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# Depression, anxiety and suicidal behaviour among college students: Comparisons pre-COVID-19 and during the pandemic

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ABSTRACT

*Background:* Many students struggle with psychological problems during their college years. These problems may be even more apparent during the COVID-19 pandemic with the accompanying restrictions and transition to an online learning environment, but few longitudinal studies have been conducted to date. The aim of this study was to compare symptoms of depression, anxiety and suicidality prior to and during the pandemic, and identify stressors.

*Methods:* This study was conducted among students attending Ulster University, Northern Ireland (NI) and LYIT, Republic of Ireland (ROI), as part of the World Mental Health International College Student Initiative (WMH-ICS). Data was collected from first year students in September 2019. The completed response rate was 25.22% (NI) and 41.9% (ROI) in relation to the number of first-year students registered. A follow up study was conducted in Autumn 2020, with 884 students fully completing the online survey in both years, equating to just under half of those who completed initially.

*Results:* High levels of mental health problems were found in year 1, especially in the ROI. Levels of depression increased significantly in year 2, particularly among students in NI, however, levels of anxiety decreased. No significant variations were found for suicidal behaviour. Several stressors were revealed, including increased social isolation, and worrying about loved ones.

*Limitations:* The findings may not be generalised to other student populations.

*Conclusions:* This study reveals variation in symptoms of depression and anxiety since the onset of the pandemic. In particular, the large increase in students with depression is of concern.

## 1. Introduction

The World Health Organisation (WHO) declared COVID-19 a pandemic on the March 11, 2020 following a significant rise in cases globally (WHO Int, 2020). By late March, the Irish and UK governments had imposed measures to mitigate the transmission of the virus, resulting in the closure of schools, universities, and non-essential businesses. Although beneficial in slowing the spread of infection, the restrictions have caused considerable social and economic disruption (Nicola et al., 2020). Fear around contracting COVID-19, increased unemployment, financial losses, and social isolation have caused concern regarding the impact on mental health. Preliminary, cross-sectional findings from around the globe indicate a high prevalence of mental health concerns in response to COVID-19, particularly in the initial stages of the pandemic (Wang et al., 2020a; Xiong et al., 2020). In fact, a recent meta-analysis examining data from ten countries, suggests the prevalence of anxiety, depression, and stress to be as high as 32%, 34%, and 30%, respectively, while another implied the prevalence of suicidal ideation to be 11%

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(Salari et al., 2020; Phiri et al., 2021), however, few longitudinal studies have been conducted which include data collected prior to the onset of the pandemic.

In the Republic of Ireland (ROI), high incidences of anxiety (20%) and depression (28%) have been reported among the general population (Hyland et al., 2020) from the start of the pandemic. However, no baseline data was available to make accurate comparisons. Likewise, a cross-sectional study conducted early in the pandemic found that mean scores for depression and anxiety have exceeded population norms in the UK (Jia et al., 2020), with rates of depression thought to have doubled compared to pre-pandemic data (Office for National Statistics, 2021). While emergent research reveals the significant impact of COVID-19 on the general population's mental health, concern is also mounting around the psychological wellbeing of vulnerable populations. International findings have repeatedly identified university students as a vulnerable group more susceptible to experiencing adverse psychological effects as a result of COVID-19 (Wang et al., 2020b; Xiong et al., 2020; Gonzalés--Sanguino et al., 2020), The move to an online learning environment, uncertainties around assessments, and reduced socialization may have a deleterious impact on their mental health and wellbeing.

Prior to the pandemic, the pervasive and persistent nature of student psychopathology had already become a cause for concern globally (Auerbach et al., 2016). Over the last decade, research has implied deteriorations in student mental health, with a five-fold increase in students reporting mental health problems (Thorley, 2017). High prevalence rates have also been reported among UK post-secondary students, with some of the most common problems including depression, anxiety, psychological distress, and suicidality (Pereira et al., 2019; Topman and Moller, 2011). In Northern Ireland (NI) particularly, high prevalence rates for major depressive episodes (24%) and generalised anxiety disorder (23%) were reported, as were high rates of suicidal ideation (31%), with one in five having previously made a suicide plan (McLafferty et al., 2017; O'Neill et al., 2018).

The ages of 18–25 are a developmentally sensitive period and this is often when the first onset of mental illness occurs (Kessler et al., 2007). Additionally, university is a time marked by major psychosocial transition that sees young adults adapt to immense changes. The high levels of stress incurred in response to such transitions combined with this sensitive period may explain the high incidence of mental illness (Bewick et al., 2010). Furthermore, increasing academic pressures, increased academic competitiveness, financial concerns, and concern for the future may contribute to these statistics (Stallman, 2010; Beiter et al., 2015).

The pre-existing vulnerability of this population highlights a critical need to assess the mental health of college students in the wake of COVID-19. In tandem with stressors associated with university life, unique stressors introduced by the pandemic may exacerbate susceptibility to psychopathology (Zhai and Du, 2020). The pandemic caused mass disruption to university campuses, with students seeing a shift to remote learning, changes in assessment and exam procedures, and cancellation of placements. Social distancing measures and the closure of social venues also significantly reduced opportunities for socialization. Research has highlighted these as some of the key stressors contributing to poor mental health (Fruehwirth et al., 2021).

Much of the research assessing the prevalence of psychopathology in student populations during COVID-19 is cross-sectional or conducted early in the pandemic, without baseline data collected prior to the onset of the pandemic. These early studies have indicated a very high prevalence of mental health problems (Chirikiv et al., 2020). For example, in the United States, a cross-sectional study conducted by X. Wang et al. (2020) found that almost half of students experienced moderate to severe depression, over one-third experienced moderate to severe anxiety, and 18% reported suicidal ideation. Less than half felt they could cope, and 71% felt that stress levels had significantly increased. Moreover, Healthy Minds, a cohort study conducted in the United States, found that relative to Autumn 2019, the prevalence of depression was higher in spring 2020 (35%–41%). Interestingly, the rate of anxiety remained unchanged (31%), and the prevalence of suicidality slightly decreased (21%–18%) (Martinez, 2020). Similar studies have shown no change in suicidality (Charles et al., 2021).

Although scarce, longitudinal studies have indicated significant increases in anxiety (18%–25%) and depression (22%–32%) when comparing pre- and mid-pandemic survey data in the United States (Fruehwirth et al., 2021). However, during data collection (June to July 2020), infection and death rates were rising in the US, which may have resulted in heightened prevalence as reported on GAD7 and PHQ9 scales. In UK student samples Evans et al. (2021) found a significant rise in depressive symptoms, with over one-third of the sample considered clinically depressed at lockdown compared to 15% pre-lockdown. Interestingly, there was no observed change in anxiety. A Canadian study remarkably found that students with pre-existing mental health concerns showed improving or similar mental health during the pandemic compared with one year prior (Hamza et al., 2021). Anxiety levels had significantly decreased for those with pre-existing mental illness. In contrast, students without pre-existing mental illness were more likely to show declining mental health. It is theorised, that restrictions may have resulted in lessened demands on time for those with mental illness, hence reducing anxiety.

Many of the longitudinal studies that do exist record data from the initial stages of the pandemic and track change over time. For example, Amendola et al. (2021) found significant reductions in anxiety one-month after the beginning of COVID-19. However, a lack of baseline data prior to the onset of the pandemic makes it difficult to make inferences between COVID-19 and the emergence of psychopathology at an individual level. The present study aims to address this and provide more insight into the impact of COVID-19 on student mental health utilising longitudinal data collected as part of an ongoing cross-border study which involves students at a university in Northern Ireland (NI) and a college in the Republic of Ireland (ROI). Although the institutions are in different jurisdictions they are geographically close, located in the North and North West of the Island of Ireland. The main difference is that one institution is a university while the other is an Institute of Technology, although both offer undergraduate courses.

The first survey point in this study predating COVID-19 revealed very high rates of mental health problems and suicidal behaviour among students commencing college, with rates in the ROI particularly high (Ward et al., Unpublished Results). It was important therefore to monitor student's wellbeing throughout their time at college, and even more so following the onset of the pandemic. The aim of the current study was to compare rates of depression and anxiety symptoms, and suicidal behaviour among college students on the island of Ireland, prior to the COVID-19 pandemic (Autumn 2019) and during the pandemic, when students returned to college in Autumn 2020. The study also aimed to identify the main stressors students endured during the pandemic It was hypothesised that the pandemic would have a negative impact on student mental health and wellbeing and that psychological problems would increase during this time period, particularly for those with pre-existing mental health conditions.

## 2. Methodology

### 2.1. Design

The Student Psychological Intervention Trial (SPIT) aims to gather information when students commence university, in relation to their mental health and wellbeing, and monitor this throughout their time at university.

The study commenced in September 2019 in Letterkenny Institute of Technology (LYIT), Co. Donegal, Republic of Ireland (ROI) and across the four Ulster University (UU) campuses in Northern Ireland (NI). This cross-border (NI/ROI) study was conducted as part of the World Mental Health International College Student Initiative (WMH-ICS) which utilises an observational, longitudinal cohort design. Ethical approval was

obtained for this study from the Ulster University Research Ethics Committee (REC/19/0072).

### 2.2. Sample

An email was circulated to all first-year undergraduate students at UU in NI and to first year students from several courses at LYIT, ROI one week prior to registration. The invitation email contained a detailed participant information sheet and students were asked to consider taking part in the study. Researchers were also afforded the opportunity to address students during welcome presentations on campus to tell them about the study. Trained researchers and volunteers recruited students after they had completed registration and collected their student cards on campus. Written informed consent was obtained from 1947 students. Each student was allocated a unique ID number which was included on the consent form and the students entered the ID number when they commenced the online survey, hosted on Qualtrics software. Overall, 1828 students fully completed the survey in year 1 (1468 NI, 360 ROI) and received a university branded sweatshirt. The completed response rate was 25.22% (NI) and 41.9% (ROI) in relation to the total number of first-year students registering at the time. All participants were over the age of 18 and were first-year undergraduate students who were residents of either NI or the ROI. Students under the age of 18, those repeating first-year and international students were excluded in line with other WMH-ICS studies.

When this cohort commenced second year, in September 2020, a follow up survey was circulated to all those who consented to take part in the SPIT study, and 939 students fully completed the survey (745 NI, 194 ROI) and received a £10 Amazon voucher. This figure includes some students who had not fully completed the survey in year one. Overall, 884 students fully completed both the first and second wave of the study (48% of those who completed the first wave of the study). There were no discernible differences between those who completed and those who did not complete both surveys in relation to the variables of interest. Weights were calculated by statisticians from WMH-ICS at Harvard University to ensure that the sample was representative of the student population in the respective colleges in relation to the age and gender characteristics of the sample.

### 2.3. Diagnostic assessment

The comprehensive survey was adapted by the WMH-ICS from the WMH-Composite International Diagnostic Interview Screening Scales (CIDI -SC) (Kessler and Ustun, 2004; Kessler et al., 2013). The SPIT project also included the PHQ-9 and GAD-7 to identify students with current symptoms of depression and anxiety, the focus of the current study.

### 2.4. Depression

The self-report Patient Health Questionnaire (PHQ-9) developed by Kroenke and Spitzer (2002) was used to screen for symptoms of depression, with questions related to problems experienced during the previous two weeks. The PHQ-9 consists of 9 items, with responses scored on a 0–3 Likert scale, with higher scores indicative of more severe symptoms. Severity of depression is scored: 0–4 minimal, 5–9 mild, 10–14 moderate, 15–19 moderately severe, 20–27 severe (Kroenke et al., 2001). In the current study individual items on the PHQ-9 were added together to give a total score and individuals with score of 10 or above were deemed to have probable depression. The PHQ-9 shows good psychometric properties (Wittkampf et al., 2007), with significant between-study heterogeneity in the estimates of specificity. In the current study the Cronbach's $\alpha = 0.975$ (year 1) and 0.958 (year 2).

### 2.5. Anxiety

The GAD-7 is a brief, self-report measure used to screen for symptoms of generalised anxiety disorder, consisting of 7 items scored on a 0–3 Likert scale (Spitzer et al., 2006). Participants were asked *'Over the last 2 weeks, how often have you been bothered by the following problems?* ', with responses ranging from *not at all* (0) to *nearly every day* (3). Severity of anxiety symptoms is scored: 0–4 minimal, 5–9 mild, 10–14 moderate, 15–21 severe. In the current study the individual items on the GAD-7 were added to give a total score, and students with a score of 10 or above were determined to have probable Generalised Anxiety Disorder. The GAD-7 has good psychometric properties (Dear et al., 2011), with Cronbach's coefficient ranging from 0.79 to 0.91. In the current study the Cronbach's $\alpha = 0.980$ (year 1) and 0.917 (year 2).

### 2.6. Suicidal behaviour

The Self Injurious Thoughts and Behaviour Interview, (SITBI), developed by Nock et al. (2007) was included in the WMH-ICS and utilised to identify students with suicidal thoughts, plans and attempts. If students indicated that they attempted suicide or made a suicide plan in the previous year, or that they may act on these plans in the near future, a high-risk alert was triggered, and the students were sent an email and were contacted by Student Wellbeing at UU or a counsellor at LYIT to offer support.

#### 2.6.1. COVID-19 related stressors

Additional questions were included in the year 2 follow up survey to identify stressors related to the COVID-19 pandemic such as finances and social isolation. Participants were asked: *Think of the month when your stress related to the COVID-19 outbreak was greatest. During that month, how much stress did the outbreak cause you in each of the following areas of your life?* The questions as detailed in Table 6 were scored on a 5-point Likert scale ranging from *'no stress'* to *'very severe stress'*.

### 2.7. Data analyses

Weights were applied to all analyses. Demographic characteristics of those who fully completed the survey in both year 1 and in year 2 were considered. The frequency of depression and anxiety symptoms as measured by the PHQ-9 and GAD-7 were compared between year 1 (2019, pre-pandemic) and year 2 (2020, during the pandemic). Comparisons were also made in relation to those who triggered the high-risk suicide alert in year 1 and year 2. Chi-square tests were used to determine differences in prevalence rates across the time periods. Severity of depression and anxiety symptoms between year 1 and year 2 was also compared. The study also explored the likelihood of the cohort having co-morbid conditions in relation to depression and anxiety symptoms and suicidal behaviour, and Chi-square tests were used to identify any differences in co-morbidity between year 1 and year 2. Finally, stressors related to the COVID-19 pandemic were examined among this cohort.

## 3. Results

The demographic characteristics of those who fully completed the survey in both year 1 and in year 2 ($n = 884$) are presented in Table 1. The majority of students were female, in full-time study, heterosexual and never married. Furthermore, the average age of participants was 21.

Table 2 shows that the prevalence rate of anxiety symptoms as measured by the GAD-7 decreased from year 1 to year 2, with a significant reduction found among students in NI. The prevalence rate in the ROI also decreased slightly but was not significantly different. However, between year 1 and year 2 levels of depression as measured by the PHQ-9 increased overall, and particularly in NI, where they increased by over 10%. Levels of depression symptoms in the ROI were significantly higher than in NI in year 1 at 21.6% compared to 13.1%. The rate increased in

**Table 1**
Demographic characteristics of students who completed survey in both year 1 and year 2.

| | | n | % |
|---|---|---|---|
| Gender | Male | 222 | 39.4% |
| | Female | 652 | 60.3% |
| | Transgender/Other | 3 | 0.3% |
| Student Status | Full time | 855 | 95.8% |
| | Part time | 18 | 2.9% |
| | Other | 10 | 1.3% |
| Sexuality | Heterosexual | 766 | 87.5% |
| | Non-heterosexual | 114 | 12.5% |
| Marital Status | Married | 26 | 3.9% |
| | Separated/divorced/widowed | 10 | 1.4% |
| | Never married | 839 | 94.7% |

Note: n = raw unweighted values, % weighted values.

**Table 2**
Comparison of Anxiety and Depression scores and Suicide Risk between Year 1 and Year 2.

| | Year 1 | | Year 2 | | χ 2 |
|---|---|---|---|---|---|
| | n | % | n | % | |
| **Anxiety** | | | | | |
| Total | **214** | **25.5%** | **163** | **18.9%** | **10.726 (p < .01)** |
| ROI | 40 | 22.6% | 37 | 20.3% | .303 (p = .582) |
| NI | **174** | **26.2%** | **126** | **18.5%** | **11.621 (p < .01)** |
| **Depression** | | | | | |
| Total | **123** | **14.9%** | **203** | **23.6%** | **20.617 (p < .001)** |
| ROI | 38 | 21.6% | 44 | 24.5% | .272 (p = .542) |
| NI | **86** | **13.1%** | **158** | **23.3%** | **22.692 (p < .001)** |
| **Suicide Risk** | | | | | |
| Total | 65 | 7.6% | 76 | 8.6% | .633 (p = .426) |
| ROI | 24 | 12.9% | 17 | 9.2% | 1.474 (p = .225) |
| NI | 41 | 6.1% | 58 | 8.4% | 2.635 (p = .105) |

Note: n = raw unweighted values, % weighted values; ROI = Republic of Ireland; NI = Northern Ireland χ 2 tests show significant differences in prevalence rates.

year 2–24.5%, slightly higher than the rate in NI, but the increase in the ROI was not significant. Table 2 also shows that suicide risk increased overall, although no significant differences were found. However, while the risk decreased in the ROI, it increased among students in NI.

Only those who completed the survey in both year 1 and in year 2 were included in the analyses described in Table 2. It should be noted however that not all those who triggered the suicide alert in year 1 completed the second survey. Furthermore, some students completed the survey for the first time in year 2. Table 3 shows details of those who triggered the alert in year 1 and/or year 2. In the ROI, the percentage of students triggering the alert in year was very high (12.12%) but this decreased in year 2 (7.3%). In NI, however, the percentage triggering the alert increased from year 1 (6.6%) to year 2 (8.36%), with many students triggering it for the first time (6.69%) in comparison to those triggering it for the first time in the ROI (3.43%).

Further analyses were conducted to examine levels of anxiety and depression symptoms among this cohort. Between year 1 and year 2 there was a decrease in minimal levels of anxiety at both institutions as shown in Table 4. Overall, there was a 12% increase in the number of participants in both the mild and moderate categories. However, there was also a decrease in those with severe symptoms, which may help account for the decrease in the prevalence rate for anxiety overall. Between year 1 and year 2, students who reported minimal levels of depression decreased substantially, with large increases in mild, moderate and severe/very severe levels in NI, and mild and severe/very severe in the ROI.

As mental health disorders rarely occur in isolation, further analyses were conducted to examine co-morbidity of symptoms of depression, anxiety and suicidal behaviour among this cohort. Table 5 shows individual and co-morbidity rates for year 1 and year 2. Depression only rates increased, while anxiety only rates decreased. Conversely, the likelihood of having co-morbid depression and anxiety in the absence of suicide risk increased significantly from 5.6% to 9.5% from year 1 to year 2.

The student participants identified a number of stressors that impacted on them during the pandemic (Table 6). Increased social isolation was one of the main stressors and they were more likely to be worried about loved ones getting infected with COVID-19, than getting it themselves.

Further analyses revealed that students with mental health problems were more likely to say that they experienced either very severe or severe stress. For example, 26.1% of students with depression said that increased social isolation caused them very severe stress and 31.2% had severe stress, in comparison to 7.9% and 21.5% reported by those who were not depressed. In relation to worrying about loved ones getting infected, participants with depression were more likely to indicate this led to very severe stress (35%) compared to those who were not depressed (15.6%). Similar rates were revealed for those with anxiety problems (36.3% versus 16.5%)

## 4. Discussion

This longitudinal study compared prevalence rates of depression and anxiety symptoms, and suicidal behaviour among students before the onset of the COVID-19 pandemic in Autumn 2019, with rates collected during the pandemic in Autumn 2020. It was hypothesised that mental health problems would likely increase over this period. While rates of current depression increased significantly, particularly among students on the NI campuses, rates of anxiety decreased, contrary to what may

**Table 4**
Comparison of severity of anxiety and depression between year 1 and year 2.

| | Yr1 total % | Yr2 total % | Yr1 ROI % | Yr2 ROI % | Yr1 NI % | Yr2 NI % |
|---|---|---|---|---|---|---|
| **Anxiety** | | | | | | |
| Minimal | 53.6 | 48.9 | 48.3 | 45.5 | 55.1 | 49.9 |
| Mild | 20.9 | 32.2 | 29.1 | 34.3 | 18.7 | 31.6 |
| Moderate | 11.3 | 12.0 | 9.1 | 14.8 | 11.0 | 11.2 |
| Severe | 14.2 | 6.9 | 13.5 | 5.5 | 14.4 | 7.3 |
| **Depression** | | | | | | |
| Minimal | 64.7 | 48.9 | 59.8 | 41.2 | 66.0 | 51.0 |
| Mild | 20.4 | 27.5 | 18.6 | 34.3 | 20.9 | 25.7 |
| Moderate | 8.1 | 12.7 | 12.8 | 9.1 | 6.8 | 13.6 |
| Severe or Very Severe | 6.8 | 10.8 | 8.8 | 15.3 | 6.3 | 9.6 |

Note: ROI = Republic of Ireland; NI = Northern Ireland; yr = year.

**Table 3**
Suicide risk alert in year 1 and in year 2 among all participants.

| | Yr 1 Alert n | % of total participants | Yr 2 Alert n | % of total participants | Yr 1 & Yr 2 alert n | % | New alert n | % |
|---|---|---|---|---|---|---|---|---|
| ROI | 44 | 12.12% (363) | 17 | 7.3% (233) | 9 | 3.86% (233) | 8 | 3.43% (233) |
| NI | 99 | 6.6% (1500) | 70 | 8.36% (837) | 14 | 1.67% (837) | 56 | 6.69% (837) |

Note: n = raw unweighted values, % weighted values; ROI = Republic of Ireland; NI = Northern Ireland; yr = year.

**Table 5**
Depression, anxiety and suicide risk and Co-morbidity.

| | Year 1 | | Year 2 | | χ 2 |
|---|---|---|---|---|---|
| | n | % | n | % | |
| None | 549 | 66.2% | 551 | 67.3% | .046 (p = -830) |
| Depression only | **45** | **5.0%** | **70** | **8.7%** | **9.911 (p < .01)** |
| Anxiety only | **137** | **15.5%** | **53** | **5.6%** | **44.094 (p < .001)** |
| Suicide Risk only | 22 | 2.5% | 21 | 2.9% | .129 (p = .719) |
| Depression & Anxiety, no Risk | **52** | **5.6%** | **94** | **9.5%** | **8.908 (p < .01)** |
| Depression & Risk, no Anxiety | 13 | 1.7% | 21 | 2.1% | .403 (p = .525) |
| Anxiety & Risk, no Depression | 10 | 0.9% | 3 | 0.4% | 2.422 (p = .120) |
| Depression, Anxiety & Risk | 24 | 2.7% | 32 | 3.4% | .801 (p = .371) |

*Note: n = raw unweighted values, % weighted values* χ 2 tests show significant differences in prevalence rates.

**Table 6**
Stressors related to the COVID-19 pandemic.

| | Very Severe Stress n % | Severe Stress n % | Moderate Stress n % | Mild Stress n % | No Stress n % |
|---|---|---|---|---|---|
| Family Finances | 64 (6.2%) | 106 (11.4%) | 214 (23.3%) | 214 (23.3%) | 285 (35.8%) |
| Increased Social Isolation | 128 (12.2%) | 224 (24.0%) | 247 (27.7%) | 154 (18.1%) | 128 (17.6%) |
| Getting help for loved ones | 63 (6.6%) | 95 (9.8%) | 229 (25.3%) | 213 (24.0%) | 283 (34.1%) |
| Arguments with family & friends | 57 (5.7%) | 105 (11.2%) | 187 (19.6%) | 222 (24.1%) | 312 (39.3%) |
| Worry about you getting infected | 71 (6.6%) | 143 (14.8%) | 224 (24.5%) | 241 (26.8%) | 203 (27.0%) |
| Worry about loved ones getting infected | 201 (19.9%) | 233 (24.5%) | 259 (31.0%) | 115 (14.0%) | 75 (10.3%) |

Note: n = raw unweighted values, % weighted values.

have been anticipated. Furthermore, there was no significant difference in suicide risk.

Given the ongoing pandemic-related restrictions during this period, it is perhaps not surprising that levels of depression increased in year 2. These findings concur with other studies which reported increased rates of depression following the onset of the pandemic in both the general population (Hyland et al., 2020; Jia et al., 2020) and student population (Martinez, 2020; Evans et al., 2021). In NI the prevalence rate increased by over ten percent, which is of concern. The increase was not as great in the ROI, yet nearly a quarter of students had probable depression, slightly higher than the rate in NI. This increase in symptoms of depression may be related to increased social isolation, feeling of helplessness and a lack of hope for the future. It may also be related to academic pressures and uncertainty during this time. Furthermore, an increase in alcohol consumption during this time may have had a negative impact (Coakley et al., 2021), exacerbating symptoms of depression.

It should be noted that very high levels of symptoms of depression and anxiety, and suicidal behaviour, were found among the ROI cohort when they first started college, as reported by Ward et al. (Unpublished Results). The authors speculated that this may be related to differences in secondary level education and health systems, north and south of the border. The question remains however, why the increase in symptoms of depression is more discernible in NI in year 2. It may be related to academic pressures and remote learning (Fruehwirth et al., 2021), or that NI students were more likely to be living away from home, as other studies have found that this led to increased stress (Husky et al., 2020). It could also be a result of restrictions and the impact of the pandemic in the different jurisdictions. In the ROI, the government were quick to respond and implemented strict lockdowns over a protracted period. Recent research would suggest that strong government actions are related to better mental health outcomes (Fetzer et al., In Press).

Lower rates of anxiety symptoms were reported among students in year 2, in comparison to year 1. This finding may be somewhat unexpected and novel, but other research has reported mixed findings in relation to symptoms of anxiety among college students following the start of the pandemic. For example, Fruehwirth et al. (2021) reported an increase in anxiety from early in the pandemic. However, Martinez (2020), and Evans et al. (2021) reported similar rates of anxiety among students over this time period. Meanwhile, other authors found reductions in anxiety symptoms from the beginning of lockdown in comparison the later stages (Amendola et al., 2021; Charles et al., 2021). It should be noted that the mixed findings reported in these studies may be related to data being collected at different times during the pandemic, in different areas, with differing infection rates and restrictions. Furthermore, most data were collected after the onset of the pandemic. One of the main benefits of the current study is that baseline data was collected *before* the pandemic commenced therefore more accurate estimates of the effect of the pandemic can be made.

While the overall incidence of anxiety symptoms decreased, it should be noted that approximately a fifth of students had symptoms of generalised anxiety disorder. Severe symptoms of anxiety decreased which helps account for the overall reduction in anxiety rates among this cohort. The high proportion of students reporting severe symptoms of anxiety in year 1 may be related to starting university and the associated demands and stressors. The reduction in year 2 could be related to fewer anxiety-inducing scenarios, particularly those related to social anxiety, and fewer competing demands on time, as a result of the pandemic. Indeed, some studies would suggest that many people with anxiety have reported better mental health during the pandemic (Hamza et al., 2021). Those with anxiety may have already felt isolated prior to the pandemic (Hamza et al., 2021) and adapted well to the lockdown and ongoing restrictions. The decrease in anxiety symptoms may also be related to improved levels of resilience among this cohort. Furthermore, some emerging research has found decreases in anxiety relating to changes from live teaching to online teaching (Bolatov et al., 2021) and not having to deal with anxiety provoking social situations.

No significant difference was found for suicidal behaviour between year 1 and year 2, yet the number of students who triggered the high-risk alert was alarming. Overall, the number of students triggering the alert increased slightly, with the rate decreasing in the ROI but increasing in NI. Of particular concern, 56 students attending university in NI triggered the high-risk alert for the first time in the follow up study. Such findings would indicate that students are a very vulnerable group, with many struggling, and support should be put in place to help them during this difficult time.

The study also aimed to identify the main stressors students endured during the pandemic. Increased social isolation impacted on them greatly, indicating that targeting interventions to address this issue would be very beneficial. While social isolation was found to have a very negative impact on the general population (Luo et al., 2020), students who were still in their first year at college when the pandemic started, may have found it particularly difficult, as they were still adapting to college life (Fruehwirth et al., 2021). Some were living away from home for the first time, meeting new friends and familiarising themselves with a less structured academic setting and then there was the shift to remote learning and changes to exams and assessments to contend with. Interruptions to the student learning and living experience may have long term repercussions, impacting on attrition rates, academic performance, and general wellbeing.

It should be remembered, however, that differences may have been revealed among this population between their first and second year at

university, in the absence of the pandemic. For example, Andrews and Wilding (2004) examined UK students before they started university, and half-way through their course, revealing that 9% of students without mental health problems at baseline had depression at follow-up, and 20% had clinical levels of anxiety. Bewick et al. (2010) also reported that student mental wellbeing deteriorated as they progressed through university. It should be noted however, that students with pre-existing symptoms of depression were more likely to indicate that stressors related to the pandemic caused them severe or very severe stress.

Prior studies which suggest that anxiety levels increase over the college years, make it harder to explain the finding that symptoms of anxiety decreased during this period of investigation. As discussed previously, students who would ordinarily be anxious, particularly those who suffer from social anxiety, may have encountered fewer stressors during restrictions. Furthermore, Martinez (2020) reported increases in resilience among some students, which may have counteracted rises in anxiety. Indeed, while many studies examine the negative effects of COVID-19, Elmer et al. (2020) found that students reported some positive impacts on their lives as a result of the pandemic. These include reduced worries that others were having more rewarding experiences than they were, as well as a reduced sense of competitiveness among students. Additionally, López-Castro et al. (2021) found that students reported positive outcomes including an increased appreciation for things they had previously taken for granted and paying more attention to their health.

This longitudinal study provides important information for policy makers and practitioners and particularly those with an interest in student mental health and wellbeing. Further research is however warranted. For example, a study in the US reported that mood disorder symptoms largely returned to pre-pandemic levels by Autumn 2020 (Charles et al., 2021). These findings suggest that although the initial emotional response to COVID-19 was considerable, students may begin to adapt to changes. It will be interesting therefore to monitor changes among this cohort. A third wave of this survey is being conducted during Autumn 2021, when students commence their final year at college. This will be very beneficial, as the researchers will have data from this cohort prior to the pandemic, during the pandemic in 2020, and approximately 20 months after the start of the pandemic. At this time, students will have endured not only the end of the first year at college under restrictions, but also their entire second year. As students will be on campus in Autumn 2021, it will be very important to gather information in relation to their mental health, in order to be able to support them during their final year at college and the challenges they may face.

## 5. Limitations

The study revealed several important findings, but some limitations should be considered when interpreting the results. While over 1800 students completed the comprehensive survey in year 1, only 884 students fully completed both the year 1 and year 2 surveys. Although weights were applied to address this issue, the sample may not be fully representative of the population under study. Furthermore, the sample concerns students at one university in NI and one Institute of Technology in the ROI, therefore the findings may not be generalised to other student populations. Another limitation is that the measures used in this study relate to symptoms of depression and anxiety in the two weeks prior to the survey and it would be beneficial to compare 12 month and lifetime disorders, but plans are in place for future research into the long-term impact of the pandemic on student mental health and wellbeing.

## 6. Conclusions

When comparing data collected from college students prior to the COVID-19 pandemic with data collected during the pandemic, this longitudinal study revealed that symptoms of depression increased significantly, while anxiety symptoms decreased, and suicide risk remained high. The findings indicate that students are a vulnerable group, in need of support during these difficult times. It is important therefore for colleges to monitor student mental health and to develop programmes and interventions to help address these issues, thereby improving retention rates, grades and the wellbeing of students. Peer support programmes, wellbeing sessions and online interventions may be beneficial and student support services should be expanded, where possible, to meet the demand.

## Contributions

Dr Margaret McLafferty, collected the data, came up with the concept of the paper, conducted the analysis and wrote up the original draft of the manuscript.

Natasha Brown conducted the literature review and helped prepare the original draft of the manuscript.

Professor Colum Walsh helped with study design, recruitment, reviewed the manuscript and assisted with editing the final document

Dr Rachel McHugh collected the data, assisted with the methodology and reviewed the manuscript.

Professor Tony Bjourson assisted with study design, provided expert advice to the research team and reviewed the manuscript.

Dr Louise McBride assisted with the recruitment of students for the study and reviewed the manuscript.

Dr John Brady provided clinical oversight and reviewed the manuscript.

Caoimhe Ward helped with recruitment and the administration of data and reviewed the manuscript.

Ailis Stevenson helped with recruitment and the administration of data and reviewed the manuscript.

Professor Siobhan O'Neill helped design the study and reviewed the manuscript.

Dr Elaine Murray, is the Principal Investigator, overseeing all elements of the project. She was involved in the conceptualisation of the paper and reviewed and edited the manuscript.

All authors have reviewed and approved the final document.

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## Declaration of competing interest

None.

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