



## Original Research

# Risk factors for COVID-19-related stress among college-going students

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### Abstract

**Objective:** To explore the degree of COVID-19-related stress among college students enrolled in higher level institutions and identify socio-demographic and psychosocial factors that may predict, or be associated with, higher levels of pandemic-related distress.

**Method:** Data were obtained from a cross-sectional survey completed by 321 college students primarily recruited from Universities in Ireland. Ages ranged between 18–21 years ( $n = 176$ ) and 22–25 years ( $n = 145$ ). Participants answered some demographic questions before completing scales assessing their experience of childhood adversity, their present resilience and levels of psychological distress, as well as their COVID-19-specific stress.

**Results:** Multiple regression analysis revealed that students who were female, who had chronic illness, who experienced monetary concerns and who expressed psychological distress experienced greater stress related to COVID-19.

**Conclusion:** Findings suggest that certain categories of college students may be at higher risk for experiencing poor mental health during a global pandemic. Higher level institutions should consider this when designing and delivering support services aiming to promote student mental health and alleviate mental distress.

**Keywords:** Coronavirus; COVID-19; higher education; mental health; risk factors; students

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### Introduction

Following the World Health Organization's proclamation of a global pandemic in March 2020, many governments across the world mandated 'lockdowns' that required their citizens to stay at home in order to stall the transmission of the novel coronavirus COVID-19. The restrictions in the months that followed had ramifications for all sections of society and, although intentioned to protect the public's physical health, have been associated with adverse effects to their psychological health (Brooks *et al.* 2020; McGinty *et al.* 2020). There is evidence that these effects, such as rising anxiety and depression symptoms, have been widespread among young people in education (Wieczorek *et al.* 2021). Understanding college students' COVID-related concerns and risk factors associated with COVID-related stress are important for informing support services that can moderate the trajectory from acute stress to more significant negative mental health outcomes.

### COVID-19-related stressors and college students' mental health

Prior to the pandemic, the mental health and wellbeing of college students was already identified as a significant and growing area of concern (Lipson *et al.* 2019). Yet studies have shown that students' anxiety and depression symptoms increased in the early months of the pandemic, when compared with previous terms (Huckins *et al.* 2020). Students have had to grapple with the sudden, unprecedented changes to their daily academic life, such as the closure of college campuses and face-to-face teaching and student support services being shifted completely online. In their study of 644 students enrolled in higher education in seven countries across three continents, Hawley *et al.* (2021) reported concerns relating to the quality of online learning, ability and opportunities to interact with lecturers and fellow students, and implications for placements, internships and their general educational progression.

However, these are only some of the challenges faced by students since the start of COVID-19, as many young people also report pandemic-related concerns relating to social isolation, financial difficulties, the exacerbation of existing mental health issues and uncertainty about their future plans, in addition to the obvious concerns for the health and safety of themselves and their loved ones (Zhang *et al.* 2020; Hawley *et al.* 2021). These concerns likely compound the stress students already experience in their adjustment to college life. Furthermore, for students

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who are young adults, they are hampering the discovery and exploration of life's possibilities, a key task deemed developmentally appropriate for this stage of life (Arnett, 2000).

Now, as the world adjusts to living with COVID-19 and restrictions begin to ease, it is important to be mindful that further psychological sequelae of stressful periods can often emerge long after the stress occurred. For example, in their longitudinal epidemiological study of college students in China, Li and colleagues (2021) have reported how the prevalence of acute stress symptoms decreased over the course of the pandemic, while symptoms of anxiety and depression increased.

### *Identifying students at increased risk for psychological distress during the pandemic*

Recent research suggests that psychological distress during COVID-19 might be more pronounced among some socio-demographic groups. Wang *et al.* (2020), for example, conducted a meta-analysis of 68 cross-sectional studies from 19 countries and found that women, individuals who are unemployed or with lower levels of income, and individuals who are more vulnerable to COVID-19 infection due to underlying health concerns were among those at higher odds of poorer psychological outcomes, primarily anxiety and depression. Particular to college students, Lopes & Nihei (2021) found that women and those with a chronic disease were among key predictors of anxiety, depression and stress. Female students also reported more COVID-19 specific stressors in Yong & Suh (2022), along with students who represented minority groups. Year of study at higher level was also found to be associated with psychological distress, with those in their graduating or final year of study at greater risk for depression or PTSD (Tang *et al.* 2020). Gonzales *et al.* (2020) report how approximately 60% of lesbian, gay, bisexual, or transgender (LGBT) students were experiencing mental distress (conceptualised as having more than 14 days where their mental health was 'not good' in the past month), anxiety and depression during the pandemic. The authors surmise that this may be in some part be due to discomfort associated with returning to live with family who were unaware or unaccepting of their LGBT status. In a similar vein, returning to home environments that gave rise to students accumulating multiple adverse childhood experiences (ACEs; e.g. neglect, physical, sexual or emotional abuse, domestic violence) may add to COVID-19-related stressors for some students. Childhood experiences are generally associated with later mental health issues among college students (Karatekin, 2018), and this continues to be the case during the pandemic (e.g. Doom *et al.* 2021).

### *Psychological correlates of COVID-19 stress*

Some studies have reported how young people already dealing with pre-existing mental health issues have indicated an increase in symptoms due to the pandemic (Shanahan *et al.* 2020; Hawley *et al.* 2021). This mirrors findings among the general population (Asmundson *et al.* 2020) suggesting that individuals dealing with anxiety- or mood-related issues may be more susceptible to stressors associated with COVID-19 (e.g. fears about contracting the virus, socio-economic consequences). In their sample of university students, Zurlo *et al.* (2020) noted how various aspects of COVID-19-related stress were significantly associated with several psychopathological symptoms including anxiety, obsessive-compulsive behaviours, depression, hostility and psychoticism.

On the other hand, understanding the role of psychological resilience, or adaptive coping when encountering adverse

situations, in dealing with the stress elicited by the pandemic is important for understanding variability in individual responses during the COVID-19 pandemic. Some studies have identified higher levels of resilience (Barzilay *et al.* 2020) and engaging in positive coping strategies (Shanahan *et al.* 2020) as protective factors associated with lower COVID-19-related worries. However, more research is needed on the role and working mechanisms of these factors, particularly among young adults and college-going cohorts.

### *The present study*

Considering the immediate and more long-term mental health needs of students throughout the pandemic and beyond is a priority for college services. Ensuring access to mental health services, online or otherwise, and strategic outreach to, and targeted interventions for, students with particular circumstances have been proposed as key to mitigating mental health risks (Liu *et al.* 2020). Mindful of this, and the fact that not enough is presently known about the long-term effects of the pandemic and its restrictions on young people, the present study aims to assess levels of COVID-19-related stress among a sample of college students attending higher level institutions in Ireland. In particular, it aims to explore a range of socio-demographic and psychosocial factors that may predict, or be associated with, higher levels of COVID-19 concerns. Identifying individuals at higher risk of COVID-19-related stress and allocating limited mental health resources according to an evidence-based risk stratification is of significant clinical and public health importance in Ireland and worldwide.

## **Methods**

### *Participants*

An online survey was completed by 321 college students, primarily recruited from higher education institutions in Ireland. Their ages ranged from 18–21 years ( $n = 178$ ) to 22–25 years ( $n = 145$ ). Approximately two-thirds of participants identified as heterosexual (65.4%), while the remaining third (34.6%) identified as non-heterosexual, that is, gay/lesbian, bisexual, asexual and others. The majority of participants identified themselves as females (78.8%), 18.1% as males and 3.1% identified as non-binary, trans male etc.

### *Measures*

#### *Demographic*

Participants reported their age, sexual orientation, nationality, ethnicity and if they were undergraduates or postgraduates. Data were also collected on each participant's living situation, any pre-existing mental or physical illnesses, and monetary sufficiency.

#### *COVID-19-related stress*

The COVID-19 Student Stress Questionnaire is a seven – item scale (Zurlo *et al.* 2020) measuring Relationships and Academic Life (e.g. *How do you perceive the relationships with your relatives during this period of COVID-19 pandemic?*), Isolation, (*How do you perceive the condition of social isolation imposed during this period of COVID-19 pandemic?*) and Fear of Contagion (*How do you perceive the risk of contagion during this period of COVID-19 pandemic?*). Participants rate each item on a five-point scale ranging from zero (Not Stressed at all) to four (Extremely Stressed). The scale provides a Global Stress score ranging from 0 to 28. For the present study, internal reliability (alpha) for this scale was 0.65.

### Psychological distress

The ten-item Clinical Outcomes in Routine Evaluation (CORE-10; Barkham *et al.* 2015) tool assesses anxiety, depression, trauma, physical problems, general functioning and risk to self over the past week. Participants rate each item on a five-point scale ranging from zero (Not at all) to four (Most or all the time). All items are added together to get the Clinical Score ranging from 0 to 40. The authors of the scale suggest clinical range score of 11–14 are ‘mild’; 15–19 ‘moderate’; 20–24 ‘moderate to severe’ and 25 or more ‘severe’. Questions include ‘I have felt I have someone to turn to for support when needed’ and ‘Talking to people has felt too much for me’. The CORE-10 internal reliability is 0.90 (Barkham *et al.* 2007), and the score for the CORE-10 correlated with the CORE-OM (the longer scale that the CORE-10 is derived from) is 0.94 in a clinical sample and 0.92 in a non-clinical sample (Barkham *et al.* 2015). The clinical cut-off score for general psychological distress has been measured as 11.0 with a reliable change index (90% CI) of 6. For the present study, internal reliability was 0.85.

### Adverse childhood experiences

Cumulative exposure to ACEs was assessed using an adapted version of the Early Adverse Experiences Questionnaire (Felitti *et al.* 1998) which assess the presence or absence of maltreatment (e.g. emotional abuse, physical abuse, sexual abuse) and household dysfunction (e.g. substance abuse or domestic violence) before age 18. Questions are phrased such as ‘Did a parent or other adult in the household often or very often . . . swear at you, insult you, put you down, or humiliate you?’ (emotional abuse item), or ‘. . . act in a way that made you afraid that you might be physically hurt?’ (physical abuse item). Two additional questions were added to the original questionnaire in order to attain a more robust model when assessing the relationship between ACEs and psychological distress (Finkelhor, 2020). These items were ‘Were your parents or stepparents arguing, yelling, and angry at one another a lot of the time?’ and ‘Did your parents, brother or sister, or best friend suffer a very bad illness or a very bad accident where they had to be in the hospital for a long time?’. The number of experiences reported by each participant was summed for a total ACEs score ranging from 0 to 12. ACEs questions have been used in several studies with young adults globally (Karatekin, 2018; Crandall *et al.* 2019) reporting acceptable reliability and validity.

### Resilience

The participants’ resilience was measured using an adaptation of the Brief Resilience Scale (BRS) developed by Smith *et al.* (2008). The BRS consisted of six items identifying one’s ability to bounce back from stress. Items 1, 3 and 5 were positively worded, and items 2, 4 and 6 were negatively worded. The BRS is scored by reverse coding items 2, 4 and 6 and finding the mean of the six items. Participants were asked to indicate the extent to which they agree with statements such as ‘I tend to bounce back quickly after hard times.’ on a five-point Likert scale ‘(1 = strongly disagree to 5 = strongly agree)’. Internal consistency of BRS is good, ranging from 0.80–0.91 (Smith *et al.* 2008). In the present study, internal reliability was 0.83.

### Procedure

The data were collected between February and March 2021. During that time, Ireland was under COVID-19 restrictions and all universities were closed for in-person teaching and college-related activities. Participants were recruited via (a) Trinity College Dublin Students Union weekly emails and (b) advertisements for this

study posted on social media (Twitter and Facebook). Students who gave web-based consent anonymously completed all questionnaires using a secure survey website called Qualtrics. Participants took between 8–12 minutes to complete the survey. At the end participants were thanked for their time and directed to the debrief sheet that included a list of mental health services and the researchers’ contact details, should they have any follow-up questions about the research.

### Data analysis plan and data preparation

Data were analysed using SPSS 27 (SPSS Inc., Chicago, IL). In addition to the descriptive statistics, the association between COVID-19-related stress and socio-demographic and psychological factors was investigated using a mix of Pearson’s and Spearman’s correlation test. Multiple linear regression was later employed to identify the unique contributions of the relevant predictors to the COVID-19 stress scores.

Before conducting the multiple linear regression analysis, we dummy-coded certain variables. Gender was dummy-coded into females and others, with female as the reference category (coded as females = 1 and others = 0). Sexual Orientation was dummy-coded into heterosexuals and sexual minorities, with heterosexuals as the reference category (coded as heterosexual = 1, sexual minorities = 0). Level of education was dummy-coded into postgraduates and undergraduates, with postgraduates as the reference category (coded as PG = 1, UG = 0). Nationality status was dummy-coded into EU and Non-EU, with EU as the reference category (coded as 1 = EU and 0 = Non-EU). Lastly, chronic illness was assessed by way of the question ‘Do you have an ongoing illness, disability or health condition that has been diagnosed by a doctor or a health professional?’. Responses of ‘yes’ were coded as the reference category (i.e. 1 = yes and 0 = no). Finally, living situation was dummy-coded into ‘living with family’ or ‘other living situations’, with living with family as the reference category (coded as 1 = living with family and 0 = others).

## Results

### Descriptive statistics

Table 1 presents the descriptive statistics of the study sample. Most college students identified as heterosexuals (65%), while approximately 34% described their sexual orientation as lesbian, gay, bisexual or asexual. The majority of the sample set was female (78%) followed by males at approximately 18%. Most of the college students that responded to the survey were currently undergraduates (~76%). Approximately 38% of college students reported that they suffer with an ongoing illness, and of that percentage approximately 54% suffer with mental health-related issues.

Childhood adversities were common with students endorsing a mean of 2.94 ACEs and median of two ACEs, with 25.2% endorsing no ACE, 35.2% endorsing between 1 and 3 ACEs, and 39.6% endorsing between 4 and 12 ACEs, out of a list of 12. The mean ACE of those who reported at least one ACE was 3.94.

The mean score of 13.02 on the COVID-19-related stress score, as shown in Table 2, indicates average Global Stress levels in relation to COVID-19. In relation to psychological distress (CORE-10), the current sample established a mean of 18.25 which indicates that, on average, students displayed moderate levels of psychological distress (Marriott *et al.* 2019). Lastly for resiliency, students scored an average of 2.53 highlighting moderate level of resiliency within the sample (Smith *et al.* 2008).

**Table 1.** Demographic characteristics of university sample

Baseline characteristics	<i>n</i>	%
Age		
18–21 years	176	54.8
22–25 years	145	45.2
Sexual orientation		
Heterosexual/straight	210	65.4
Bisexual	66	20.6
Gay/lesbian	32	10
Prefer not to answer	9	2.8
Asexual	2	0.6
Do not specify as any	2	0.6
Gender		
Female	253	78.8
Male	58	18.1
Genderqueer	5	1.6
Trans female	3	0.9
Trans male	1	0.3
Prefer not to answer	1	0.3
Level of study		
1 <sup>st</sup> –2 <sup>nd</sup> year undergrad	132	41.1
3 <sup>rd</sup> –4 <sup>th</sup> year undergrad	113	35.2
Postgraduate (taught)	49	15.3
Doctoral/PhD	27	8.4
Monetary sufficiency		
Sufficient	203	63.2
Completely sufficient	58	18.1
Less than sufficient	49	15.3
Not sufficient	11	3.4
Physical health		
Fair	106	33
Good	104	32.3
Very good	62	19.3
Excellent	32	10.1
Poor	17	5.3
Any ongoing illnesses		
No	200	62.3
Yes	121	37.7
If yes: Types of illness		
Mental health disorders	66	54.5
Physical health issues	35	29
Autism	16	13.2
Both physical/mental health	4	3.3

See Table 3 for Spearman's correlations between all key study variables. COVID-19-related stress was found to be positively and significantly associated with having monetary concerns ( $r(319) = 0.154$ ,  $p = 0.006$ ), having a chronic illness ( $r(319) = 0.155$ ,  $p = 0.006$ ) and

**Table 2.** Descriptive statistics – achieved mean, standard deviation, and min-max of total score of the scales

Variables	<i>N</i>	Mean	SD	Min.	Max.
COVID-19-related stress	321	13.02	4.28	1	24
ACEs	321	2.94	2.62	0	9
Resiliency	321	12.91	0.69	1	4
Psychological distress	321	18.25	7.90	1	39

being psychologically distressed ( $r(319) = 0.276$ ,  $p = 0.000$ ). Lastly, COVID-19-related stress was found to be negatively and significantly associated with being enrolled in a postgraduate degree ( $r(319) = -0.136$ ;  $p = 0.023$ ). Preliminary analyses indicated no major violation of the assumptions of normality, linearity and homoscedasticity.

### Multiple linear regression

A multiple regression was carried out (see Table 4) to investigate the independent effects of gender, sexual orientation, level of education enrolled in, nationality status, monetary sufficiency, chronic illnesses, living situation, childhood adversities, resiliency and lastly psychological distress on COVID-19-related stress in college-going students. The minimum Tolerance Value was 0.68 and the maximum Variance Inflation Factor (VIF) value was 1.05 indicating that the assumptions of multicollinearity were not violated.

The regression model was significant [ $F(10, 310) = 5.37$ ,  $p = 0.000$ ] and explained 15% of the variance in COVID-19-related stress. Results indicated that female students expressed greater COVID-19-related stress as compared to other gender groups ( $p = 0.014$ ). Students who had chronic illness ( $p = 0.037$ ), monetary concerns ( $p = 0.013$ ) and higher levels of psychological distress ( $p = 0.000$ ) were also shown to experience greater stress related to COVID-19. Considering all the significant predictor variables, higher levels of psychological distress had the strongest association with the outcome variable.

### Discussion

The COVID-19 pandemic and the restrictions imposed on Irish colleges and universities have given rise to concern for students' mental health and how services that support them can best be delivered. Identifying students who may be particularly vulnerable to the stresses of COVID-19 will assist strategies for ensuring mental health service access for those who most need it.

The present study considered several socio-demographic and psychological predictors of pandemic-related stress among a sample of students attending third-level education institutions in Ireland. Students' gender, having sufficient money at their disposal or not, having a chronic illness or not, and level of psychological distress were found to be significant predictors of COVID-19 stress, so that those who had monetary and financial concerns, had a pre-existing illness, and higher levels of psychological distress reported higher levels of stress related to the pandemic. We also found individuals who identified as female reported higher level of stress related to the pandemic. This finding also adds to research done previously which found that the COVID-19 pandemic has amplified gender gaps, suggesting females were affected more across different economic-, social- and health-related

**Table 3.** Spearman's correlation for key study variables

	1	2	3	4	5	6	7	8	9	10	11
1. Covid-19 stress	–										
2. Gender	0.094	–									
3. Sexual orientation	–0.046	0.072	–								
4. Level of education	–0.136*	–0.052	0.066	–							
5. Nationality	0.009	0.162**	0.019	–0.151**	–						
6. Monetary sufficiency	0.154**	–0.06	–0.045	0.134*	–0.021	–					
7. Any chronic illness	0.154**	–0.047	–0.152**	–0.06	0	0.111*	–				
8. Living Situation	0.047	0.01	0.017	–0.134*	0.153**	–0.093	0.017	–			
9. ACEs	0.056	–0.114*	–0.095	0.047	–0.132*	0.298**	0.158**	–0.09	–		
10. Resiliency	–0.081	–0.023	0.226**	0.06	0.047	–0.135*	–0.180**	–0.089	–0.114*	–	
11. Psych. distress	0.276**	–0.035	–0.145**	–0.122*	–0.110*	0.220**	0.153**	–0.026	0.311**	–0.432**	–

Gender: coded as females (1) and other (0); sexual orientation: coded as heterosexual (1) and sexual minorities (0); level of education: codes as undergraduates (1) and postgraduates (0); nationality: codes as EU(1) and non-EU (0); any chronic illness: codes as yes (1) and no (0); living situation: codes as living with family (1) and others (0); ACEs: Adverse Childhood Experiences questionnaire with 2 additional items; resiliency: brief resiliency scale; psych. distress: CORE-10 scale.

\*\*Correlation is significant at the 0.01 level.

\*Correlation is significant at the 0.05 level.

**Table 4.** Multiple regression analysis on COVID-19-related stress on sample population

	Unstandardized coefficients		Standardized coefficients		<i>t</i>	<i>p</i>
	<i>B</i>	S.E.	<i>B</i>			
Gender <sup>a</sup>	1.383	0.562	0.132		2.463	0.014
Sexual orientation <sup>b</sup>	–0.304	0.486	–0.034		–0.626	0.532
Level of education <sup>c</sup>	–0.89	0.548	–0.089		–1.623	0.106
Nationality status <sup>d</sup>	–0.068	0.651	–0.006		–0.104	0.917
Monetary sufficiency	0.899	0.36	0.144		2.499	0.013
Any chronic illnesses <sup>e</sup>	1.014	0.483	0.115		2.1	0.037
Living situation <sup>f</sup>	0.669	0.48	0.075		1.392	0.165
Childhood adversities	–0.139	0.096	–0.085		–1.448	0.149
Resiliency	0.521	0.376	0.084		1.387	0.166
Psychological distress	0.159	0.035	0.293		4.612	0.000

<sup>a</sup>1 = female and 0 = others. <sup>b</sup>1 = heterosexual; 0 = sexual minorities. <sup>c</sup>1 = postgraduate; 0 = undergraduate. <sup>d</sup>1 = EU; 0 = non-EU. <sup>e</sup>1 = yes; 0 = no. <sup>f</sup>1 = living with family; 0 = living outside family.

indicators compared to men (Flor *et al.* 2022). One such reason for this disparity and higher stress among females can be increased rates of employment loss and increase in unpaid labour. Unlike previous recessions, most affected sectors during the COVID-19 pandemic were traditionally dominated by female such as retail and hospitality. Previous studies have also noted associations between COVID-19-related stress and having an underlying chronic illness (Wang *et al.* 2020) and poor mental health outcomes (Huckins *et al.* 2020; Wiczorek *et al.* 2021).

However, counter to expectations based on theory and previous research, we did not find significant relationships between some of our predictor variables and the outcome variable. For example, neither ACEs nor resilience scores were found to significantly predict levels of COVID-19-related stress. It could be that COVID-19 stress, representing specific pandemic-related stressors such as isolation experienced as a result of stay-at-home mandates and social distancing measures (Pfefferbaum and North, 2020), is an unique

experience that operates differently to other forms of psychological stress that are more typically associated with ACEs and resilience. It is also possible that COVID-19 stress is related more to other protective factors, beyond resilience, that were not included in this study. Maladaptive coping strategies, for example, may have a stronger relationship with COVID-specific stress (e.g. Kar *et al.* 2021). We also did not find a significant relationship between resiliency and COVID-19-related stress. One reason for that could be that COVID-19 stress operates differently in relation to other forms of psychological stress. This could also be due to the fact that COVID-19 stress is more related to other protective factors that were not included in this study. For example, coping strategies (i.e. emotional regulations, problem solving skills) may be a factor that could mitigate this relationship. Future research should consider measuring for coping strategies and resilience within a longitudinal design to strengthen causal relationship among coping strategies, resilience and protective outcomes.

### Implication for higher education institutions

As students and students' services in universities have heavily relied on in-person/walk-in mental health services, it is pivotal to reduce barriers to access to these services. University services should consider more adaptable service delivery models such as virtual care clinics and online interventions such as internet-based Cognitive Behavioural Therapy (i-CBT), as they have proven effective with adolescents (Vigerland *et al.* 2016). Another important aspect to shed light on is that crises such as the COVID-19 pandemic can increase the disparity and widen the gap between and within population groups such as those with low income, students with special needs and first-generation students. Some from these groups may encounter greater stressors during periods of pandemic-related restrictions, for example, if they are also contending with issues relating to accessing technology or general household dysfunction that interferes with their ability to access and engage with resources provided by their college. Moreover, international students and students of colour who already avail of less student mental health services (Vigerland *et al.* 2016; Chen *et al.* 2019) may find these resources much further out of reach during a pandemic. Our findings highlight how female students and those on low incomes or with physical and psychological health issues may require particular supports, or indeed particular efforts to encourage their participation in available supports, in order to mitigate the stress, they are experiencing relating to the pandemic and derail the trajectory from acute stress to more significant negative mental health outcomes (Liu *et al.* 2020).

### Limitations

The main limitation of this research is that the sample was largely female, restricting the generalizability of findings. Future research could reconfirm the model from this study in more varied population groups. Another limitation is that the recruitment procedure could contribute to selection bias. This poses yet another challenge to the generalizability of findings, as students with particular characteristics, such as interest in mental health research, or perhaps personal experience with mental illness, may be drawn to the research and bias the results. A further limitation that warrants consideration is that psychological distress, assessed at the same time as COVID-related stress, was used in the present study as a predictor of COVID-related stress. However, it may be the case that COVID-19 stress might be predicting or causing psychological distress. In any case, there is an association between the two variables, one that warrants further examination in future research.

### Conclusion

The findings of this study provide an insight into which categories of college students are at higher risk for experiencing poorer mental health, in the form of COVID-related stress, during this global pandemic. While education institutions should aim to develop teaching pedagogies and support service provision that are accessible and inclusive for all students, specific student groups may be in particular need at this time. This should be considered by universities when planning, developing and delivering mental health services now and in the months ahead in order to attenuate some of the negative effects experienced to date. Monitoring student mental health in the aftermath of the pandemic to account for the long-term effects of the COVID-19 pandemic is recommended.

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**Ethical standards.** The authors note that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008. The study protocol was approved by the institutional review board of the participating institution. Informed consent was obtained from all participants online. Approval for conducting the study was granted by the College Data Protection Officer and by the School of Psychology Research Ethics Committee (approval: SPREC092020-05) at Trinity College Dublin. Data were collected through an online cross-sectional quantitative questionnaire, and all participants took part voluntarily. Informed consent was obtained electronically after the participants had received a detailed introduction to the study.

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