly agree) (Leary et al., 2013). Three items are reverse scored such that a higher score indicates a greater need to belong (α = .739). The final scale score is an average across all items. Table 1 summarises the scales included in Section 3 of the survey.

Table 1. Summary of the measures included in the survey that were expected to relate to loneliness

Scale Measure	Ratings	Number of Items	Example Item	Reliability
Social Identity Scale (SIS)	1-7	11	I often think about the fact that I am a university student	.728
Modified Multidimensional Scale of Perceived Social Support (MSPSS)	1-7	16	I have friends with whom I can share my joys and sorrows	.907
General Belongness Scale (GBS)	1-7	12	When I am with other people, I feel included	.915
Need to Belong Scale (NBS)	1-5	10	If other people don't seem to accept me, I don't let it bother me.	.739

Finally, Section 4 contained the three-item UCLA Loneliness Scale (Hughes et al., 2004; Russell, 1996) where items were rated by frequency of feelings (1 = hardly ever, 2 = some of time, 3 = often) and summed to compute a total score between 3 and 9 (α = .806). Higher scores indicate higher levels of self-perceived loneliness with those scoring 3-4 considered not lonely, those scoring 5-7 are sometimes lonely, and 8-9 are mostly lonely. This scale of loneliness was selected because it is the most

commonly used scale, allowing potential comparisons with other work and is recognized as being appropriate in contemporary settings (Buecker et al., 2021; Pinquart & Sorensen, 2001). Additionally, it has been used in previous COVID-related studies of university students worldwide (Dinu et al., 2022; El-Monshed et al., 2022; Padmanabhanunni & Pretorius, 2021).

Sample characterisation

The survey was completed by 241 participants. Six were excluded because they reported studying outside of the UK or at an exclusively distance-learning university and, therefore, did not comply with the inclusion criteria, leaving 235 for analysis. Of these, 174 identified their university and 64 institutions were named, including those in the Russell Group, defined as world-class, research-intensive universities, Oxford and Cambridge Universities, and Post-92 universities, defined as newer universities including former polytechnic colleges, suggesting a good spread across the sector. Table 2 provides a summary of the sample demographic and study characteristics as a total cohort and by individual year group.

In terms of cohorts for comparison, 93 (39.6%) begun their studies pre-pandemic in 2019/20, 81 (34.5%) began during the pandemic in 2020/21, and 61 (26%) began after a return to campus teaching in 2021/22. Overall, 95 (40.4%) identified as male, 136 (57.9%) as female, and 4 (1.7%) indicated other. There was no significant association between gender and cohort, $\chi^2(2) = 3.44$, $p = .179$. Ethnicity was considered in terms of the four main groups (68.3% white, $n = 151$; 8.1% mixed, $n = 19$; 16.2% Asian, $n = 38$; and 5.5% black, $n = 13$) to avoid multiple categories with low numbers. As with gender, there was no significant association between ethnicity and cohort, $\chi^2(6) = 9.18$, $p = .164$. The mean age for all participants was 21.53 years ($SD = 4.32$) and, as might be expected, this differed significantly by cohort, $F(2, 232) = 4.69$, $p = .01$, with significant differences between each subsequent cohort, although it was actually the middle cohort who were the oldest on average. Most participants ($n = 155$, 66.0%) did not report a disability and a small number preferred not to answer this ($n = 5$, 2.1%). Of those who did declare a disability ($n = 75$), 17 reported a physical disability, 5 reported a sensory disability, 14 reported a learning difference, 58 reported a mental illness and 8 reported another kind of disability. Given the small numbers in each category, the three cohorts were compared only in terms of overall disability status (no disability/reported disability) which revealed no significant association between cohort and disability, $\chi^2(2) = 2.722$, $p = .256$.

For study characteristics, most students were home or UK students ($n = 187$, 79.6%), followed by international students ($n = 32$, 13.6%) and EU students ($n = 16$, 6.8%) and this did not differ by cohort, $\chi^2(4) = .92$, $p = .922$. Discipline of study was classified as subjects allied to medicine ($n = 59$, 25.1%), arts and humanities ($n = 42$, 17.9%), social science and economics ($n = 90$, 38.3%), and natural and mathematical sciences ($n = 44$, 18.7%). Discipline did differ significantly between the study year groups, $\chi^2(6) = 14.0$, $p = .029$. Inspection of the data indicates that students were more likely to be studying

subjects allied to medicine and natural and mathematical sciences in the first cohort and more likely to be studying arts and humanities or social science and economics in the later cohorts.

Table 2. Demographics and study characteristics of the sample

Characteristics	All (*N* = 235)	2019/20 (*N* = 93)	2020/21 (*N* = 81)	2021/22(*N* = 61)
Age in years *M* ± *SD*	21.53 ± 4.32	21.95 ± 4.07	22.12 ± 4.55	20.09 ± 4.11
Gender *N* (%)				
Male	95 (40.4)	45 (48.4)	28 (34.6)	22 (36.1)
Female	136 (57.9)	48 (51.6)	51 (63.0)	37 (60.7)
Other	4 (1.7)	0	2 (2.5)	2 (3.3)
Ethnicity *N* (%)*				
White	151 (68.3)	59 (63.4)	60 (74.1)	32 (52.5)
Mixed	19 (8.1)	6 (6.5)	4 (4.9)	9 (14.8)
Black	13 (5.5)	7 (7.5)	3 (3.7)	2 (4.9)
Asian	38 (16.2)	15 (16.1)	11 (13.6)	12 (19.7)
Disability *N* (%)				
No	155 (66.0)	67 (72.0)	49 (60.5)	39 (63.9)
Yes	75 (31.9)	25 (26.9)	29 (35.8)	21 (34.4)
Prefer not to say	5 (2.1)	1 (1.1)	3 (3.7)	1(1.6)
Fee/Student Status *N* (%)				
Home/UK Citizen	187 (79.6)	74 (79.6)	65 (80.2)	48 (78.7)
EU	16 (6.8)	7 (7.5)	6 (7.4)	3 (4.9)
International	32 (13.6)	12 (12.9)	10 (12.3)	10 (16.4)
Academic Discipline *N* (%)				
Arts & Humanities	42 (17.9)	12 (12.9)	16 (19.8)	14 (23.0)
Social Science & Economics	90 (38.3)	28 (30.1)	36 (44.4)	26 (42.6)
Medicine & Allied Healthcare	59 (25.1)	31 (33.3)	13 (16.0)	15 (24.6)
Natural & Mathematical Science	44 (18.7)	22 (23.7)	16 (19.8)	6 (9.8)

Because data were collected across over 60 UK universities, assessment of representativeness of the sample must be at a UK level rather than individual institutions. Such data are provided by the Higher Education Statistical Agency (HESA), who have published data for all years up to and including the 2020/21 intake (Higher Education Statistics Agency, 2022). Looking first at demographic data, the sample in the current study falls into the expected age range for university students and the overall gender ratio aligns well with HESA reporting 43% male and 57% female (they report 0% for other because the nature of reporting is based on sex rather than gender identity), although arguably our data is slightly biased towards female participants in the later cohorts. For ethnicity, HESA data indicate 12% of students are Asian, 8% are black, 4-5% are mixed, and 73-74% are white. The present study had similar overall percentages suggesting a broadly representative sample. The individual cohort that differed the most from the data stated above was the 2021/22 cohort for whom HESA data are not yet

available. Finally, for disability, HESA report that 16-17% reported a disability for the 2019/20 and 2020/21 cohorts. This proportion is less than reported in the current study. However, HESA requires a disability to be present for at least 12 months which the current study did not and, as such, this may partially explain the difference. For study characteristics, HESA data have demonstrated that UK students consistently make up 82% of the students at UK universities, in line with our own sample here. The next largest group is international students, ranging from 11.5% (HESA, 2019/20) to 17.5 (HESA, 2020/21), which aligns well with our own sample. Finally, EU students make up the smallest group at 6.2% in the HESA data for 2019/20 and 2020/21. Therefore, in terms of the fee status of students, the current sample represents the wider student population well. HESA data on discipline provides a greater number of categories than used the in the current study, however, collapsing across their categories we find that at a national level ~34% of students are studying social sciences and economics, followed by ~26% studying medicine and allied healthcare, followed by ~21% studying arts and humanities, and, finally, ~19% studying natural and mathematical sciences. These data from HESA suggest our overall sample is characteristics of the university population, even though individual cohorts may vary a little.

Results

The impact of COVID-19 on loneliness and related measures

To contextualize the findings of the hypothesis-driven analysis, the relationships between the variables was analysed using Pearson's correlations, summarized in Table 3. As might be expected the Need to Belong Scale (NBS) score negatively correlated with both subscales of the General Belongingness Scale (GBS). The NBS score showed a positive correlation with the centrality subscale of the Social Identity Scale (SIS) and Loneliness. Correlations between subscales of the same scales were as expected for the GBS and the Multidimensional Scale of Perceived Social Support (MSPSS). For the SIS, the centrality subscale did not correlate with any other subscales. Finally, all measures except the SIS centrality correlated significantly with loneliness.

To test our hypothesis that loneliness and the factors that relate to it would be different in the three cohorts we conducted a MANCOVA with age and discipline as covariates for all the dependent variables shown in Table 3, with the independent variable of cohort (2019/20, 2020/21, 2021/22). Box's M of 152.46 indicates that the homogeneity of covariance matrices across groups could be assumed (F(132, 115561.19) = 1.08, p = .262, and linearity and multicollinearity were satisfactory. Table 4 indicates that, after controlling for the effects of age and discipline, there was a significant effect of cohort on both subscales of the GBS.

Contrasts indicate that both Acceptance and Rejection scores differed significantly between individuals starting university in 2019/20 and 2020/21. There was also a significant difference for Acceptance between 2019/20 and 2021/22. The latter two cohorts showed reduced acceptance, indicated

by lower scores, and the 2020/21 showed greater rejection, also indicated by lower scores due to scale scoring relating to lack of rejection (Malone et al., 2012). There were no differences between those starting in 2020/21 and 2021/22. The between cohort differences are shown in Figure 1.

Table 3. Correlations between measured variables * *p*<.05, ** *p*<.01

Variable	1	2	3	4	5	6	7	8	9	10
1. NBS	-									
2. GBS Acceptance	-.029									
3. GBS Rejection	-.227**	.657**								
4. SIS In group ties	-.096	.478**	.436**							
5. SIS In group Affect	.018	.343**	.288**	.269**						
6. SIS centrality	.236**	.063	.006	.094	.304**					
7. MSPSS Significant	.011	.567**	.446**	.186**	.172**	.161*				
8. MSPSS Friend	-.036	.465**	.403**	.218**	.244**	.115	.389**			
9. MSPSS Family	.006	.614**	.476**	.326**	.261**	-.037	.331**	.468**		
10. MSPSS Univ	-.043	.487**	.330**	.665**	.245**	.104	.228**	.270**	.519**	
11. Loneliness	.314**	-.588**	-.687**	-.463**	-.240**	.027	-.412**	-.430**	-.429**	-.408**

Table 4. Cohort level differences were found for general sense for belonging measures only

Factor	Range	Mean ± *SD*	*F* (df = 2, 230)	*p*
NBS	1-5	3.36 ±.61	.38	.687
GBS Acceptance	1-7	5.22 ± .99	5.14	.007
GBS Rejection	1-7	4.77 ± 1.29	3.28	.040
SIS In group ties	1-7	3.84 ± 1.46	.68	.508
SIS In group Affect	1-7	5.16 ± 1.17	.01	.994
SIS centrality	1-7	4.31 ± 1.09	.16	.851
MSPSS Friend	1-7	5.10 ± 1.43	.14	.870
MSPSS Significant other	1-7	5.19 ± 1.62	1.13	.325
MSPSS Family	1-7	5.17 ± 1.25	.49	.614
MSPSS Univ. Friends	1-7	4.24 ± 1.59	.83	.436
Loneliness	3-9	5.52 ± 1.81	1.92	.149

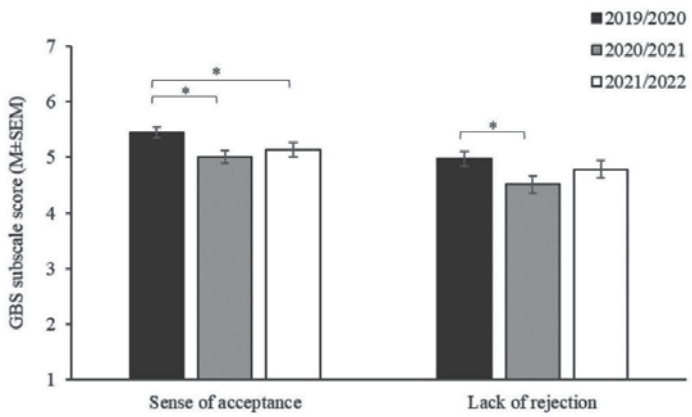

Figure 1. Reduced acceptance and greater sense of rejection in cohorts beginning their studies after the outbreak of the COVID-19 pandemic

Although the MANCOVA showed no significant effects of cohort on loneliness when it is considered a continuous variable, we also conducted a chi-square analysis categorizing participants into not lonely (N = 80), sometimes lonely (N = 116), and mostly lonely (N = 39). Results indicate that there was no significant association between cohort and loneliness level ($\chi^2(4) = 3.42$, $p = .490$).

Predicting loneliness

A blocked linear regression was conducted to establish which factors predicted loneliness. The first model included only demographic variables (age, gender, ethnicity, and disability) and was not significant, $F(10, 220) = 179$, $p = .064$. The addition of study variables (cohort, discipline, and student status) in the second model was also non-significant, $F(16, 220) = 1.36$, $p = .166$. The final model included the measures from the SIS, GBS, NBS, and the MSPSS and was significant, $F(26, 220 = 11.77$, $p < .001$. This model contained three significant predictors of loneliness. Firstly, scores on the Rejection subscale for the GBS was a significant predictor of loneliness (B=-.534, 95% CI -.721, -.347, $p < .001$), such that greater feelings of rejection (indicated by lower scores) were associated with greater loneliness. Support from a significant other (B=-.167, 95% CI -.294, -.040, $p = .01$) on the MSPSS was also significant predictor such that less support was associated with greater loneliness. Finally, overall need to belong was a positive predictor of loneliness (B = .594, 95% CI .298, .889, $p < .001$), such that a greater need to belong was associated with greater loneliness.

Given that the factors which predict loneliness may vary with the level of loneliness experienced, in addition to our a priori analysis, we repeated the blocked linear regression described above for each of the categories of loneliness (not lonely, sometimes lonely, mostly lonely). The first and second models, containing demographic variables alone (model 1) or in combination with study variables (model 2) remained non-significant. Model 3, which incorporated the SIS, GBS, NBS, and the MSPSS scores, was also non-significant for those who were not lonely ($F(25, 74) = 1.10$, $p = .382$) and those who were mostly lonely ($F(25, 36) = .89$, $p = .618$). For those who were sometimes lonely, this model was significant ($F(26, 108) = 1.81$, $p = .023$). However, no individual predictor reached significance. Examination of the correlations and multicollinearity suggest that these are satisfactory, indicating this may be due to the small sample size and high number of predictors, as might be expected form the number in each category and our initial power calculations.

Discussion

In this study we aimed to investigate whether students who transitioned into university at the height of the pandemic experienced greater loneliness than those that started in more typical circumstances in the previous academic year (2019/20) or the following one (2021/22). Additionally, we aimed to investigate what factors predicted loneliness. Before considering the results of the study it is helpful to reflect on

the representativeness of the sample. We recruited a sample from across the sector with representation from the three main types of UK universities. Comparison with HESA data also suggests that our overall sample is representative of the general UK higher education student population in terms of age, gender and ethnicity. However, whilst nationally the HESA data show around 15% of students report a disability (Higher Education Statistics Agency, 2022), 34% of students in the current study reported disability, indicating that this student group may have been overrepresented, although the definitions used of disability varied slightly. Finally, national data suggests that 82% of students are UK or Home students, whilst 6.2% are EU and around 11-17% are non-EU International students (Higher Education Statistics Agency, 2022), again supporting representativeness of our sample. In summary, overall, the sample in the current study is broadly comparable to national data, which is perhaps unsurprising given that the sample included participants from multiple universities.

We hypothesised that those starting university during the 2020/21 academic year would report higher levels of loneliness, underpinned by reduced social identity, sense of belonging, and perceived social support, in comparison to students who transitioned into university either prior to the pandemic (2019/20) or following the height of it (2021/22) when restrictions on in-person social contact were lifted. Our MANCOVA analyses revealed no significant effect of cohort on loneliness, when considered as a continuous variable. This was supported by a lack of association between cohort and loneliness category in further analyses. The lack of effect on loneliness may appear surprising given the increased focus on and visibility of student loneliness in recent years as well as findings of increased loneliness in the general population during COVID-19, thought to be related to social isolation (Killgore et al., 2020). However, the data collected here focused on a period more than 20 months after the immediate impact of the pandemic and, therefore, it is plausible any initial decreases had returned to typical levels by the time data for the current study was collected. Certainly, only a relatively small proportion of all participants fell into the mostly lonely category. Alternatively, other studies have indicated that loneliness did not affect everyone equally during the pandemic, with risk factors such as lower levels of education predicting increased loneliness (Bu et al., 2020). As such, it is possible that the cohort sampled was less at risk because, by definition, they were highly educated. However, this seems unlikely based on previous research which has shown loneliness in students in the pandemic (Dinu et al., 2022). An alternative explanation could be that expectations of social connections were lower in all three groups at the time of sampling because of the pandemic. Given that loneliness can arise when social connections are considered to be inadequate, lower expectations is likely to result in lower perceived loneliness (de Jong Gierveld & Havens, 2004). It is also possible that adequate and fulfilling social connections were created despite the pandemic. Previous research, albeit not specifically in students, reported fluctuating levels of loneliness during the lockdown with the authors proposing a dissociation between social support and loneliness, such that social support can still occur during social isolation (Carollo et al., 2021a). Within the context of education, one means of developing this social support could have been through online learning. A recent systematic review focused on remote learning during COVID-19

revealed that digital activities and resources supported students connecting with each other and their university, which the authors suggested decreases loneliness (Hehir et al., 2021).

Despite the lack of effect on loneliness we did see significant differences in general belonging. These effects could not be explained by differences in the need to belong, because the cohorts were similar on this measure. Students beginning their studies in 2019/20, i.e., before the pandemic, differed from those starting during (2020/21) in terms of both acceptance and rejection, with those starting during the pandemic feeling more likely to be rejected and less likely to feel accepted. Whilst this could be a carry-over effect from their final school year being very disrupted by lockdown periods and school closures, the differences for acceptance remained when comparing pre- and post-pandemic restrictions (2021/22) suggesting that the final school year context cannot fully explain this, because schools had reopened for this cohort, although they had of course still experienced disruption earlier in their school years. The continued reduced acceptance found in the 2021/22 cohort could relate to the use of face masks in classrooms at school and at university, which was a condition of campuses fully re-opening. Face masks make it harder to identify familiar faces and emotional facial expressions (Gil & Arroyo-Anlló, 2021), and facial expressions are critical social cues important for social interactions (Waller et al., 2016), meaning this could have impacted the early interactions students had when starting university in 2021. In support of this, it has been found that facial expressions can signal acceptance (happy expression) and rejection (angry expression) (Heerdink et al., 2015) and that only happy expression recognition decreases when the person is wearing a mask (Williams et al., 2021) which could underpin the reduced acceptance, but recovery of rejection when university started with use of face masks.

Previous research examining sense of belonging for students during COVID-19 has focused on specific cohorts where geopolitical tensions could impact belonging (Weng et al., 2021), students within medical fields whose experiences were likely quite distinct as they were enculturated into their profession (Santos, 2020), or those accessing specific university resources (Scoulas, 2021). Therefore, to our knowledge this is the first study to report changes in belonging more broadly in higher education student populations. Research focused on the general population in Spain, which saw strict ‘stay at home’ orders, has demonstrated an initial increase in sense of belonging, followed by a significant decrease, below baseline levels as people returned to normality (Saiz et al., 2021). Whilst we did not measure the immediate effects of the pandemic on belonging, it is possible that there was an increase before the decrease seen here. However, the fact that the reduced belonging was only found for those who joined university during or following the height of the pandemic and consequential restrictions, suggests that the effects were dependent on whether initial relationships had formed at university. This aligns with qualitative research with students which suggests that those transitioning into university during the pandemic found it difficult to set down roots in their university city and feel as though they belonged there (Phillips et al., 2022). In 2020/21 teaching was largely, if not entirely, remote whilst in 2021/22 teaching returned to campus with face masks in place, both of which could have impacted the ability to set down roots and feel as though students commencing their university studies in the respective

academic years belonged. Additionally, it is possible that the general disruption they experienced to their studies prior to university had disrupted their typical progression through life transitions (Phillips et al., 2022) within late adolescence which had, in turn, made it harder to transition into university, creating a longer term impact.

There were no differences between the cohorts in terms of students' social identity and perceived social support. The lack of effects on social identity are perhaps surprising given that students did not have as much opportunity to be on campus and interact with other members of the university during the transition for the 2020/21 cohort. However, research shows that a sense of 'we-ness' can be created even in remote situations (Krug et al., 2021) and studies recruiting students suggest that the educational experience was acceptable or satisfactory which may have created sufficient context for social identity as a student to develop. There was also no effect on social support and scores recorded here were similar to those recorded in other studies in students at the height of the pandemic (Abdullah et al., 2021), suggesting social support was not affected during the pandemic even though in-person interactions were reduced. Interestingly, social support typically came from family or a significant other, ahead of friends, and university friendships were the lowest for support, although it should be noted that the latter was a novel item created for this study. Given that previous studies have indicated friendship are more important during adolescence (van Roekel et al., 2014), this may also be another effect of COVID-19 and warrants further investigation. It is noteworthy that this study did not include any measures of university support (e.g., from support services or individual staff) which would be worth examining in the future.

In terms of how these factors predicted loneliness, we found no predictive power of demographics or study variables on loneliness. Previous research examining loneliness in students during the pandemic did find an impact of demographic and study factors, with age and academic discipline predicting loneliness scores on a 4 item version of the UCLA scale (Dinu et al., 2022). In this previous work, younger students and those studying arts and humanities more likely to be lonely (Dinu et al., 2022). These results are in line with young adults being more at risk of loneliness (Barreto et al., 2021) and suggestions that arts students have higher rates of psychiatric conditions (Springett & Lekarz, 1986) and expect a more interactive experience which risks a greater expectation-reality mismatch (Stubbe et al., 2021). The differences between previous research and the current study could be attributed to a narrow age range in the present study, differences in the specific academic disciplines studied for the participants and the slightly different measure used.

In contrast to the lack of effects of demographic and study factors on loneliness, the level of rejection experienced, as measured by the GBS, did predict loneliness such that greater rejection indicated greater loneliness. Additionally, social support from a significant other predicted loneliness but associations with support from family, friends, and university friends specifically, were not significant. Finally, the overall need to belong was a positive predictor of loneliness such that those with a greater need to belong tended to reporter higher levels of loneliness. In all cases, whilst the predictors

were significant, the coefficient values indicated relatively small impact. For example, the largest B value was .594 (for NBS) which suggests that scores on this scale would need to go up by .594 out of a possible score of 5, to see a 1-point rise in loneliness. Previous research into student experiences during the pandemic found that social connectedness was a significant predictor of loneliness, with weaker connectedness associated with greater loneliness (Dinu et al., 2022). Outside of the pandemic context, other work has indicated belonging to a university impacts loneliness (Alkan, 2016) and, as such, the role of needing to belong and the sense of belonging in predicting loneliness is in line with other research. Furthermore, research has shown that social support is significantly and negatively correlated to loneliness during the pandemic (Grey et al., 2020), and that closeness to online friends can buffer any negative effect of loneliness (Boursier et al., 2022), both aligning with the current study. Notably, regression analyses separated by level of loneliness did not reveal any significant predictors, which may be due to the low sample size when the dataset is divided this way. It is noteworthy that cohort was not a significant predictor of loneliness, but we did find cohort levels differences in belonging and specifically rejection as measured by the GBS; the cohort who started studying at the height of the pandemic (2020/21) and those studying following it (2021/22) reported reduced belonging. Given that GBS rejection significantly predicted loneliness, we might have expected to see cohort differences for loneliness as well. However, the cohort differences in GBS shown in Figure 1, whilst significant, are relatively smaller. Indeed, the largest group difference was less than 0.5 which is less than the co-efficient for this variable when predicting loneliness. As such, small but significant changes in belonging between cohorts, may not be sufficient to drive a change in loneliness between cohorts as well although we can speculate that this could indirectly contribute to greater levels of loneliness in these cohorts, even though this was not significant in the current study.

The findings of the current study, aligning with previous research, suggest that to tackle student loneliness, universities should consider how to increase sense of belonging in students, noting that this can be through online connections as well as in-person activities. Recent research has indicated that to support belonging, universities need to think across four key domains academic, social, surroundings, and personal space, the latter of which refers to self-identifications, self-esteem and life satisfaction (Ahn & Davis, 2020). Historically, university-led activities have focused on academic and social elements (e.g., mentoring, societies), but this research suggests it is also important to engage students with their geographical, natural, and cultural surroundings, something which was inevitably more challenging during the pandemic. This can include activities such as local community volunteering and service learning, which has been shown to enhance sense of belonging (York & Fernandez, 2018). Furthermore, policies and initiatives to support development of self-esteem could positively impact belonging. These could be aimed at reducing things that negatively impact self-esteem, for example, microaggressions (Nadal et al., 2014) or enhancing activities associated with increased self-esteem, such as exercise or physical activity programmes (Spence et al., 2005; Yiğiter, 2014). In addition to potentially reducing loneliness, increased belonging is thought to have wider benefits for students, and

universities, because greater belonging is associated with increased academic motivation and study enjoyment for students, both of which aid retention (Pedler et al., 2022).

Despite this study providing novel insights into the medium-term effects of the pandemic on students, it is important to recognize that there are limitations to this work. Firstly, although the work was carried out across multiple universities, with a sample broadly representative of the UK university student population, the sample was small, falling 16 short of the sample size calculated a priori for the MANCOVA, although it was ample for the main regression. This means that it was not possible to make conclusions about intersectionality and it is possible that small or small-to-medium effect sizes would not have been found in the present study, given the study was powered for a medium effect. Although our initial estimate of effect size for the power calculations was based a meta-analysis of loneliness in young people (Mahon et al., 2006), a COVID-specific study looking at loneliness has since found only small effects of loneliness on mental health (Prati & Mancini, 2021), meaning effects could have been missed in the current study and future studies relating to loneliness should power for smaller effects than the current study. Furthermore, related to the overall sample size, sub-analyses looking at only those identified as mostly lonely, was limited by a very small sample. Secondly, all data were collected remotely. Whilst this was practical, due to the unpredictable changes in regulations during the pandemic, it also means that we may have excluded those who were less digitally-able. Given previous research demonstrated a relationship between digital capabilities and wellbeing in students, this could have biased the sample (Dinu et al., 2022). Thirdly, all data is quantitative and therefore lacks the richness of qualitative data, which may provide more insight into the lived experience of the students. As such, further research in this area should include qualitative methods and consider focusing on identifying a sufficient sample of mostly lonely students to examine how this cohort differ from those who are not lonely. Finally, we only examined a limited number of potential predictors of loneliness and we selected these based on what we expected to be disrupted by the pandemic. Therefore, whilst this study gives some insight into key predictors of loneliness, it does not offer a comprehensive model, given the complexity of the experiences of students during this time.

In summary, the current study has demonstrated that students beginning their university studies at the height of the pandemic (2020/21) and after most restrictions had lifted (2021/22) experienced a reduced sense of belonging when compared to those who transitioned into university prior to the pandemic (2019/20). Despite the altered sense of belonging, the groups had similar social support, social identity and need to belong, as well as comparable loneliness scores. This indicates that the effects of COVID-19 on some psychological constructs remain over two years since the pandemic begun. Furthermore, sense of belonging, social support from a significant other, and need to belong significantly predicted loneliness. Going forward, it will be important to unpick the relationship between belonging and loneliness fully and to establish what interventions might support better belonging in university students, as well as considering more how social support and need to belong can inform interventions to reduce loneliness in this at-risk group.

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