

# Stressful Life Events and Chronic Stressors as Predictors of Psychopathological Conditions in the WMH-ICS Initiative

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## ABSTRACT

**Introduction.** Stressful life events (SLEs) and chronic stressors are established risk factors for psychopathology, yet their bidirectional associations with psychopathological conditions remain understudied among university students. **Objective.** To examine whether prior lifetime psychopathological conditions predict subsequent exposure to 12-month SLEs and current chronic stressors, and whether these stressors predict 12-month onset and persistence of psychopathological conditions among incoming university students. **Method.** Data were from the World Mental Health International College Student Initiative. Web-based surveys at 77 universities in 18 countries assessed prior lifetime psychopathological conditions, SLEs, chronic stressors, mental disorders, non-suicidal self-injury, and suicidal thoughts and behaviors among first-year students ( $n = 60,673$ ). Poisson regression models estimated reciprocal associations of stressors with prior psychopathological conditions. **Results.** Exposure to recent stressors was highly prevalent: 72.9% reported one or more 12-month SLEs, and 46.1% reported one or more current chronic stressors. Relationships of psychopathological conditions with stressors were largely positive and reciprocal. Population-attributable risk proportions (PARPs) for stressors predicting lifetime first onsets of psychopathological conditions occurring in the 12 months before the survey were 17.0%–35.8% across conditions for SLEs, 10.9%–34.9% for chronic stressors, and 29.9%–51.4% for either SLEs or chronic stressors. Comparable PARPs predicting 12-month persistence of psychopathological conditions were 3.8%–30.0% across conditions for SLEs, 5.8%–22.0% for chronic stressors, and 10.1%–44.6% for either SLEs or chronic stressors. **Discussion and conclusion.** These findings highlight the prevalence of stressors among university students and suggest that prevention and early intervention efforts should focus on reducing exposure to these stressors and/or their psychological effects.

**Keywords:** University students, stressful life events, chronic stressors, psychopathological conditions, WMH-ICS.

## RESUMEN

**Introducción.** Aunque los acontecimientos vitales estresantes (AVE) y los estresores crónicos son factores de riesgo reconocidos de psicopatología, sus relaciones bidireccionales con los trastornos mentales siguen siendo poco estudiadas en estudiantes universitarios. **Objetivo.** Examinar si las condiciones psicopatológicas previas predicen la exposición posterior a AVE y estresores crónicos actuales, y si estos estresores predicen el inicio y la persistencia a 12 meses de condiciones psicopatológicas en estudiantes universitarios. **Método.** Los datos provienen de la Iniciativa Internacional de Salud Mental en Estudiantes Universitarios. Estudiantes ( $n = 60,673$ ) en 77 universidades de 18 países respondieron encuestas en línea que evaluaron AVE, estresores crónicos, trastornos mentales, autolesiones no suicidas y conductas suicidas. Modelos de regresión de Poisson estimaron asociaciones entre estresores y condiciones psicopatológicas. **Resultados.** 72.9% reportó uno o más AVE en los últimos 12 meses y 46.1% uno o más estresores crónicos actuales. Las relaciones entre condiciones psicopatológicas y estresores fueron, principalmente, positivas y recíprocas. Las proporciones de riesgo atribuible poblacional (PRAP) para predecir el inicio de las condiciones psicopatológicas en los 12 meses previos a la encuesta fueron del 17.0%–35.8% para AVE, 10.9%–34.9% para estresores crónicos, y 29.9%–51.4% para AVE o estresores crónicos. Las PRAP para predecir la persistencia fueron del 3.8%–30.0% para AVE, 5.8%–22.0% para estresores crónicos, y 10.1%–44.6% para AVE o estresores crónicos. **Discusión y conclusión.** Estos hallazgos destacan la elevada carga de estresores recientes en estudiantes universitarios y sugieren que la prevención e intervención temprana deben centrarse en reducir la exposición a estos estresores y/o sus efectos psicológicos.

**Palabras clave:** Estudiantes universitarios, acontecimientos vitales estresantes, estresores crónicos, condiciones psicopatológicas, WMH-ICS.

## INTRODUCTION

Stressful life events (SLEs) are acute, time-limited events that challenge or exceed an individual's coping capacities. SLEs are established risk factors for psychopathology in adolescents (March-Llanes et al., 2017) and adults (Rnic et al., 2023). However, these relationships are reciprocal: psychopathology can increase the risk of subsequent SLEs, which in turn can influence disorder onset and course (Liu et al., 2024). Chronic stressors are ongoing difficulties that generate sustained strain. Chronic stressors across domains, including physical illness (Scott et al., 2023), occupational roles (Niedhammer et al., 2021), interpersonal relationships (Robles et al., 2014), and finances (Dackehag et al., 2019), are linked to adverse mental health outcomes. Chronic stressors also show reciprocal associations with psychopathology (Santee et al., 2023).

The transition to university is a critical developmental period marked by exposure to new SLEs, chronic stressors, and elevated psychopathology (Auerbach et al., 2018; Karyotaki et al., 2020; Mason et al., 2025). Although studies have linked SLEs and chronic stressors to mental disorders in university students (Karyotaki et al., 2020; Liu et al., 2019; Miranda-Mendizabal et al., 2024; Sheldon et al., 2021), few have examined reciprocal relationships or geographic and cultural variation in stress exposure. This leaves an important epidemiologic question unresolved: among incoming university students, how are stressors associated with prior psychopathology, and how are these stressors in turn associated with the onset and persistence of 12-month psychopathology? To address this gap, we examine survey data from first-year students at 77 universities in 18 countries in the World Mental Health International College Student (WMH-ICS) initiative to assess reciprocal associations of recent stressors with lifetime and 12 month psychopathology. We hypothesize: (i) a high prevalence of SLEs and chronic stressors; (ii) positive bidirectional associations of psychopathology with recent SLEs and chronic stressors; and (iii) stronger associations of recent SLEs and chronic stressors with 12-month onset compared to persistence of psychopathology.

## METHOD

### Study design

An observational, cross-sectional, and retrospective study was carried out using online surveys which were administered to first-year students in a convenience sample of 77 universities across 18 countries, categorized into four regions: the Americas (Canada, Chile, Mexico), Europe (Belgium, France, Germany, Netherlands, Northern Ireland,

Republic of Ireland, Romania, Spain, Sweden), Asia/Pacific (Australia, China [HK SAR China & PR China], New Zealand), and the Middle East/Africa (Kenya, Saudi Arabia, South Africa).

### Participants

Given the strong associations between childhood adversities and psychopathological conditions in prior WMH-ICS reports (Husky et al., 2025; Mortier et al., 2025), we restricted our sample to participants who were internally subsampled to receive the childhood adversity measures, allowing us to control for this construct in our analyses ( $n = 60,719$ ). We also excluded participants who were missing SLE or chronic stressor data ( $n = 46$ ), resulting in a final analytic sample size of  $n = 60,673$ .

### Measurements

The self-report questionnaire ([https://www.hcp.med.harvard.edu/wmh/ftpd/WMH-ICS\\_Baseline\\_survey\\_V3.2\\_FINAL\\_20220228.pdf](https://www.hcp.med.harvard.edu/wmh/ftpd/WMH-ICS_Baseline_survey_V3.2_FINAL_20220228.pdf)) was developed in English and translated into local languages using a translation, back-translation, and harmonization protocol based on the standard World Health Organization (WHO) protocol to maximize cross-national comparability of measures (Harkness et al., 2008).

#### *Stressful life events*

Eleven SLEs that occurred over the past 12 months were assessed based on the List of Threatening Experiences (LTE; Brugha et al., 1985; Brugha & Cragg, 1990). The events in this list included life-threatening illness/injury of a loved one, death of a loved one, romantic relationship dissolution, romantic relationship infidelity, serious betrayal, ongoing conflict or breakup with other loved one, physical assault, sexual assault/rape, trouble with police, serious legal problems, and an open-ended question about any other comparably stressful experience. To evaluate cross-national psychometric properties, we conducted country-specific exploratory factor analyses (EFAs) and calculated Cronbach's alphas (Supplementary Table 1). The first and second unrotated eigenvalues ranged from 2.0–2.8 and 1.2–1.4, respectively, with  $\alpha = .48-.65$ , indicating a dominant general SLE factor but with a smaller second factor (i.e., some multidimensionality), as expected for a checklist of heterogeneous life events that do not necessarily co-occur (Streiner, 2003).

#### *Chronic stressors*

Chronic stressors at the time of the survey were assessed across seven life domains using a five-point Likert scale with response options of 'none, mild, moderate, severe, and very severe' (Lepore, 1995). The domains were finances, health, love life, relationships with family, difficulties getting along

with people, health of a loved one, and other problems with loved ones. For analysis, each item was dichotomized such that responses of ‘severe’ or ‘very severe’ were coded as present, and all others as absent. Eigenvalues in the country-specific EFAs ranged from 1.9–2.7 for the first factor and .9–1.3 for the second factor, with  $\alpha = .57$ –.72. This supports a largely unidimensional construct with moderate to acceptable internal consistency across countries.

### *Mental disorders*

Lifetime prevalence of DSM-5 generalized anxiety disorder (GAD), major depressive disorder (MDD), and panic disorder (PD) was assessed with the Composite International Diagnostic Interview Screening Scales, Version 3.2 (CIDI-SC; Kessler et al., 2013). Lifetime assessments of bipolar I/II disorder (BD) and drug use disorder (DUD) were based on the Composite International Diagnostic Interview for DSM-5 (CIDI-5) modified for self-report administration (for detailed operational definitions, see Mason et al., 2025).

Three other disorders were assessed with brief, specialized dimensional screening scales. We established probable diagnoses using validated cut-points: post-traumatic stress disorder (PTSD) using a score of 5+ on the 4-Item Short-Form of the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013); past 6-month attention-deficit/hyperactivity disorder (ADHD) using a score of 14+ on the Adult Self-Report Scale-V1.1 (ASRS-V1.1) Screener (Kessler et al., 2007); and past 12-month alcohol use disorder (AUD) using standard scoring rules (16+ total, or 8–15 with 4+ on the dependence subscale) and scores indicating likely abuse (8+ total) on the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 1992; Villarosa-Hurlocker et al., 2020). Diagnoses obtained from all scales have shown good concordance with diagnoses based on blinded clinical reappraisal interviews (Kessler et al., 2005; Kessler et al., 2013; Khaled et al., 2024; Toner et al., 2019; Zuromski et al., 2019).

For lifetime disorders, respondents who endorsed diagnostic stem questions were asked symptom questions focused on the time in their life when symptoms were most severe. Additional items taken from the CIDI were used to assess the age-of-onset (AOO) and whether the disorder was present in the past 12 months.

### *Self-injurious thoughts and behaviors*

Non-suicidal self-injury (NSSI) was assessed with a question from the validated self-report version of the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007) about whether the respondent ever did something purposely to hurt themselves, without wanting to die. We used the DSM-5 criterion of engaging in NSSI five or more times in the past 12 months (American Psychiatric Association, 2022) as the cut-point for defining recent NSSI.

The survey also asked about lifetime and recent suicidal thoughts and behaviors (STB), specifically suicidal ideation

(wishing to be dead or having thoughts of killing oneself), suicide plans (thinking about or working out a method), and suicide attempts (purposefully hurting oneself with at least some intent to die) using questions adapted from the Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011). For both NSSI and STB, participants who responded positively to the lifetime question were then asked about AOO and whether the experience occurred in the past 12 months.

Collectively, the eight mental disorders and four indicators of self-injurious thoughts and behaviors are referred to as *psychopathological conditions* throughout the report.

### *Covariates*

Survey covariates included country, year of survey, and survey timing in the academic year. Socio-demographics included age, sex at birth, gender modality, sexual orientation, and parental education. Childhood adversities prior to age 18 were assessed using items adapted from the ACE survey (Felitti et al., 1998) and the Childhood Trauma Questionnaire-Short Form (Bernstein et al., 2003), operationalized by type, number, and frequency.

### **Procedure**

Data were collected between 2017 and 2023. Although recruitment methods varied by institution, incoming first-year students were typically invited to participate via email. Prospective participants received a study description, an informed consent script, and a university phone number for questions. Eleven countries offered incentives (e.g., raffles for store credit coupons, movie passes, cash) and reminder emails were used to increase response rates. The weighted response rate was 20.9%, with within-country sample sizes ranging from  $n = 333$  (Kenya) to  $n = 14,475$  (South Africa). See Supplementary Table 2 for further recruitment details.

### **Statistical analysis**

A calibration weight adjusted for differential within-university response rates by student age and sex. Multiple imputation by chained equations ( $m = 30$ ; Van Buuren, 2012) was then used to adjust for non-response, missing data from minor skip logic errors, and random internal subsampling of survey sections (i.e., mental disorders and childhood adversities). The latter was a variation on the split questionnaire design (Raghunathan & Grizzle, 1995) to shorten assessments while still obtaining information about all outcomes from all respondents. For more details regarding internal subsampling, see Husky et al. (2025).

Prior lifetime psychopathological conditions were defined as those with first onsets at least two years ago, whereas 12-month first onset and 12-month persistence referred to conditions meeting criteria in the past 12 months in the

absence versus presence of a prior lifetime occurrence, respectively. Mean calculations were used to estimate prevalence, onset, and persistence of disorders, as well as recent SLEs and chronic stressors.

Person-level multivariable Poisson regression models with robust error variance (Chen et al., 2018; Zou, 2004) were then used to estimate risk ratios (RRs) with 95% confidence intervals. Models controlled for survey characteristics, socio-demographics, and childhood adversities. Persistence models additionally controlled for AOO and time-since-onset (i.e., number of years between AOO and age-at-interview). Given the large number of associations between psychopathological conditions (12 types and 3 combined-condition outcomes) and stressors (11 SLEs, 7 chronic stressors, 6 combination stressor variables based on stressor counts and co-occurrence), results were summarized as the proportion of positive associations ( $\%RR_{+}$ ), positive and statistically significant associations ( $\%RR_{Sig+}$ ), and the geometric mean of the positive significant associations ( $RR_{MSig+}$ ).

Population-attributable risk proportions (PARPs) were calculated to estimate the proportion of onset and persistence cases due to recent SLEs, chronic stressors, or either. Using coefficients from the final multivariable model, predicted probabilities were computed twice for each respondent: once assuming no exposure to these stressors and once using observed predictor values (Greenland & Drescher, 1993). The ratio of the mean predicted probabilities indicates the proportion of cases expected to remain if these predictors were eliminated, assuming the RR estimates reflect unconfounded causal effects. PARP was then defined as 1 minus this ratio, representing the proportion of observed cases attributable to recent SLEs, chronic stressors, or both.

Design-based standard errors, accounting for weighting and clustering within universities, were used to evaluate statistical significance. Stata/MP (V18) was used to estimate multivariable Poisson models with robust variance estimates to adjust for design effects (Chen et al., 2018). All significance tests were evaluated using .05-level two-sided design-based tests.

## Ethical considerations

The survey content, recruitment, consent, and data protection procedures were approved by the institutional review boards of the participating organizations. Ethics approval details are available at [https://www.hcp.med.harvard.edu/wmh/ftpd/IRB\\_EthicsApproval\\_WMH-ICS\\_DSM-5.pdf](https://www.hcp.med.harvard.edu/wmh/ftpd/IRB_EthicsApproval_WMH-ICS_DSM-5.pdf)

## RESULTS

### Sample characteristics

Participants had a median age of 19 years (interquartile range [*IQR*] = 18–21), though first-year students from Middle East/Africa (MEA) countries were slightly older (*Mdn* = 22, *IQR* = 19–27) than other regions (*Mdn* = 18–19, *IQRs* = 18–20). Over half of participants were assigned female at birth (57.9%; *range*: 53.8% [Americas] to 62.3% [MEA]). A small proportion identified as transgender (1.4%; *range*: .3% [MEA] to 1.8% [Europe]), and 21.2% were non-heterosexual (*range*: 14.8% [MEA] to 23.6% [Europe]). Nearly half of the participants had at least one parent with a university education (46.5%; *range*: 30.5% [MEA] to 53.0% [Europe]). Detailed characteristics for the total sample and across the four geographic regions are provided in Supplementary Table 3.

### Prevalence of recent SLEs and chronic stressors

SLEs occurring within 12 months of the survey were reported by 72.9% of participants (*range*: 62.6% [Asia/Pacific] to 81.9% [MEA]; Table 1). Nearly half (49.4%) of participants reported multiple SLEs (*range*: 38.2% [Asia/Pacific] to 64.1% [MEA]). The most common SLEs were illness/injury of a loved one (29.8% overall, 24.7–37.5% across regions), argument/breakup with a loved one other than a romantic partner (27.9% overall, 18.1–34.5% across regions), and death of a loved one (27.8% overall, 21.0–39.0% across regions). Physical assault (4.5%), sexual assault (2.6%), trouble with police (2.7%), and legal trouble (1.1%) were rare globally. However, most SLEs were higher in the MEA region, notably physical assault (10.0% in MEA versus 1.9–6.0% elsewhere), being cheated on by a romantic partner (31.9% in MEA versus 6.2–11.0% elsewhere), and experiencing four or more distinct types of SLEs (31.8% in MEA versus 10.7–21.0% elsewhere).

Chronic stressors were less common than SLEs, but still frequent: 46.1% of participants reported at least one chronic stressor overall and 33.8–59.8% across regions (Table 2). Approximately one-quarter (26.1%) reported multiple chronic stressors (*range*: 16.4% [Asia/Pacific] to 36.5% [MEA]). Financial stressors were the most common overall (18.5%) and in the Asia/Pacific and MEA regions (14.1–39.5%), whereas health of a loved one was the next most common overall (17.8%) and most common in the Americas and Europe (17.9–19.8%). As with SLEs, most types of chronic stressors were more prevalent in the MEA region than elsewhere, especially for financial stressors (39.5% in MEA versus 13.7–14.5% in other regions).

Table 1  
Prevalence of 12-month stressful life events in total sample and by region

| Variable                              | Total    |      | The Americas |      | Europe   |      | Asia/Pacific |      | MEA      |      |
|---------------------------------------|----------|------|--------------|------|----------|------|--------------|------|----------|------|
|                                       | %        | (SE) | %            | (SE) | %        | (SE) | %            | (SE) | %        | (SE) |
| Stressful life events                 |          |      |              |      |          |      |              |      |          |      |
| Illness/injury of a loved one         | 29.8     | (.2) | 37.5         | (.4) | 26.6     | (.3) | 24.7         | (.5) | 30.4     | (.4) |
| Death of a loved one                  | 27.8     | (.2) | 32.4         | (.4) | 22.6     | (.3) | 21.0         | (.5) | 39.0     | (.5) |
| Breakup with a romantic partner       | 27.2     | (.2) | 32.4         | (.4) | 22.7     | (.3) | 19.9         | (.5) | 36.1     | (.5) |
| Cheated on by a romantic partner      | 12.0     | (.1) | 11.0         | (.3) | 6.3      | (.1) | 6.2          | (.3) | 31.9     | (.4) |
| Other betrayal                        | 24.7     | (.2) | 27.5         | (.4) | 19.8     | (.2) | 16.1         | (.4) | 38.9     | (.5) |
| Argument/breakup with other loved one | 27.9     | (.2) | 34.1         | (.4) | 24.4     | (.3) | 18.1         | (.5) | 34.5     | (.5) |
| Physically assaulted                  | 4.5      | (.1) | 6.0          | (.2) | 2.1      | (.1) | 1.9          | (.2) | 10.0     | (.3) |
| Sexually assaulted/raped              | 2.6      | (.1) | 1.7          | (.1) | 2.6      | (.1) | 3.4          | (.2) | 3.1      | (.2) |
| Problems with the police              | 2.7      | (.1) | 3.7          | (.2) | 2.5      | (.1) | 2.1          | (.2) | 2.4      | (.1) |
| Legal trouble                         | 1.1      | (.0) | .7           | (.1) | .8       | (.1) | .8           | (.1) | 2.6      | (.2) |
| Other stressful event                 | 27.0     | (.2) | 19.9         | (.3) | 27.9     | (.3) | 27.0         | (.5) | 34.7     | (.5) |
| Number of stressful life events       |          |      |              |      |          |      |              |      |          |      |
| 1                                     | 23.5     | (.2) | 22.3         | (.3) | 26.3     | (.3) | 24.3         | (.5) | 17.8     | (.4) |
| 2                                     | 18.6     | (.2) | 19.2         | (.3) | 19.3     | (.2) | 17.7         | (.5) | 16.7     | (.4) |
| 3                                     | 13.1     | (.1) | 14.3         | (.3) | 12.3     | (.2) | 9.8          | (.4) | 15.6     | (.3) |
| 4+                                    | 17.7     | (.2) | 21.0         | (.3) | 12.0     | (.2) | 10.7         | (.4) | 31.8     | (.4) |
| Any (1 or more)                       | 72.9     | (.2) | 76.9         | (.3) | 69.8     | (.3) | 62.6         | (.6) | 81.9     | (.4) |
| (n)                                   | (60,673) |      | (15,502)     |      | (27,283) |      | (7,152)      |      | (10,736) |      |

Note: SE = standard error of %; MEA = Middle East/Africa.

Table 2  
Prevalence of current chronic stressors in total sample and by region

| Variable                           | Total    |      | The Americas |      | Europe   |      | Asia/Pacific |      | MEA      |      |
|------------------------------------|----------|------|--------------|------|----------|------|--------------|------|----------|------|
|                                    | %        | (SE) | %            | (SE) | %        | (SE) | %            | (SE) | %        | (SE) |
| Chronic stressors                  |          |      |              |      |          |      |              |      |          |      |
| Financial                          | 18.5     | (.2) | 14.5         | (.3) | 13.7     | (.2) | 14.1         | (.4) | 39.5     | (.5) |
| Personal health                    | 10.3     | (.1) | 10.2         | (.2) | 10.1     | (.2) | 7.3          | (.3) | 13.2     | (.3) |
| Love life                          | 15.6     | (.1) | 11.9         | (.3) | 17.5     | (.2) | 9.8          | (.4) | 20.1     | (.4) |
| Relationships with family          | 12.1     | (.1) | 13.2         | (.3) | 10.9     | (.2) | 6.5          | (.3) | 17.4     | (.4) |
| Problems getting along with people | 9.1      | (.1) | 7.4          | (.2) | 9.5      | (.2) | 7.0          | (.3) | 11.5     | (.3) |
| Health of a loved one              | 17.8     | (.2) | 19.8         | (.3) | 17.9     | (.2) | 10.4         | (.4) | 19.5     | (.4) |
| Other problems with loved ones     | 14.1     | (.1) | 14.3         | (.3) | 14.4     | (.2) | 8.3          | (.3) | 16.7     | (.4) |
| Number of chronic stressors        |          |      |              |      |          |      |              |      |          |      |
| 1                                  | 19.9     | (.2) | 16.9         | (.3) | 21.1     | (.2) | 17.3         | (.4) | 23.3     | (.4) |
| 2                                  | 12.1     | (.2) | 10.6         | (.2) | 12.8     | (.2) | 8.4          | (.3) | 15.2     | (.3) |
| 3                                  | 14.0     | (.1) | 13.9         | (.3) | 12.8     | (.2) | 8.0          | (.3) | 21.3     | (.4) |
| Any (1 or more)                    | 46.1     | (.2) | 41.3         | (.4) | 46.7     | (.3) | 33.8         | (.6) | 59.8     | (.5) |
| (n)                                | (60,673) |      | (15,502)     |      | (27,283) |      | (7,152)      |      | (10,736) |      |

Note: SE = standard error of %; MEA = Middle East/Africa.

## Associations of prior psychopathological conditions with recent SLEs and chronic stressors

Prior lifetime psychopathological conditions were consistently associated with increased risk of 12-month SLEs ( $\%RR_+ = 81.8\%$ ;  $\%RR_{Sig+} = 50.6\%$ ) and current chronic stressors ( $\%RR_+ = 82.7\%$ ;  $\%RR_{Sig+} = 62.2\%$ ) (Table 3). BD ( $\%RR_{Sig+} = 81.8\text{--}100\%$ ) and PTSD ( $\%RR_{Sig+} = 90.9\text{--}100\%$ ) were the most consistent predictors. However, the strengths of associations were modest ( $RR_{MSig+} = 1.0\text{--}1.3$  across conditions predicting SLEs and  $1.1\text{--}1.3$  predicting chronic stressors). The largest RRs were observed for BD with physical and sexual assault, legal problems, and interpersonal problems ( $RR = 1.3\text{--}1.5$ ); AUD and DUD with legal problems and trouble with the police ( $RR = 1.5\text{--}2.2$ ); and AUD with sexual assault ( $RR = 1.6$ ; for detailed results regarding specific associations, see [Zhang et al., in press](#)).

## Associations of recent stressors with onset and persistence of 12-month psychopathological conditions

Twelve-month first onset was much higher for PTSD (19.3%) and suicidal ideation (9.9%) than for any other psychopathological condition (.9–4.6%) (Table 4). These onsets were consistently and positively associated with both 12-month SLEs ( $\%RR_+ = 76.4\%$ ;  $\%RR_{Sig+} = 30.0\%$ ) and current chronic stressors ( $\%RR_+ = 81.4\%$ ;  $\%RR_{Sig+} = 48.6\%$ ). Combinations (including exposure to multiple SLEs, multiple chronic stressors, and combinations of both) were also consistent and positive predictors ( $\%RR_+ = 78.3\%$ ;  $\%RR_{Sig+} = 28.3\%$ ). PTSD was the condition most consistently influenced regarding onset ( $\%RR_{Sig+} = 63.6\%$  for SLEs,  $100\%$  for chronic stressors, and  $66.7\%$  for combinations). Across nearly all psychopathological conditions, chronic stressors more strongly predicted onset than SLEs, in both the

Table 3

Association between prior lifetime psychopathological conditions and 12-month stressful life events and current chronic stressors ( $n = 60,673$ )<sup>a,b</sup>

| Variable                                  | %    | (SE)  | 12-Month stressful life events |                     |                     | Current chronic stressors |                     |                     |
|-------------------------------------------|------|-------|--------------------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|
|                                           |      |       | %RR <sub>+</sub>               | %RR <sub>Sig+</sub> | RR <sub>MSig+</sub> | %RR <sub>+</sub>          | %RR <sub>Sig+</sub> | RR <sub>MSig+</sub> |
| Prior lifetime mental disorders           |      |       |                                |                     |                     |                           |                     |                     |
| Major depressive disorder                 | 19.4 | (.2)  | 63.6                           | 18.2                | 1.1                 | 100.0                     | 100.0               | 1.3                 |
| Bipolar I/II disorder                     | 4.2  | (.1)  | 100.0                          | 81.8                | 1.2                 | 100.0                     | 100.0               | 1.3                 |
| Generalized anxiety disorder              | 10.7 | (.1)  | 54.5                           | 36.4                | 1.1                 | 100.0                     | 100.0               | 1.3                 |
| Panic disorder                            | 7.7  | (.1)  | 81.8                           | 45.5                | 1.1                 | 85.7                      | 57.1                | 1.2                 |
| Post-traumatic stress disorder            | 34.7 | (.3)  | 100.0                          | 90.9                | 1.2                 | 100.0                     | 100.0               | 1.2                 |
| Drug use disorder                         | 7.4  | (.1)  | 100.0                          | 100.0               | 1.3                 | 85.7                      | 42.9                | 1.1                 |
| Alcohol use disorder <sup>c</sup>         | 8.5  | (.1)  | 100.0                          | 90.9                | 1.3                 | 71.4                      | 28.6                | 1.2                 |
| ADHD <sup>d</sup>                         | 24.1 | (.2)  | 72.7                           | 18.2                | 1.2                 | 100.0                     | 71.4                | 1.1                 |
| Prior lifetime self-destructive behaviors |      |       |                                |                     |                     |                           |                     |                     |
| NSSI                                      | 22.3 | (.2)  | 90.9                           | 54.5                | 1.1                 | 71.4                      | 28.6                | 1.1                 |
| Suicidal ideation                         | 41.1 | (.2)  | 54.5                           | 9.1                 | 1.1                 | 100.0                     | 42.9                | 1.2                 |
| Suicide plan                              | 22.5 | (.6)  | 54.5                           | 9.1                 | 1.0                 | .0                        | .0                  | -                   |
| Suicide attempt                           | 8.0  | (1.3) | 90.9                           | 36.4                | 1.2                 | 42.9                      | .0                  | -                   |
| Number of prior lifetime conditions       |      |       |                                |                     |                     |                           |                     |                     |
| 1                                         | 20.4 | (.3)  | -                              | -                   | -                   | -                         | -                   | -                   |
| 2                                         | 13.5 | (.2)  | 90.9                           | 72.7                | 1.2                 | 100.0                     | 100.0               | 1.3                 |
| 3+                                        | 32.2 | (.4)  | 90.9                           | 45.5                | 1.3                 | 100.0                     | 100.0               | 1.3                 |

Note: SE = standard error of %;  $\%RR_+$  = percentage of risk ratios > 1.0 from multivariable models predicting recent stressors (11 stressful life event models; seven chronic stress models);  $\%RR_{Sig+}$  = percentage of risk ratios > 1.0 and statistically significant at the .05 level (two-sided, design-based tests) from multivariable models predicting recent stressors (11 stressful life event models; seven chronic stress models);  $RR_{MSig+}$  = the geometric mean of  $RR_{Sig+}$  estimates; ADHD = attention-deficit/hyperactivity disorder; NSSI = non-suicidal self-injury.

<sup>a</sup> Data were multiply imputed ( $m = 30$ ).

<sup>b</sup> Models controlled for survey characteristics (country, year of survey, whether surveyed in the first three months of academic year), socio-demographics (age, sex at birth [male versus female], parental education [college degree or higher versus less than college degree], gender modality [gender identity same as sex at birth versus different], sexual orientation [heterosexual versus non-heterosexual]), and childhood adversities. These adversities were assessed across five categories and operationalized by type (present if occurring at least rarely versus absent), number (0–5 count of present categories), and frequency (0–20 composite scale, truncated at 10).

<sup>c</sup> Alcohol use disorder estimates reflect 12-month prevalence.

<sup>d</sup> ADHD estimates reflect 6-month prevalence.

proportion and magnitude of statistically significant RRs (median and IQR $RR_{MSig+}$  of 1.2 [1.2–1.3] for SLEs versus 1.3 [1.2–1.5] for chronic stressors).

The largest RRs for onset were observed for physical assault, sexual assault, and trouble with the police predicting DUD ( $RR = 1.5$ – $1.7$ ); argument/breakup with a non romantic loved one and legal problems predicting GAD ( $RR = 1.4$ ); and argument/breakup with a non romantic loved one predicting NSSI ( $RR = 1.4$ ; for detailed results regarding specific associations, see Zhang et al., in press).

Twelve-month persistence was consistently and positively associated with 12-month SLEs ( $\%RR_+ = 80.9\%$ ;  $\%RR_{Sig+} = 28.2\%$ ), current chronic stressors ( $\%RR_+ = 88.6\%$ ;  $\%RR_{Sig+} = 48.6\%$ ), and combinations ( $\%RR_+ = 61.7\%$ ;  $\%RR_{Sig+} = 33.3\%$ ), although  $RR_{MSig+}$  values were modest (1.0–1.2) compared with onset models (for detailed persistence results, see Zhang et al., in press).

## Population-attributable risk proportions

PARPs were relatively comparable for SLEs and chronic stressors, sub-additive for the combination of SLEs and chronic stressors (i.e., the PARPs for having either type of stressor were less than the sum of the PARPs for the two components), and higher for 12-month first onset than 12-month persistence (Table 5). PARPs for onset were in the range 29.9–51.4%, and PARPs for persistence were 10.1–20.6% other than for an exceptionally high PARP for persistence of suicide attempt (44.6%). Patterns were broadly similar across the four regions, although somewhat smaller in the Americas (for detailed results, see Zhang et al., in press).

Table 4

Associations between 12-month stressful life events and current chronic stressors with 12-month first onset of psychopathological conditions<sup>a,b</sup>

|                                 |      |      | 12-Month stressful life events |                     |                     | Current chronic stressors |                     |                     | Combination <sup>c</sup> |                     |                     |          |
|---------------------------------|------|------|--------------------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|--------------------------|---------------------|---------------------|----------|
| 12-Month first onset of:        | %    | (SE) | %RR <sub>+</sub>               | %RR <sub>Sig+</sub> | RR <sub>MSig+</sub> | %RR <sub>+</sub>          | %RR <sub>Sig+</sub> | RR <sub>MSig+</sub> | %RR <sub>+</sub>         | %RR <sub>Sig+</sub> | RR <sub>MSig+</sub> | (n)      |
| Prior lifetime mental disorders |      |      |                                |                     |                     |                           |                     |                     |                          |                     |                     |          |
| Major depressive disorder       | 4.6  | (.1) | 63.6                           | 45.5                | 1.2                 | 85.7                      | 57.1                | 1.5                 | 66.7                     | 66.7                | 1.3                 | (46,297) |
| Bipolar I/II disorder           | .9   | (.0) | 90.9                           | 9.1                 | 1.3                 | 85.7                      | 28.6                | 1.5                 | 83.3                     | 33.3                | 1.5                 | (57,702) |
| Generalized anxiety disorder    | 2.0  | (.1) | 63.6                           | 27.3                | 1.3                 | 85.7                      | 71.4                | 1.4                 | 83.3                     | 33.3                | 1.3                 | (52,335) |
| Panic disorder                  | 1.2  | (.1) | 81.8                           | .0                  | -                   | 71.4                      | 14.3                | 1.8                 | 100.0                    | .0                  | -                   | (54,628) |
| Post-traumatic stress disorder  | 19.3 | (.3) | 81.8                           | 63.6                | 1.2                 | 100.0                     | 100.0               | 1.1                 | 83.3                     | 66.7                | 1.2                 | (36,354) |
| Drug use disorder               | 1.7  | (.1) | 90.9                           | 45.5                | 1.4                 | 71.4                      | 42.9                | 1.2                 | 83.3                     | 33.3                | 1.4                 | (55,971) |
| Self-destructive behaviors      |      |      |                                |                     |                     |                           |                     |                     |                          |                     |                     |          |
| NSSI                            | 3.3  | (.1) | 72.7                           | 36.4                | 1.3                 | 71.4                      | 42.9                | 1.2                 | 83.3                     | .0                  | -                   | (44,508) |
| Suicidal ideation               | 9.9  | (.2) | 63.6                           | 18.2                | 1.2                 | 71.4                      | 71.4                | 1.3                 | 66.7                     | 33.3                | 1.2                 | (32,430) |
| Suicide plan                    | 4.5  | (.2) | 81.8                           | 27.3                | 1.2                 | 85.7                      | 42.9                | 1.3                 | 83.3                     | 16.7                | 1.4                 | (44,711) |
| Suicide attempt                 | 1.5  | (.3) | 72.7                           | 27.3                | 1.2                 | 85.7                      | 14.3                | 1.2                 | 50.0                     | .0                  | -                   | (54,739) |

Note: SE = standard error of %;  $\%RR_+$  = percentage of risk ratios > 1.0 from multivariable models assessing recent stressors (11 stressful life event predictors; seven chronic stress predictors; six combination predictors);  $\%RR_{Sig+}$  = percentage of risk ratios > 1.0 and statistically significant at the .05 level (two-sided, design-based tests) from multivariable models assessing recent stressors (11 stressful life event predictors; seven chronic stress predictors; six combination predictors);  $RR_{MSig+}$  = the geometric mean of  $RR_{Sig+}$  estimates; NSSI = non-suicidal self-injury.

<sup>a</sup> Data were multiply imputed ( $m = 30$ ).

<sup>b</sup> Models controlled for survey characteristics (country, year of survey, whether surveyed in the first three months of academic year), socio-demographics (age, sex at birth [male versus female], parental education [college degree or higher versus less than college degree], gender modality [gender identity same as sex at birth versus different], sexual orientation [heterosexual versus non-heterosexual]), and childhood adversities. These adversities were assessed across five categories and operationalized by type (present if occurring at least rarely versus absent), number (0–5 count of present categories), and frequency (0–20 composite scale, truncated at 10).

<sup>c</sup> Represents associations for the number of stressors variables: 2, 3, and 4+ stressful life events; 2 and 3+ chronic stressors; and combined exposure to 2+ stressful life events and 2+ chronic stressors.

Table 5

*Estimated population attributable risk proportions (PARPs) of 12-month first onset and 12-month persistence of psychopathological conditions due to 12-month stressful life events, current chronic stressors, and either (n = 60,673)<sup>a,b</sup>*

| Variable                          | 12-Month first onset |      |                  | 12-Month persistence |      |                  |
|-----------------------------------|----------------------|------|------------------|----------------------|------|------------------|
|                                   | SLE                  | CS   | Either SLE or CS | SLE                  | CS   | Either SLE or CS |
| <b>Mental disorders</b>           |                      |      |                  |                      |      |                  |
| Major depressive disorder         | 25.0                 | 23.9 | 41.4             | 5.6                  | 7.2  | 12.3             |
| Bipolar I/II disorder             | 28.6                 | 34.1 | 51.4             | 5.2                  | 5.8  | 10.6             |
| Generalized anxiety disorder      | 28.0                 | 34.9 | 50.9             | 3.8                  | 6.5  | 10.1             |
| Panic disorder                    | 22.4                 | 19.8 | 36.7             | 4.5                  | 6.5  | 10.6             |
| Post-traumatic stress disorder    | 26.7                 | 13.3 | 35.3             | 7.2                  | 8.8  | 15.2             |
| Drug use disorder                 | 35.8                 | 16.7 | 45.2             | 10.5                 | 5.8  | 15.6             |
| Alcohol use disorder <sup>a</sup> | -                    | -    | -                | 16.2                 | 4.1  | 19.4             |
| ADHD <sup>c</sup>                 | -                    | -    | -                | 7.4                  | 10.1 | 16.6             |
| <b>Self-destructive behaviors</b> |                      |      |                  |                      |      |                  |
| NSSI                              | 25.7                 | 10.9 | 33.0             | 8.4                  | 10.4 | 17.7             |
| Suicidal ideation                 | 17.0                 | 16.5 | 29.9             | 6.3                  | 11.0 | 16.4             |
| Suicide plan                      | 19.7                 | 20.6 | 35.3             | 6.8                  | 15.1 | 20.6             |
| Suicide attempt                   | 26.7                 | 17.5 | 38.3             | 30.0                 | 22.0 | 44.6             |

*Note:* PARPs = population attributable risk proportions; SLE = 12-month stressful life events; CS = current chronic stressors; ADHD = attention-deficit/hyperactivity disorder; NSSI = non-suicidal self-injury.

<sup>a</sup> PARPs were calculated using the first imputation from a multiply imputed dataset (m = 30). PARPs were adjusted for survey characteristics (country, year of survey, whether surveyed in the first three months of the academic year), socio-demographics (age [onset only], age-of-onset [persistence only], time-since-onset [persistence only], sex at birth [male versus female], parental education [college degree or higher versus less than college degree], gender modality [gender identity same as sex at birth versus different], sexual orientation [heterosexual versus non-heterosexual]), prior lifetime disorders, number of prior lifetime disorders, and childhood adversities. These adversities were assessed across five categories and operationalized by type (present if occurring at least rarely versus absent), number (0-5 count of present categories), and frequency (0-20 composite scale, truncated at 10).

<sup>b</sup> Alcohol use disorder estimates reflect 12-month prevalence, not 12-month persistence.

<sup>c</sup> Alcohol use disorder estimates reflect 12-month prevalence.

<sup>d</sup> ADHD estimates reflect 6-month prevalence, not 12-month persistence.

## DISCUSSION AND CONCLUSION

Three key findings emerged. First, SLEs and chronic stressors were highly prevalent among university students. Second, prior psychopathological conditions were associated with increased risk of stress exposure. Third, 12-month SLEs and current chronic stressors were significantly associated with onset and, to a lesser degree, persistence of psychopathological conditions.

### Prevalence of stress exposure

Stress exposure was common among first-year students: 72.9% reported at least one SLE and 46.1% at least one chronic stressor. Interpersonal events (e.g., illness/injury or death of a loved one) were the most frequent SLEs. Regional disparities also emerged: Concern over a loved one's health was the most prevalent chronic stressor in the Americas and Europe, whereas financial stress was the highest in the Asia/Pacific and MEA regions. These differences may reflect variation in exposure or cultural differences in reporting and in meanings attached to interpersonal events, but should be interpreted cautiously given substantial within-region

heterogeneity and the diverse populations at many universities. It is also important to note that some chronic stressors may arise from SLEs, as acute events such as illness, injury or financial disruption can become more persistent source of strain. However, these data cannot determine when or for whom SLEs become chronic stressors; examining individual differences and contextual factors that shape this transition is an important direction for future research.

### Bidirectionality and stress generation

Consistent with prior research (March-Llanes et al., 2017; Rnic et al., 2023; Santee et al., 2023), we found bidirectional relationships between stressors and psychopathology. Several of the strongest associations likely reflect selection rather than causation, for example, prior BD and substance use disorders predicting later physical or sexual assault and legal or police problems, consistent with stress-generation processes in which existing psychopathology increases exposure to high-risk contexts. In contrast, other associations (e.g., arguments or breakups with loved ones and legal problems with new onset GAD or NSSI) could reflect acute stressors precipitating symptoms, although our cross

sectional design and limited temporal detail mean that such interpretations must remain tentative.

In line with this, stress generation can arise through multiple selection mechanisms that increase exposure to stressors, particularly in interpersonal and academic domains (Hammen, 2006). These stressors can exacerbate disorders and contribute to secondary disorders, creating self-perpetuating cycles of stress and psychopathology (Monroe & Harkness, 2022). Consequently, campus interventions may need to target both current symptom burden and stress-generating behavioral patterns.

### **Stronger associations with onset than persistence**

Across disorders, stressors were more consistently associated with first onset than with persistence, consistent with longitudinal studies showing stronger associations of stress with first onset than with recurrence (Stroud et al., 2011). Because psychopathological conditions can become self-perpetuating over time (Monroe & Harkness, 2005), early intervention targeting first onset is critical. However, chronic stressors may uniquely contribute to persistence through cumulative ‘wear and tear’ and sustained stress-response activation (McEwen, 1998). This aligns with our finding that chronic stressors, relative to SLEs, were more important for persistence than onset, suggesting that ongoing contextual strain may maintain psychopathology even after acute precipitating events have passed. Clinically, this matters because chronic stressors may be more modifiable through campus level interventions than many acute life events.

### **Population-attributable risk proportions for recent stressors**

Combined PARPs indicated that recent stressors were associated with a significant fraction of new onsets of mental disorders and self-injurious thoughts and behaviors, whereas contributions to persistence were considerably smaller for most outcomes. From a public health perspective, reducing exposure to stressors or mitigating their impact through campus initiatives such as financial counseling, interpersonal supports, anti-bullying and harassment campaigns, and evidence-based stress-management interventions could meaningfully reduce student psychopathology. Because many universities already offer such services, future research should focus on enhancing their reach, uptake, and implementation.

The high PARP for persistence of suicide attempts is especially concerning, underscoring the need for intensive, sustained follow-up care and rapid stressor-focused support after an initial attempt. While depression and hopelessness are known to be important longitudinal predictors of STB (Ribeiro et al., 2018), our results suggest that recent stress

may be an additional key lever for reducing recurrence of attempts. Stress assessment should therefore be more central in post-attempt monitoring, not only as background context but as a proximal target for relapse prevention.

PARPs were high despite relatively small individual stressor RRs because exposure to multiple stressors was common, and the RRs for combined exposures (multiple SLEs, multiple chronic stressors, or both) were largely positive and statistically significant. This means that stressor effects increased with an increasing number of stressors, leading to a very high prevalence of psychopathological conditions among students who were exposed to many stressors. Accordingly, public health efforts should prioritize reducing the pile-up of multiple stressors rather than targeting individual stressors.

### **Strengths and limitations**

This study has several strengths. The large sample across 18 countries provides high statistical power and a much-needed cross-cultural perspective on the stress-psychopathology dynamic among university students. By simultaneously evaluating SLEs and chronic stress, the study captures a comprehensive profile of the student stress burden. Nonetheless, several limitations should be noted. The use of self-report screening scales and imputed data introduces potential miscalibration bias. Low variable response rates across countries may limit generalizability and introduce selection bias, particularly if survey participation was related to stress exposure or psychopathology. Chronic stress was measured as perceived stress within life domains rather than direct exposure to specific stressors. Additionally, assessing stress exposure and psychopathology within the same retrospective timeframe prevents accurate temporal sequencing, a common limitation of cross-sectional research (Monroe & Reid, 2009). We plan to address this in prospective analyses using WMH-ICS follow-up data, which will establish temporal order and allow examination of stress buffering roles of additional baseline variables (e.g., personality traits, social support).

### **Conclusion**

SLEs and chronic stressors were common and frequently co-occurred among university students worldwide. Our findings suggest a vicious cycle in which these stressors contribute to the onset and persistence of psychopathological conditions, which in turn exacerbate existing stressors and the onset of additional stressors. Especially students who experience multiple stressors are at high risk of adverse outcomes. These results highlight the importance of campus prevention strategies for both acute and chronic stressors and their negative effects.

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## Conflicts of interest

In the past three years, Dr. Auerbach has received funding from NIH/NIMH, the Morgan Stanley Foundation, and the Erick Shirley Foundation for Mental Health. He serves on the scientific advisory board for the Jake Collective. Dr. Auerbach has received consulting fees and equity from Get Sonar, Inc., and consulting fees from RPA Health Consulting, Inc., and from Covington & Burling LLP, which is representing a social media company in litigation. Dr. Ebert reports having received consulting fees from and served on the scientific advisory boards of several companies such as Sanofi, Minddistrict, Lantern, Schoen Kliniken, and German health insurance companies (Techniker Krankenkasse, BARMER). He is a shareholder of the Institute for Online Health Training GmbH (GET.ON>HelloBetter), a provider of digital therapeutics for mental disorders in routine mental health care (unrelated to the

present paper). In the past three years, Dr. Kessler served as a consultant for Cambridge Health Alliance, Child Mind Institute, Massachusetts General Hospital, RallyPoint LLC., Sage Therapeutics, University of Michigan, and University of North Carolina. He has stock options in Cerebral Inc., Mirah, PYM (Prepare Your Mind), and Verisense Health and owns an interest in MenSSano LLC.

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- Brugha, T. S., & Cragg, D. (1990). The List of Threatening Experiences: The reliability and validity of a brief life events questionnaire. *Acta Psychiatrica Scandinavica*, 82(1), 77–81. <https://doi.org/10.1111/j.1600-0447.1990.tb01360.x>
- Chen, W., Qian, L., Shi, J., & Franklin, M. (2018). Comparing performance between log-binomial and robust Poisson regression models for estimating risk ratios under model misspecification. *BMC Medical Research Methodology*, 18(1). <https://doi.org/10.1186/s12874-018-0519-5>
- Dackehag, M., Ellegård, L. M., Gerdtham, U. G., & Nilsson, T. (2019). Debt and mental health: New insights about the relationship and the importance of the measure of mental health. *European Journal of Public Health*, 29(3), 488–493. <https://doi.org/10.1093/eurpub/ckz002>
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults. *American Journal of Preventive Medicine*, 14(4), 245–258. [https://doi.org/10.1016/s0749-3797\(98\)00017-8](https://doi.org/10.1016/s0749-3797(98)00017-8)
- Greenland, S., & Drescher, K. (1993). Maximum Likelihood Estimation of the Attributable Fraction from Logistic Models. *Biometrics*, 49(3), 865–872. <https://doi.org/10.2307/2532206>
- Hammen, C. (2006). Stress generation in depression: Reflections on origins, research, and future directions. *Journal of Clinical Psychology*, 62(9), 1065–1082. <https://doi.org/10.1002/jclp.20293>
- Harkness, J., Pennell, B., Villar, A., Gebler, N., Aguilar-Gaxiola, S., & Bilgen, I. (2008). Translation procedures and translation assessment in the World Mental Health Survey Initiative. In R. C. Kessler & T. B. Ustun (Eds.), *The WHO World Mental Health Surveys: Global perspectives on the epidemiology of mental disorders* (pp. 91–113). Cambridge University Press.
- Husky, M. M., Lee, S., Sampson, N. A., Borowski, S., Albor, Y., Alhadi, A. N., Alonso, J., Al-Saud, N. K., Altwajiri, Y. A., Andersson, C., Atwoli, L., Muaka, C. A., Báez-Mansur, P. M., Ballester, L., Bantjes, J., Baumeister, H., Bendtsen, M., Benjet, C., ... World Mental Health International College Student collaborators (2025). Childhood adversities and their associations with mental disorders in the World Mental Health International College Student surveys initiative. *Psychiatry Research*, 351, Article 116585. <https://doi.org/10.1016/j.psychres.2025.116585>
- Karyotaki, E., Cuijpers, P., Albor, Y., Alonso, J., Auerbach, R. P., Bantjes, J., Bruffaerts, R., Ebert, D. D., Hasking, P., Kiekens, G., Lee, S., McLafferty, M., Mak, A., Mortier, P., Sampson, N. A., Stein, D. J., Vilagut, G., & Kessler, R. C. (2020). Sources of Stress and Their Associations With Mental Disorders Among College Students: Results of the World Health Organization World Mental Health Surveys International College Student Initiative. *Frontiers in Psychology*, 11, Article 1759. <https://doi.org/10.3389/fpsyg.2020.01759>
- Kessler, R. C., Adler, L., Ames, M., Demler, O., Faraone, S., Hiripi, E., Howes, M. J., Jin, R., Secnik, K., Spencer, T., Ustun, T. B., & Walters, E. E. (2005). The World Health Organization Adult ADHD Self-Report Scale (ASRS): A short screening scale for use in the general population. *Psychological Medicine*, 35(2), 245–256. <https://doi.org/10.1017/s0033291704002892>
- Kessler, R. C., Adler, L. A., Gruber, M. J., Sarawate, C. A., Spencer, T., & Van Brunt, D. L. (2007). Validity of the World Health Organization Adult ADHD Self-Report Scale (ASRS) Screener in a representative sample of health plan members. *International Journal of Methods in Psychiatric Research*, 16(2), 52–65. <https://doi.org/10.1002/mpr.208>
- Kessler, R. C., Santiago, P. N., Colpe, L. J., Dempsey, C. L., First, M. B., Heeringa, S. G., Stein, M. B., Fullerton, C. S., Gruber, M. J., Naifeh, J. A., Nock, M. K., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Ursano, R. J. (2013). Clinical reappraisal of the Composite International Diagnostic Interview Screening Scales (CIDI-SC) in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *International Journal of Methods in Psychiatric Research*, 22(4), 303–321. <https://doi.org/10.1002/mpr.1398>
- Khaled, S. M., Al-Thani, S. M., Sampson, N. A., Kessler, R. C., Woodruff, P. W., & Alabdulla, M. (2024). Twelve-month prevalence, persistence, severity, and treatment of mood and anxiety disorders in Qatar's national mental health study. *International Journal of Methods in Psychiatric Research*, 33(S1), e2012. <https://doi.org/10.1002/mpr.2012>
- Lepore, S. J. (1995). Measurement of chronic stressors. In S. Cohen, R. C. Kessler, &

## REFERENCES

- American Psychiatric Association. (2022). *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR)*. <https://doi.org/10.1176/appi.books.9780890425787>
- Auerbach, R. P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D. D., Green, J. G., Hasking, P., Murray, E., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Stein, D. J., Vilagut, G., Zaslavsky, A. M., Kessler, R. C., & WHO WMH-ICS Collaborators. (2018). WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. *Journal of Abnormal Psychology*, 127(7), 623–638. <https://doi.org/10.1037/abn0000362>
- Babor, T. F., de la Fuente, J. R., Saunders, J., & Grant, M. (1992). *AUDIT: The Alcohol Use Disorders Identification Test: Guidelines for use in primary health care (WHO/PSA/92.4)*. World Health Organization. <https://auditscreen.org/cmsb/uploads/1992-audit-the-alcohol-use-disorders-identification-test-guidelines-for-use-in-primary-health-care-geneva-world-health-organization-1992.pdf>
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169–190. [https://doi.org/10.1016/s0145-2134\(02\)00541-0](https://doi.org/10.1016/s0145-2134(02)00541-0)
- Brugha, T., Bebbington, P., Tennant, C., & Hurry, J. (1985). The List of Threatening Experiences: A subset of 12 life event categories with considerable long-term contextual threat. *Psychological Medicine*, 15(1), 189–194. <https://doi.org/10.1017/s003329170002105x>

- L. U. Gordon (Eds.), *Measuring stress: A guide for health and social scientists* (pp. 102–120). Oxford University Press.
- Liu, R. T., Hamilton, J. L., Boyd, S. I., Dreier, M. J., Walsh, R. F. L., Sheehan, A. E., Turnamian, M. R., Workman, A. R. C., & Jorgensen, S. L. (2024). A systematic review and Bayesian meta-analysis of 30 years of stress generation research: Clinical, psychological, and sociodemographic risk and protective factors for prospective negative life events. *Psychological Bulletin*, 150(9), 1021–1069. <https://doi.org/10.1037/bul0000431>
- Liu, Y., Zhang, N., Bao, G., Huang, Y., Ji, B., Wu, Y., Liu, C., & Li, G. (2019). Predictors of depressive symptoms in college students: A systematic review and meta-analysis of cohort studies. *Journal of Affective Disorders*, 244, 196–208. <https://doi.org/10.1016/j.jad.2018.10.084>
- March-Llanes, J., Marqués-Feixa, L., Mezquita, L., Fañanás, L., & Moya-Higueras, J. (2017). Stressful life events during adolescence and risk for externalizing and internalizing psychopathology: a meta-analysis. *European Child & Adolescent Psychiatry*, 26(12), 1409–1422. <https://doi.org/10.1007/s00787-017-0996-9>
- Mason, A., Rapsey, C., Sampson, N., Lee, S., Albor, Y., Al-Hadi, A. N., Alonso, J., Al-Saud, N., Altwaijri, Y., Andersson, C., Atwoli, L., Auerbach, R. P., Ayuya, C., Báez-Mansur, P. M., Ballester, L., Bantjes, J., Baumeister, H., Bendtsen, M., Benjet, C., ... WMH-ICS collaborators (2025). Prevalence, age-of-onset, and course of mental disorders among 72,288 first-year university students from 18 countries in the World Mental Health International College Student (WMH-ICS) initiative. *Journal of Psychiatric Research*, 183, 225–236. <https://doi.org/10.1016/j.jpsychires.2025.02.016>
- McEwen, B. S. (1998). Protective and Damaging Effects of Stress Mediators. *New England Journal of Medicine*, 338(3), 171–179. <https://doi.org/10.1056/nejm199801153380307>
- Miranda-Mendizabal, A., Castellví, P., Vilagut, G., Alayo, I., Almenara, J., Ballester, L., Echeburúa, E., Gabilondo, A., Gili, M., Mortier, P., Piqueras, J. A., Roca, M., Auerbach, R. P., Bruffaerts, R., Kessler, R. C., & Alonso Caballero, J. (2024). Suicidal ideation risk among LGB Spanish university students: The role of childhood and adolescence adversities and mental disorders. *Journal of Affective Disorders*, 353, 52–59. <https://doi.org/10.1016/j.jad.2024.02.084>
- Monroe, S. M., & Harkness, K. L. (2005). Life Stress, the "Kindling" Hypothesis, and the Recurrence of Depression: Considerations From a Life Stress Perspective. *Psychological Review*, 112(2), 417–445. <https://doi.org/10.1037/0033-295x.112.2.417>
- Monroe, S. M., & Harkness, K. L. (2022). Major Depression and Its Recurrences: Life Course Matters. *Annual Review of Clinical Psychology*, 18(1), 329–357. <https://doi.org/10.1146/annurev-clinpsy-072220-021440>
- Monroe, S. M., & Reid, M. W. (2009). Life Stress and Major Depression. *Current Directions in Psychological Science*, 18(2), 68–72. <https://doi.org/10.1111/j.1467-8721.2009.01611.x>
- Mortier, P., Yang, X., Altwaijri, Y. A., Holdcraft, J. A., Lee, S., Sampson, N. A., Albor, Y., Alhadi, A. N., Alonso, J., Al-Saud, N. K., Andersson, C., Atwoli, L., Auerbach, R. P., Muaka, C. A., Báez-Mansur, P. M., Ballester, L., Bantjes, J., Baumeister, H., Bendtsen, ... World Mental Health International College Student collaborators (2025). The associations of childhood adversities and mental disorders with suicidal thoughts and behaviors: Results from the World Mental Health International College Student Initiative. *Psychiatry Research*, 350, Article 116555, 1–13. <https://doi.org/10.1016/j.psychres.2025.116555>
- Niedhammer, I., Bertrais, S., & Witt, K. (2021). Psychosocial work exposures and health outcomes: a meta-review of 72 literature reviews with meta-analysis. *Scandinavian Journal of Work, Environment & Health*, 47(7), 489–508. <https://doi.org/10.5271/sjweh.3968>
- Nock, M. K., Holmberg, E. B., Photos, V. I., & Michel, B. D. (2007). Self-Injurious Thoughts and Behaviors Interview: Development, reliability, and validity in an adolescent sample. *Psychological Assessment*, 19(3), 309–317. <https://doi.org/10.1037/1040-3590.19.3.309>
- Posner, K., Brown, G. K., Stanley, B., Brent, D. A., Yershova, K. V., Oquendo, M. A., Currier, G. W., Melvin, G. A., Greenhill, L., Shen, S., & Mann, J. J. (2011). The Columbia–Suicide Severity Rating Scale: Initial Validity and Internal Consistency Findings From Three Multisite Studies With Adolescents and Adults. *American Journal of Psychiatry*, 168(12), 1266–1277. <https://doi.org/10.1176/appi.ajp.2011.10111704>
- Raghunathan, T. E., & Grizzle, J. E. (1995). A Split Questionnaire Survey Design. *Journal of the American Statistical Association*, 90(429), 54–63. <https://doi.org/10.1080/01621459.1995.10476488>
- Ribeiro, J. D., Huang, X., Fox, K. R., & Franklin, J. C. (2018). Depression and hopelessness as risk factors for suicide ideation, attempts and death: Meta-analysis of longitudinal studies. *British Journal of Psychiatry*, 212(5), 279–286. <https://doi.org/10.1192/bjp.2018.27>
- Rnic, K., Santee, A. C., Hoffmeister, J., Liu, H., Chang, K. K., Chen, R. X., Neufeld, R. W. J., Machado, D. A., Starr, L. R., Dozois, D. J. A., & LeMoult, J. (2023). The vicious cycle of psychopathology and stressful life events: A meta-analytic review testing the stress generation model. *Psychological Bulletin*, 149(5-6), 330–369. <https://doi.org/10.1037/bul0000390>
- Robles, T. F., Slatcher, R. B., Trombello, J. M., & McGinn, M. M. (2014). Marital quality and health: A meta-analytic review. *Psychological Bulletin*, 140(1), 140–187. <https://doi.org/10.1037/a0031859>
- Santee, A. C., Rnic, K., Chang, K. K., Chen, R. X., Hoffmeister, J., Liu, H., LeMoult, J., Dozois, D. J., & Starr, L. R. (2023). Risk and protective factors for stress generation: A meta-analytic review. *Clinical Psychology Review*, 103, 102299. <https://doi.org/10.1016/j.cpr.2023.102299>
- Scott, A. J., Correa, A. B., Bisby, M. A., & Dear, B. F. (2023). Depression and Anxiety Trajectories in Chronic Disease: A Systematic Review and Meta-Analysis. *Psychotherapy and Psychosomatics*, 92(4), 227–242. <https://doi.org/10.1159/000533263>
- Sheldon, E., Simmonds-Buckley, M., Bone, C., Mascarenhas, T., Chan, N., Wincott, M., Gleeson, H., Sow, K., Hind, D., & Barkham, M. (2021). Prevalence and risk factors for mental health problems in university undergraduate students: A systematic review with meta-analysis. *Journal of Affective Disorders*, 287, 282–292. <https://doi.org/10.1016/j.jad.2021.03.054>
- Streiner, D. L. (2003). Being Inconsistent About Consistency: When Coefficient Alpha Does and Doesn't Matter. *Journal of Personality Assessment*, 80(3), 217–222. [https://doi.org/10.1207/s15327752jpa8003\\_01](https://doi.org/10.1207/s15327752jpa8003_01)
- Stroud, C. B., Davila, J., Hammen, C., & Vrshek-Schallhorn, S. (2011). Severe and nonsevere events in first onsets versus recurrences of depression: Evidence for stress sensitization. *Journal of Abnormal Psychology*, 120(1), 142–154. <https://doi.org/10.1037/a0021659>
- Toner, P., Böhnke, J. R., Andersen, P., & McCambridge, J. (2019). Alcohol screening and assessment measures for young people: A systematic review and meta-analysis of validation studies. *Drug and Alcohol Dependence*, 202, 39–49. <https://doi.org/10.1016/j.drugalcdep.2019.01.030>
- Van Buuren, S. (2012). *Flexible imputation of missing data* (1st ed.). Chapman & Hall/CRC. <https://doi.org/10.1201/b11826>
- Villarosa-Hurlocker, M. C., Schutts, J. W., Madson, M. B., Jordan, H. R., Whitley, R. B., & Mohn, R. C. (2020). Screening for alcohol use disorders in college student drinkers with the AUDIT and the USAUDIT: a receiver operating characteristic curve analysis. *The American Journal of Drug and Alcohol Abuse*, 46(5), 531–545. <https://doi.org/10.1080/00952990.2020.1712410>
- Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). *The PTSD Checklist for DSM-5 (PCL-5)*. National Center for PTSD. <https://www.ptsd.va.gov/>
- Zhang, A., Borowski, S., Holdcraft, J. A., Zainal, N. H., & Roest, A. M. (in press). Stressful life events and chronic stressors as predictors of mental disorders, NSSI, and suicidality in the WMH-ICS surveys. In C. Benjet, R. Bruffaerts, P. Cuijpers, & R. C. Kessler (Eds.), *The mental health of university students: Global perspectives on prevalence and innovations in treatment from the World Mental Health International College Student Initiative*. Cambridge University Press.
- Zou, G. (2004). A Modified Poisson Regression Approach to Prospective Studies with Binary Data. *American Journal of Epidemiology*, 159(7), 702–706. <https://doi.org/10.1093/aje/kwh090>
- Zuromski, K. L., Ustun, B., Hwang, I., Keane, T. M., Marx, B. P., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2019). Developing an optimal short-form of the PTSD Checklist for DSM-5 (PCL-5). *Depression and Anxiety*, 36(9), 790–800. <https://doi.org/10.1002/da.22942>

## SUPPLEMENTARY INFORMATION

Supplementary table 1  
Exploratory factor analysis eigenvalues and cronbach's alphas for 12-month stressful life events and current chronic stressors by country

|                         | Eigenvalue of first and secon<br>unrotated principal factors |          |          |          |                  |     |
|-------------------------|--------------------------------------------------------------|----------|----------|----------|------------------|-----|
|                         | SLE                                                          |          | CS       |          | Cronbach's alpha |     |
| Country                 | Factor 1                                                     | Factor 2 | Factor 1 | Factor 2 | SLE              | CS  |
| I. Americas             |                                                              |          |          |          |                  |     |
| Canada                  | 2.0                                                          | 1.2      | 2.1      | 1.0      | .51              | .58 |
| Chile                   | 2.1                                                          | 1.2      | 2.2      | 1.0      | .54              | .65 |
| Mexico                  | 2.5                                                          | 1.3      | 2.7      | .9       | .64              | .72 |
| II. Europe              |                                                              |          |          |          |                  |     |
| Belgium                 | 2.1                                                          | 1.3      | 2.2      | 1.1      | .55              | .64 |
| France                  | 2.0                                                          | 1.3      | 2.1      | 1.0      | .53              | .59 |
| Germany                 | 2.0                                                          | 1.3      | 2.1      | 1.0      | .49              | .61 |
| Netherlands             | 2.0                                                          | 1.3      | 2.0      | 1.1      | .53              | .58 |
| Northern Ireland        | 2.5                                                          | 1.3      | 2.2      | 1.0      | .64              | .63 |
| Romania                 | 2.3                                                          | 1.4      | 2.3      | 1.0      | .58              | .67 |
| Spain                   | 2.1                                                          | 1.3      | 2.5      | 1.0      | .48              | .71 |
| Sweden                  | 2.1                                                          | 1.3      | 1.9      | 1.1      | .55              | .57 |
| III. Middle East/Africa |                                                              |          |          |          |                  |     |
| Kenya                   | 2.6                                                          | 1.4      | 2.3      | 1.2      | .65              | .64 |
| Saudi Arabia            | 2.8                                                          | 1.4      | 2.4      | 1.3      | .62              | .68 |
| South Africa            | 2.5                                                          | 1.3      | 2.3      | 1.0      | .64              | .68 |
| IV. Asia/Pacific        |                                                              |          |          |          |                  |     |
| Australia               | 2.2                                                          | 1.3      | 2.2      | 1.0      | .58              | .64 |
| China                   | 2.2                                                          | 1.4      | 2.1      | 1.2      | .60              | .62 |
| New Zealand             | 2.2                                                          | 1.3      | 2.2      | 1.0      | .60              | .64 |

Note: SLE = 12-month stressful life events; CS = current chronic stressors.

Supplementary table 2  
World mental health-international college student initiative (WMH-ICS) sample characteristics

| Country   | Number of participating universities | Total size of universities | Number of first-year students (18 +) eligible | Number of first-year students (18 +) participated | Re-sponse Rate | Data Collection dates | Sampling and recruitment procedures <sup>a</sup>                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------|--------------------------------------|----------------------------|-----------------------------------------------|---------------------------------------------------|----------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Australia | 1 public                             | ~ 52,000                   | 26,445                                        | 3,139                                             | 11.9%          | 2018-23               | All onshore first-year students were invited to participate through e-mail. Five reminder emails were sent with personalized links to the survey. Conditional incentives were applied (movie passes).                                                                                                                                                                                                                                                                     |
| Belgium   | 2 public                             | ~ 61,000                   | 24,615                                        | 4,899                                             | 19.9%          | 2018-22               | All eligible first-year students were invited by email (student email) to participate, with up to 7 reminder emails sent to non-respondents. No incentives were provided.                                                                                                                                                                                                                                                                                                 |
| Canada    | 1 public                             | ~ 58,000                   | 7,082                                         | 1,199                                             | 16.9%          | 2020-21               | Email invitations were sent weekly to a stratified random sample (based on gender, year of study, age, international student status, degree type) of 350 new students selected from all enrolled students. Two email reminders and a phone call or personalized email reminder (to a randomly selected subgroup of 70 non-responders) were implemented each week. Each respondent was entered into a gift card prize drawing (CAD \$1000 = USD \$716.70) as an incentive. |

Supplementary table 2

*World mental health-international college student initiative (WMH-ICS) sample characteristics (continuation)*

| <i>Country</i>                                                                                  | <i>Number of participating universities</i> | <i>Total size of universities</i> | <i>Number of first-year students (18+) eligible</i> | <i>Number of first-year students (18+) participated</i> | <i>Re-sponse Rate</i> | <i>Data Collection dates</i> | <i>Sampling and recruitment procedures<sup>a</sup></i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------------------------|---------------------------------------------------------|-----------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chile                                                                                           | 3 public<br>2 private                       | ~ 175,600                         | 20,836                                              | 7,225                                                   | 34.7%                 | 2020-21                      | All first-year students were invited to participate via email and social media. Between four and eleven reminder emails were sent with the link to the survey. No incentives were used.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| China (Separate samples in Hong Kong Special Administrative Region [SAR] and in mainland China) | 3 public                                    | ~ 31,000                          | 18,522                                              | 2,674                                                   | 14.4%                 | 2017-23                      | All first-year students were invited to participate by email and campus posters. QR codes were also used in Hong Kong but not in mainland China. After verification by the research team of the email addresses, individual survey links were sent to the students. Up to 5 reminder emails, each 1 week apart, were sent. In Hong Kong, all respondents who completed surveys were given HKD100 (=USD 12.8) shopping coupons as incentives. In mainland China, 10% of the participants received incentives of either RMB100 or RMB50.                                                                   |
| France                                                                                          | 1 public                                    | ~54,000                           | 43,701                                              | 3,640                                                   | 8.3%                  | 2017-21                      | All first-year students were invited to participate through e-mail. Three reminder emails were sent with personalized links to the survey. A lottery was used to provide incentives (USB flash drives, gift cards).                                                                                                                                                                                                                                                                                                                                                                                      |
| Germany                                                                                         | 2 public                                    | ~ 50,000                          | 15,431                                              | 2,378                                                   | 15.4%                 | 2018-21                      | All first-year students were invited to participate through e-mail. Six reminder emails were sent with personalized links to the survey. Conditional incentives were applied (store credit coupons).                                                                                                                                                                                                                                                                                                                                                                                                     |
| Kenya                                                                                           | 2 public<br>1 private                       | ~ 148,400                         | 11,787                                              | 333                                                     | 2.8%                  | 2019-20                      | All first-year students were invited to participate through email. Qualtrics software was used to send the invitations. Reminders were sent via email every 3 days. No incentives were provided.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Mexico                                                                                          | 3 public<br>4 private                       | ~ 98,000                          | 13,019                                              | 8,521                                                   | 65.4%                 | 2018-23                      | All registered first-year students were invited. Initial contact differed by university: students were invited through promotion on social media and by teachers (1 university), or through the department coordinators and tutors who provided time and space to respond either in computer rooms, in classes or on their own time (6 universities). No incentives were provided.                                                                                                                                                                                                                       |
| Netherlands                                                                                     | 6 public                                    | ~ 200,000                         | 138,978                                             | 11,607                                                  | 8.4%                  | 2018-22                      | All students enrolled in an undergraduate or Master's program were invited via e-mail to complete the survey for the first 3 cohorts (2018-2020) and in 2021-22, all first-year students were invited. In 2018-2019, after the initial email, reminders were sent to non-responders at least once, but in most cases several times for 14 months. In 2020-22, one initial e-mail and two reminder e-mails were sent. No incentives were applied.                                                                                                                                                         |
| New Zealand                                                                                     | 1 public                                    | ~ 24,000                          | 8,663                                               | 2,418                                                   | 27.9%                 | 2021-22                      | All first-year students were invited to participate through student email. Qualtrics software was used to send the invitations. In 2021, one follow-up email was sent; and all Māori (indigenous people), all Pacifica people, and a random sample of 500 non-Māori and non-Pacifica were offered \$50.00 to participate. In 2022, four follow-up emails were sent and all Māori (indigenous people), all Pacifica people, and a random sample of 500 non-Māori and non-Pacifica and a random sample of students not living in university residential accommodation were offered \$50.00 to participate. |

Supplementary table 2

*World mental health-international college student initiative (WMH-ICS) sample characteristics (continuation)*

| <i>Country</i>                   | <i>Number of participating universities</i> | <i>Total size of universities</i> | <i>Number of first-year students (18 +) eligible</i> | <i>Number of first-year students (18 +) participated</i> | <i>Re-sponse Rate</i> | <i>Data Collection dates</i> | <i>Sampling and recruitment procedures<sup>a</sup></i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------|---------------------------------------------|-----------------------------------|------------------------------------------------------|----------------------------------------------------------|-----------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Northern Ireland <sup>b</sup>    | 1 public                                    | ~ 25,000                          | 5,820                                                | 1,469                                                    | 25.2%                 | 2019                         | All first-year students due to register at 1 college and students from 3 courses at a second college were invited to participate by email. Following registration, ID numbers and links to the survey were provided. Four reminder emails/text messages were sent with personalized links to the survey. All respondents received a university branded hoodie for participating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Republic of Ireland <sup>b</sup> | 1 public                                    | ~ 4,000                           | 859                                                  | 360                                                      | 41.9 %                | 2019                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Romania                          | 4 public                                    | ~ 108,000                         | 22,165                                               | 1,577                                                    | 7.1%                  | 2021                         | All first-year students were invited to participate via email where the survey link was provided. Three recruitment campaigns were conducted, with 4 reminder emails sent during each round of recruitment. All respondents were entered into a lottery to win vouchers for online stores and coaching sessions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Saudi Arabia                     | 1 public                                    | ~ 72,200                          | 21,231                                               | 1,230                                                    | 5.8%                  | 2022-23                      | In the 2022-23 academic year, all university students were invited to complete the survey by email and Blackboard, an online learning platform. The survey was circulated following a social media mental health campaign. A total of one initial email and three reminders were sent. The university academic affairs department assisted by distributing the survey through email, university newsletter and social media. Respondents were entered in a random drawing of incentives (bookstore gift-cards-US\$100). In the 2023-24 academic year, only first-year students were invited to participate. Students received 1 initial email and 2 follow-ups. University faculty supported the study by giving students some time to fill out the survey during their class. The same incentives were also provided.                                          |
| South Africa                     | 24 public                                   | ~657,400                          | 135,135                                              | 14,475                                                   | 10.6%                 | 2020                         | All undergraduate students were invited to participate through e-mail. Three reminder emails were sent with personalized links to the survey. Conditional incentives were applied (5x R1000 draw).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Spain                            | 5 public<br>2 private                       | ~ 76,900                          | 17,659                                               | 906                                                      | 5.1%                  | 2020-22                      | In 5 public universities, all undergraduate students were eligible. Invitation methods included: information in the classrooms, poster campaigns, university website, social media. In three universities and some colleges of the fourth, students were invited via email from university authorities, with one to three reminder emails. No monetary incentives were provided. After completing the survey, all participants could download a personalized report with a summary of their results and a list of available resources. In 2 private universities, first-year students in the schools of nursing and medicine were invited to participate via email from university authorities. Additionally, students were informed about the study in the classrooms. A specific time was allocated to facilitate participation. No incentives were provided. |

Supplementary table 2

*World mental health-international college student initiative (WMH-ICS) sample characteristics (continuation)*

| Country | Number of participating universities | Total size of universities | Number of first-year students (18 +) eligible | Number of first-year students (18 +) participated | Re-sponse Rate     | Data Collection dates | Sampling and recruitment procedures <sup>a</sup>                                                                                                                                                                                                                |
|---------|--------------------------------------|----------------------------|-----------------------------------------------|---------------------------------------------------|--------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sweden  | 7 public                             | ~ 220,000                  | 40,094                                        | 4,238                                             | 10.6%              | 2020-23               | All first-year students with email addresses registered by the university records were invited. The initial invitation email and two reminder emails were sent to students. All emails included a personalized link to the survey. No incentives were provided. |
| Total   | 77<br>68 public<br>9 private         | ~ 2,115,500                | 572,042                                       | 72,288                                            | 20.9% <sup>c</sup> | 2017-23               |                                                                                                                                                                                                                                                                 |

Note:

<sup>a</sup> In cases where the survey was distributed to students in all years of undergraduate or higher-level courses, only data from first-year undergraduate students (aged 18 +) were included in the cross-national dataset.<sup>b</sup> These surveys were coordinated in Northern Ireland and administered in two countries.<sup>c</sup> Average response rate weighted by achieved sample size.

Supplementary table 3

*Distribution of socio-demographics characteristics*

|                                   | Total sample |      | The Americas |      | Europe |      | Asia/Pacific |      | Middle East/Africa |      |
|-----------------------------------|--------------|------|--------------|------|--------|------|--------------|------|--------------------|------|
|                                   | Est          | (SE) | Est          | (SE) | Est    | (SE) | Est          | (SE) | Est                | (SE) |
| Age                               |              |      |              |      |        |      |              |      |                    |      |
| 20+, %                            | 39.8         | (.2) | 26.3         | (.4) | 40.3   | (.3) | 22.6         | (.6) | 69.3               | (.5) |
| Median                            | 19           |      | 18           |      | 19     |      | 18           |      | 22                 |      |
| 25th percentile                   | 18           |      | 18           |      | 18     |      | 18           |      | 19                 |      |
| 75th percentile                   | 21           |      | 19           |      | 20     |      | 19           |      | 27                 |      |
| Female sex at birth, %            | 57.9         | (.2) | 53.8         | (.4) | 59.2   | (.4) | 54.9         | (.7) | 62.3               | (.6) |
| Transgender <sup>a</sup> , %      | 1.4          | (.1) | 1.6          | (.1) | 1.8    | (.1) | 1.6          | (.2) | .3                 | (.1) |
| Not heterosexual <sup>b</sup> , % | 21.2         | (.2) | 21.3         | (.3) | 23.6   | (.3) | 21.0         | (.5) | 14.8               | (.4) |
| University graduate parent, %     | 46.5         | (.2) | 45.1         | (.4) | 53.0   | (.3) | 49.0         | (.7) | 30.5               | (.5) |
| (n)                               | 60,673       |      | 15,502       |      | 27,283 |      | 7,152        |      | 10,736             |      |

Note: Est = estimate; SE = standard error of Est.

<sup>a</sup> Defined as self-reported male assigned sex at birth and identifying as female or another gender or female assigned sex at birth and male or another gender identity.<sup>b</sup> Self-reported their sexual orientation as gay or lesbian, bisexual, asexual, not sure, or other.