



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

Andre Mason^{a,b}, Charlene Rapsey^a, Nancy Sampson^c, Sue Lee^c, Yesica Albor^d, Ahmad N. Al-Hadi^e, Jordi Alonso^{f,g,h}, Nouf Al-Saudⁱ, Yasmin Altwajiriⁱ, Claes Andersson^j, Lukoye Atwoli^k, Randy P. Auerbach^l, Caroline Ayuya^m, Patricia M. Báez-Mansurⁿ, Laura Ballester^{g,h}, Jason Bantjes^{o,p}, Harald Baumeister^q, Marcus Bendtsen^r, Corina Benjet^d, Anne H. Berman^s, Erik Bootsma^t, Silver C.N. Chan^u, Irina Cohut^v, María Anabell Covarrubias Díaz Couder^w, Pim Cuijpers^x, Oana David^y, Dong Dong^z, David D. Ebert^{aa}, Mireia Felez Nobrega^{ab,ac}, Jorge Gaete^{ad,ae}, Carlos García Forero^{af}, Margalida Gili^{ag}, Raúl Gutiérrez-García^{ah}, Josep Maria Haro^{ab,ac}, Penelope Hasking^{ai}, Kristen Hudec^{aj}, Xanthe Hunt^{ak}, Petra Hurks^{al}, Mathilde Husky^{am}, Florence Jaguga^{an}, Leontien Jansen^t, Fanny Kählke^{aa}, Elisabeth Klinkenberg^{ao}, Ann-Marie Küchler^q, Álvaro I. Langer^{ad,ap}, Irene Léniz^{aq}, Yan Liu^{ar}, Scarlett Mac-Ginty^{ad,as}, Vania Martínez^{ad,at}, Muthoni Mathai^{au}, Margaret McLafferty^{av}, Andrea Miranda-Mendizabal^{ab,bk}, Elaine Murray^{aw}, Catherine M. Musyoka^{au}, Catalin Nedelcea^{ax}, Chun Ho Ngai^z, Daniel Núñez^{ad,ay}, Siobhan O'Neill^{az}, Jose A. Piqueras^{ba}, Codruta A. Popescu^{bb}, Kealagh Robinson^{bc}, Tiscar Rodriguez-Jimenez^{bd}, Damian Scarf^{be}, Oi Ling Siu^{bf}, Dan J. Stein^{p,bg}, Sascha Y. Struijs^x, Cristina Tomoiaga^y, Karla Patricia Valdés-García^{bh}, Sanne van Luenen^{bi}, Daniel V. Vigo^{aj}, Angel Y. Wang^{aj}, Reinout Wiers^{bj}

* Corresponding author. Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, MA, 02115, USA.

E-mail addresses: Andre.mason@waikato.ac.nz (A. Mason), charlene.rapsey@otago.ac.nz (C. Rapsey), sampson@hcp.med.harvard.edu (N. Sampson), sue_lee@hcp.med.harvard.edu (S. Lee), yesicaalbor@outlook.es (Y. Albor), alhadi@ksu.edu.sa (A.N. Al-Hadi), jalonso@researchmar.net (J. Alonso), nbalsaud@kfsshr.edu.sa (N. Al-Saud), yasmint@kfsshr.edu.sa (Y. Altwajiri), claes.andersson@mau.se (C. Andersson), lukoye.atwoli@aku.edu (L. Atwoli), rpa2009@cumc.columbia.edu (R.P. Auerbach), cvihenda@daystar.ac.ke (C. Ayuya), patricia.baez@ulsavictoria.edu.mx (P.M. Báez-Mansur), lballester@researchmar.net (L. Ballester), jason.bantjes@mrc.ac.za (J. Bantjes), harald.baumeister@uni-ulm.de (H. Baumeister), marcus.bendtsen@liu.se (M. Bendtsen), cbenjet@gmail.com (C. Benjet), anne.h.berman@psyk.uu.se (A.H. Berman), ronny.bruffaerts@uzleuven.be (E. Bootsma), sasilver@ust.hk (S.C.N. Chan), psih.ococ@ococ.utcluj.ro (I. Cohut), Anabell.covarrubias@lasallenoroeste.edu.mx (M.A. Covarrubias Díaz Couder), p.cuijpers@vu.nl (P. Cuijpers), oanadavid@psychology.ro (O. David), dongdong@cuhk.edu.hk (D. Dong), david.daniel.ebert@tum.de (D.D. Ebert), mireia.felez@sjd.es (M.F. Nobrega), jgaete@uandes.cl (J. Gaete), cgarciaf@uic.es (C.G. Forero), margalida.gili@gmail.com (M. Gili), raulgutierrezgarcia7@gmail.com (R. Gutiérrez-García), josepmaria.haro@sjd.es (J.M. Haro), penelope.hasking@curtin.edu.au (P. Hasking), kristen.hudec@ubc.ca (K. Hudec), xanthe@sun.ac.za (X. Hunt), pm.hurks@maastrichtuniversity.nl (P. Hurks), mathilde.husky@u-bordeaux.fr (M. Husky), flokemboi@gmail.com (F. Jaguga), leontien.jansen@kuleuven.be (L. Jansen), fanny.kaehlke@tum.de (F. Kählke), lisa.klinkenberg@inholland.nl (E. Klinkenberg), ann-marie.kuechler@uni-ulm.de (A.-M. Küchler), alvaro.langer@gmail.com (Á.I. Langer), irene.leniz@uoh.cl (I. Léniz), hakunaly@163.com (Y. Liu), scarlettmf@u.uchile.cl (S. Mac-Ginty), vmartinez@uchile.cl (V. Martínez), muthonimathai@gmail.com (M. Mathai), Margaret.McLafferty@atu.ie (M. McLafferty), andrea.miranda@sjd.es (A. Miranda-Mendizabal), e.murray@ulster.ac.uk (E. Murray), camulundu2011@gmail.com (C.M. Musyoka), catalin.nedelcea@fpse.unibuc.ro (C. Nedelcea), alfonsengai@cuhk.edu.hk (C.H. Ngai), dnunez@utalca.cl (D. Núñez), sm.oneill@ulster.ac.uk (S. O'Neill), jpiqueras@umh.es (J.A. Piqueras), cpopescu@umfcluj.ro (C.A. Popescu), k.robinson2@massey.ac.nz (K. Robinson), trodriiguez@unizar.es (T. Rodriguez-Jimenez), [Damian.scarf@otago.ac.nz](mailto:d Damian.scarf@otago.ac.nz) (D. Scarf), siuol@ln.edu.hk (O.L. Siu), dan.stein@uct.ac.za (D.J. Stein), s.y.struijs@vu.nl (S.Y. Struijs), cristinalorint@psychology.ro (C. Tomoiaga), karlavaldes@uadec.edu.mx (K.P. Valdés-García), s.van.luenen@fsw.leidenuniv.nl (S. van Luenen), daniel.vigo@ubc.ca (D.V. Vigo), angel.wang@ubc.ca (A.Y. Wang), R.W.H.J.Wiers@uva.nl (R. Wiers), yeungshanwong@cuhk.edu.hk (S.Y.S. Wong), kessler@hcp.med.harvard.edu (R.C. Kessler), ejhl.bootsma@gmail.com (R. Bruffaerts).

<https://doi.org/10.1016/j.jpsychires.2025.02.016>

Received 4 November 2024; Received in revised form 15 January 2025; Accepted 11 February 2025

Available online 18 February 2025

0022-3956/© 2025 Published by Elsevier Ltd.

Samuel Y.S. Wong^z, Ronald C. Kessler^{c,*}, Ronny Bruffaerts^t, the WMH-ICS collaborators¹

- ^a Department of Psychological Medicine, University of Otago, 135 Park St, Dunedin, 9016, New Zealand
- ^b School of Psychological and Social Sciences, University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand
- ^c Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave, Boston, MA, 02115, USA
- ^d Center for Global Mental Health, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Av. Ramón de la Fuente 495, Mexico City, C.P. 14370, Mexico
- ^e Department of Psychiatry, & SABIC Psychological Health Research & Applications Chair (SPHRAC), College of Medicine, King Saud University, P.O. Box 2925, Riyadh, 11461, Saudi Arabia
- ^f Health Services Research Unit, IMIM-Hospital del Mar Medical Research Institute, C/ del Doctor Aiguader, 88 08003, Barcelona, Spain
- ^g Department of Medicine and Life Sciences, Pompeu Fabra University (UPF), Carrer del Doctor Aiguader, 88 08003, Barcelona, Spain
- ^h CIBER en Epidemiología y Salud Pública (CIBERESP), Carrer del Doctor Aiguader, 88 08003, Barcelona, Spain
- ⁱ Biostatistics, Epidemiology and Scientific Computing Department, King Faisal Specialist Hospital and Research Center, P.O. Box 3354, Riyadh, 11211, Saudi Arabia
- ^j Department of Criminology, Malmö University, Nordenskiöldsgatan 10, 211 19, Malmö, Sweden
- ^k Brain and Mind Institute and Medical College of East Africa, The Aga Khan University, 3rd Parklands Avenue, Nairobi, Kenya
- ^l Department of Psychiatry, Columbia University, 1051 Riverside Dr, New York, NY, 10032, USA
- ^m Department of Psychology & Counselling, Daystar University, P.O. Box 10195, Nairobi, Kenya
- ⁿ Coordinación de Desarrollo Académico y Servicios Educativos, Universidad la Salle Ciudad Victoria, Av. Universidad 300, Ciudad Victoria, Tamaulipas, C.P. 87000, Mexico
- ^o Mental Health, Alcohol, Substance Use and Tobacco (MAST) Research Unit, South African Medical Research Council, Francie van Zijl Dr, Cape Town, 7500, South Africa
- ^p Department of Psychiatry and Mental Health, University of Cape Town, P.O. Box 19070, Observatory, 7725, Cape Town, South Africa
- ^q Department of Clinical Psychology and Psychotherapy, Ulm University, Helmut-G.-Walther-Str. 3, 89081, Ulm, Germany
- ^r Department of Health, Medicine and Caring Sciences, Linköping University, 581 83, Linköping, Sweden
- ^s Department of Psychology, Uppsala University, Villavägen 16, 752 36, Uppsala, Sweden
- ^t Center for Public Health Psychiatry, Universitair Psychiatrisch Centrum - Katholieke Universiteit Leuven, Herestraat 49, 3000, Leuven, Belgium
- ^u Counseling and Wellness Center, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong Special Administrative Region of China
- ^v Career Counseling and Guidance Center, Technical University of Cluj-Napoca, Str. Memorandumului 28, 400114, Cluj-Napoca, Romania
- ^w Coordinación de Investigación, Universidad la Salle Noroeste, Av. 5 de Febrero 809, Ciudad Obregón, Sonora, C.P. 85000, Mexico
- ^x Department of Clinical, Neuro- and Developmental Psychology, Vrije Universiteit Amsterdam, Van der Boerhorstraat 7, 1081 BT, Amsterdam, the Netherlands
- ^y Department of Clinical Psychology and Psychotherapy, Babeş-Bolyai University, Str. Treboniu Laurian, 400271, Cluj-Napoca, Romania
- ^z School of Public Health and Primary Care, The Chinese University of Hong Kong, Shatin, N.T, Hong Kong Special Administrative Region of China
- ^{aa} Professorship Psychology and Digital Mental Health Care, Technical University of Munich, Ismaninger Str. 22, 81675, München, Germany
- ^{ab} Sant Joan de Déu Research Institute, Carrer de Santa Rosa, 39-57, 08950, Esplugues del Llobregat, Spain
- ^{ac} Centro de Investigación Biomédica en Red (CIBERSAM), Paseo del Prado, 20 28014, Madrid, Spain
- ^{ad} Millennium Nucleus to Improve the Mental Health of Adolescents and Youths (Imhay), Av. Presidente Kennedy, 5700, Santiago, Chile
- ^{ae} Centro de Investigación en Salud Mental Estudiantil (ISME), Universidad de los Andes, Av. Presidente Kennedy, Las Condes, 5700, Santiago, Chile
- ^{af} Departament de Medicina, Universitat Internacional de Catalunya, Carrer de Urgell 236, 08036, Barcelona, Spain
- ^{ag} Universitat Illes Balears (UIB), Crta. de Valldemossa, Km 7.5, 07122, Palma, Mallorca, Spain
- ^{ah} Universidad De La Salle Bajío, Campus Salamanca, Carr. a la Victoria, km 1.5, Salamanca, Gto, 36810, Mexico
- ^{ai} School of Population Health, Faculty of Health Sciences, Curtin University, Kent St, Bentley, WA, 6102, Perth, Australia
- ^{aj} Department of Psychiatry, Faculty of Medicine, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC, V6T 1Z3, Canada
- ^{ak} Institute for Life Course Health Research, Department of Global Health, Stellenbosch University, 7600, Stellenbosch, South Africa
- ^{al} Faculty of Psychology and Neuroscience, Maastricht University, Universiteitssingel 50, 6229 ER, Maastricht, the Netherlands
- ^{am} INSERM U1219, Bordeaux Population Health Research Center, ACTIVE Team, University of Bordeaux, 146 Rue Léo Saignat, 33076, Bordeaux, France
- ^{an} Department of Alcohol and Drug Abuse Rehabilitation Services, Moi Teaching and Referral Hospital, P.O. Box 3, 30100, Eldoret, Kenya
- ^{ao} Department of Education and Innovation, in Holland University of Applied Sciences, Molenweide 24, 2034 ZH, Haarlem, the Netherlands
- ^{ap} Facultad de Psicología y Humanidades, Universidad San Sebastián, Avenida Picarte 1610, Valdivia, Chile
- ^{aq} Dirección de Salud Mental, Universidad de O'Higgins, Av. O'Higgins 130, Rancagua, Chile
- ^{ar} School of Public Health, Jining Medical University, 25 South Zhongshan Rd, Jining, Shandong, China
- ^{as} Department of Health Service & Population Research, King's College London, 125 Coldharbour Ln, London, SE5 9NP, United Kingdom
- ^{at} Facultad de Medicina, Universidad de Chile, Av. Libertador Bernardo O'Higgins 1058, Santiago, Chile
- ^{au} Department of Psychiatry, School of Medicine, University of Nairobi, P.O. Box 30197, Nairobi, Kenya
- ^{av} School of Medicine, Ulster University, 100 University Ave, Derry/Londonderry, Derry, BT47 6AL, United Kingdom
- ^{aw} Personalised Medicine Centre, School of Medicine, Ulster University, C-TRIC, Altnagelvin Hospital, Derry, 100 University Ave, Derry, BT47 6AL, United Kingdom
- ^{ax} Department of Psychology and Cognitive Sciences, University of Bucharest, Str. Bdul. Regina Elisabeta 4-12, 030018, Bucharest, Romania
- ^{ay} Faculty of Psychology, Universidad de Talca, Av. Marcelino Núñez 045, Talca, Chile
- ^{az} School of Psychology, Ulster University, Cromore Road, Coleraine, BT52 1SA, United Kingdom
- ^{ba} Universidad Miguel Hernandez (UMH), Elche, 03202, Alicante, Spain
- ^{bb} Department of Human Sciences, "Iuliu Hatieganu" University of Medicine and Pharmacy, Str. Victor Babeş 8, 400012, Cluj-Napoca, Romania
- ^{bc} School of Psychology, Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand
- ^{bd} Universidad de Zaragoza (UNIZAR), Calle Pedro Cerbuna, 12, 50009, Zaragoza, Spain
- ^{be} Department of Psychology, University of Otago, 135 Park Street, Dunedin, 9016, New Zealand
- ^{bf} Department of Psychology, Lingnan University, 8 Castle Peak Road, Tuen Mun, Hong Kong Special Administrative Region of China
- ^{bg} South African Medical Research Council (SAMRC) Unit on Risk and Resilience in Mental Disorders, University of Cape Town, P.O. Box 19070, Observatory, 7725, South Africa
- ^{bh} Facultad de Psicología, Universidad Autónoma de Coahuila, Av. Universidad 250, Ciudad Universitaria, 25280, Saltillo, Coahuila, Mexico
- ^{bi} Department of Clinical Psychology, Leiden University, Wassenaarseweg 52, 2333 AK, Leiden, the Netherlands
- ^{bj} Department of Developmental Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB, Amsterdam, the Netherlands
- ^{bk} rather Than Parc Sanitari Sant Joan de Déu, IRSJD, Carrer del Celler, 08130, Sant Boi de Llobregat, Spain

¹ The WMH-ICS collaborators include: Rodrigo Antunes Lima, Elsie Breet, Nadia Garmefski, Karen Jacobs, Vivian Kraaij, Lonna Munro, Richard J. Muntali, Ana Paula Prescivalli, Marisa Rebagliato, Miquel Roca, Elske Saleminck, Claudia van der Heijde.

ARTICLE INFO

Keywords:

College students
Mental disorders
WMH-ICS

ABSTRACT

Background: The college years are a developmentally sensitive period for mental disorder onset. Reliable epidemiological data are critical for informing public health responses. This study aimed to estimate prevalence and socio-demographic distributions of common DSM-5 mental disorders among first-year university students from 77 universities across 18 countries.

Methods: Data were collected 2017–2023 in the World Mental Health International College Student Initiative with $n = 72,288$ university students. Online surveys assessed alcohol use, attention-deficit/hyperactivity, bipolar, drug use, generalized anxiety, major depression, panic, and post-traumatic stress disorders with validated screening scales. Socio-demographics included student age, sex at birth, gender modality, sexual orientation, and parent education.

Results: The weighted mean response rate was 20.8%. Data were calibrated for differential response rates by sex at birth and age. 65.2% of respondents screened positive for lifetime mental disorders and 57.4% for 12-month mental disorders. Females had higher prevalence of internalizing disorders and males of substance and attention-deficit/hyperactivity disorders. Older age was associated with lower prevalence of most 12-month but not lifetime mental disorders. Non-heterosexual sexual orientation and identifying as transgender were associated with highest prevalence of most mental disorders. Parent education was for the most part uncorrelated with prevalence.

Conclusions: Although prevalence might have been overestimated due to the low response rate and possible screening scale miscalibration, results nonetheless suggest that mental disorders are highly prevalent among first-year university students worldwide and are widely distributed with respect to socio-demographic characteristics. These findings highlight the need to implement effective interventions to better support first-year university student mental health.

1. Introduction

The college years mark a developmental period when students make the transition from late adolescence to emerging adulthood and onset of mental disorders is high (Auerbach et al., 2016, 2018; McGrath et al., 2023). Epidemiological studies suggest that roughly one-third of university students meet criteria for a 12-month mental disorder (Auerbach et al., 2018; Bantjes et al., 2023; Benjet et al., 2019). These disorders are associated with numerous adverse outcomes, including reduced academic attainment and dropout (Alonso et al., 2018; Auerbach et al., 2016; Bruffaerts et al., 2018), longer-term persistent emotional and physical health problems (Scott et al., 2016), relationship difficulties (Kerr and Capaldi, 2011), and poor employment outcomes (Porru et al., 2023).

To reduce these negative effects, early identification and treatment are needed (Auerbach et al., 2016). A crucial first step is documenting the extent of the problem. Prior studies have consistently found that female sex and non-heterosexual sexual orientation are factors associated with higher mental disorder prevalence among university students (Campbell et al., 2022; Crockett et al., 2024; Ward et al., 2022). Yet, information on other essential aspects of descriptive epidemiology, such as age-of-onset and disease course, has been less well-documented. Continued efforts to describe prevalence and understand risk factors are crucial to increase detection of high-risk students and enhance opportunities for early intervention.

We attempted to address these gaps by carrying out coordinated cross-national needs assessment surveys of first-year university students in the World Mental Health International College Student (WMH-ICS) initiative (Cuijpers et al., 2019). Results reported here focus on prevalence and socio-demographic associations based on surveys carried out between 2017 and 2023 with $n = 72,288$ respondents from 77 universities across 18 countries. We build on an earlier report based on the 2014–2017 WMH-ICS surveys (Auerbach et al., 2018) that focused on DSM-IV disorders, whereas the more recent surveys were based on DSM-5 disorders. Subsequent reports will investigate other issues, such as comorbidity, impairments, treatment, and barriers to receiving treatment in these more recent surveys.

2. Methods

2.1. Participants & procedures

Online surveys were carried out in a convenience sample of 77 universities across 18 countries (Australia, Belgium, Canada, Chile, China, France, Germany, Kenya, Mexico, Netherlands, New Zealand, Northern Ireland, Republic of Ireland, Romania, Saudi Arabia, South Africa, Spain, and Sweden). Although the recruitment method varied by institution (Supplementary Table 1), attempts were generally made to recruit 100% of first-year students via emails provided by participating universities requesting participation in a confidential online survey of student mental health. Participants were provided with a study description, an informed consent script, and a university phone number for questions. Incentives, which differed across countries (e.g., raffles for store credit coupons, movie passes, cash), were offered in 11 of the 18 countries to encourage survey completion (Supplementary Table 1). Informed consent was required before administering the survey. Reminder emails were used to increase response rates. Within-country sample sizes ranged from $n = 333$ in Kenya to $n = 11,607$ in the Netherlands. Ethics approval details are posted at https://www.hcp.med.harvard.edu/wmh/ftpd/IRB_EthicsApproval_WMh-ICS_DSM-5.pdf.

2.2. Measures

The self-report questionnaire (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 to maximize cross-national equivalence building on the standard World Health Organization (WHO) protocol (Harkness et al., 2008).

2.2.1. 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., 2013a). Diagnoses based on CIDI-SC have been shown to have good concordance with diagnoses based on blinded clinical reappraisal interviews (Kessler et al., 2013a, 2013b). Lifetime assessments of bipolar I/II disorder (BP) and drug use disorder

(DUD) were based on the Composite International Diagnostic Interview for DSM-5 (CIDI-5) modified for self-report administration. Although only one clinical reappraisal study has assessed CIDI-5 so far, concordance of diagnoses with diagnoses based on blinded clinical reappraisal interviews was consistently good (AU-ROC = 0.67–0.75) (Khaled et al., 2024). See [Supplementary Table 2](#) for operational definitions of CIDI-SC and CIDI DSM-5 diagnoses.

The other three disorders were assessed with brief specialized dimensional screening scales: post-traumatic stress disorder (PTSD) with the 4-Item Short-Form Short-Form of the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013); attention-deficit/hyperactivity disorder (ADHD) with the Adult Self-Report Scale-V1.1 (ASRS-V1.1) Screener (Kessler et al., 2007a); and alcohol use disorder (AUD) with the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 1992).

The PCL-5 is a widely used and validated PTSD screening scale (Georgescu et al., 2024; Hansen et al., 2023; Kramer et al., 2023). Diagnoses obtained by using a cutpoint of 5+ on the 4-Item Short-Form PCL-5 (each item scored in the range 0–4 for a total score of 0–16) have good concordance with DSM-5 diagnoses in the full PCL-5 (AU-ROC = 0.98) (Zuromski et al., 2019).

The ASRS-V1.1 Screener is a widely used and validated 6-item screening scale of adult ADHD (each item scored in the range 0–4 for a total score of 0–24) (Ziobrowski et al., 2023) that assesses symptoms over a 6-month recall period. Diagnoses obtained by using a cutpoint of 14+ have been shown to have good concordance with blinded clinical diagnoses in multiple clinical reappraisal studies (Kessler et al., 2005, 2007a).

Lastly, the AUDIT, a widely used and validated 10-question screening scale for AUD (each item scored in the range 0–4 for as total score of 0–40), assesses symptoms over a 12-month recall period. We used the standard AUDIT scoring rules for possible dependence (either a score of 16 or more on the 0–40 total AUDIT or a score of 8–15 on the total AUDIT in conjunction with a score of 4+ on the AUDIT dependence subscale), which have had high concordance with blinded clinical diagnoses of AUD in prior research (AU-ROC = 0.91) (Toner et al., 2019). However, as more recent studies suggest that a lower threshold might be preferable for university students, we also included AUDIT scores for likely abuse (8+ on the total AUDIT) (Villarosa-Hurlocker et al., 2020).

For the six mental disorders where lifetime prevalence was assessed, respondents were asked lifetime diagnostic stem questions and then, if affirmative, were asked to focus on the time in their life when the symptoms were most severe. The symptom questions were asked about that worst time, which could differ within respondents across mental disorders. Respondents screening positive for lifetime prevalence were then asked about age-of-onset (AOO) and a single question (i.e., rather than repeating all symptom questions) about 12-month prevalence. ADHD and AUD, in comparison, were assessed only for the past 6 months or 12 months, respectively.

2.2.2. Socio-demographics

The socio-demographics considered here were respondent age (18–36+ years old), sex at birth (male, female), gender identity (male, female, another gender), sexual orientation (heterosexual/straight, gay/lesbian, other), and parent education (highest education of either parent dichotomized into college degree versus less than college degree). Dichotomous variables were created for sexual orientation (heterosexual vs non-heterosexual) and gender modality (cisgender vs transgender, based on alignment between gender identity and sex at birth). As neither gender identity nor sexual orientation was assessed in Saudi Arabia, gender identity was set equal to sex at birth and sexual orientation was set equal to heterosexual in that survey.

2.3. Data analysis

A calibration weight was used to adjust for differential within-university response rates by student age and sex at birth. Multiple

imputation (MI) by chained equations (Van Buren, 2012) was then used to adjust for within-survey item non-response, missing data due to minor skip logic errors in a few surveys, and random internal subsampling of survey sections. The latter was a variation on the split questionnaire design (Raghunathan and Grizzle, 1995) to shorten assessments while still obtaining information about all outcomes from all respondents. We did this in universities where concerns were raised about survey length by administering diagnostic stem questions for four diagnoses with long question series - PD, BP, PTSD, and AUD - to all respondents and then administering full diagnostic sections only to a probability subsample of 40% of the respondents who endorsed the stems. Students who screened negative were coded no. Students who screened positive and had the full assessment were coded either yes or no depending on subsequent question responses. Students who screened positive but were randomized not to have the full assessment (between 13.1% [BP] and 21.5% [AUD] across disorders) were assigned predicted probabilities based on MI methods. Cross-validated analyses reported in the Methodology Supplement demonstrate that prevalence estimates were not biased by using MI in this way.

Simple mean calculations were used to estimate lifetime prevalence, 12-month prevalence, and 12-month persistence. Persistence analyses focused on respondents whose AOO occurred at least two years prior to age-at-interview, as some proportion of respondents with more recent AOO would necessarily be 12-month cases due to onsets occurring less than 12 months before interview (e.g., onset near the end of age 18 for a respondent who only recently turned 19 at the time of interview).

Multivariable Poisson regression models were used to examine associations of socio-demographics with lifetime prevalence, 12-month prevalence, and 12-month persistence, noting that both AOO and number of years since onset were included as predictors of 12-month persistence. Exponentiated Poisson regression coefficients are reported here as risk ratios (RRs) with 95% confidence intervals.

The lifetime models were estimated in a person-year discrete-time survival framework where year of life was treated as a continuous control variable, the outcome (i.e., first onset of the outcome mental disorder) was defined dichotomously, and person-years beyond the year of onset were censored (Singer and Willett, 1993). 12-month prevalence models were estimated in the total sample at the person-level ignoring information about lifetime prevalence. Persistence models, finally, were estimated to predict 12-month prevalence among lifetime cases at the person-level, using AOO and time-since-onset (i.e., number of years between AOO and age-at-interview) as separate control variables and, as noted above, limiting analysis to respondents with AOO 2+ years prior to age-at-interview. Clustering of observations within universities was taken into consideration in estimating standard errors. Regression models included control variables for country, year of survey, and whether students were surveyed in the first three months of the academic year, generating pooled within-country/within-year regression coefficients. Design-based standard errors and F tests taking into consideration clustering and weighting were used to evaluate statistical significance. Design-based standard errors were obtained using SAS (V15.2). 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 0.05-level two-sided design-based tests. The multiple testing problem, which leads to increased risk of Type I errors, was addressed by evaluating significance of full predictor sets in each multivariable model and interpreting individually significant coefficients only if the total model was significant.

3. Results

3.1. Sample characteristics

The weighted (by sample size) mean response rate across surveys was 20.9% and ranged between 2.8% in Kenya and 65.4% in Mexico

(inter-quartile range [IQR] = 8.3–27.9%) (Supplementary Table 1). The n = 72,288 respondents had a median age-at-interview of 19 (IQR = 18–22). 57.9% were female at birth (Table 1). The great majority were cisgender (98.6%) and heterosexual (79.0%). Close to half of respondents had at least one parent with a college degree (45.7%).

3.2. Prevalence

Estimated lifetime and 12-month prevalence of any mental disorder were 65.2% and 57.4%, respectively (Table 2), with the prevalence estimates of any internalizing disorder (lifetime 54.7%; 12-month 43.9%) higher than those of any externalizing disorders (lifetime 44.1%; 12-month 30.7%). It is noteworthy, though, that two externalizing disorders, AUD and ADHD, were assessed only for the prior 12 months and 6 months, respectively. PTSD was estimated to be the most common individual lifetime disorder (46.5%). AUD, although assessed only for the prior 12 months, nonetheless had a higher estimated 12-month prevalence (23.6%) than the estimated lifetime prevalence of MDD (23.3%), the next most common mental disorder. The lifetime prevalence estimates of other mental disorders were considerably lower, from 12.8% for GAD to 4.9% for BP, but noting that ADHD, which was assessed only for the prior 6 months, had an estimated 6-month prevalence (8.1%) nearly as high as the lifetime prevalence of PD (9.1%) and DUD (9.2%).

The rank-order of 12-month prevalence estimates was relatively comparable to that of lifetime prevalence estimates, a result consistent with the fact that 12-month persistence was estimated to be quite consistent across disorders. Estimated 12-month persistence was highest for GAD, MDD, and BP (89.0–85.9%), lower for PD (78.2%) and PTSD (71.3%), and lowest for DUD (63.0%).

Estimated median (IQR) AOO of the first lifetime mental disorder was 16 (IQR = 12–18) years of age for all respondents with at least one lifetime mental disorder (Fig. 1). However, diagnostic criteria for ADHD require onset before age 12. As a result, median (IQR) AOO for ADHD was much lower than for the other mental disorders (7, IQR = 5–10). Median (IQR) AOO were highest for PTSD (18, IQR = 15–21) and DUD (18, IQR = 16–21) and intermediate for the remaining mental disorders (17, IQR = 14/15–19/21).

Table 1
Socio-demographic distribution of the sample (n = 72,288)^a.

Variable	Total among respondents with and without any lifetime diagnosis					
	Total		With		Without	
	Est	(SE)	Est	(SE)	Est	(SE)
Age						
Median	19		19		19	
25th percentile	18		18		18	
75th percentile	22		21		22	
Sex/Gender modality/Sexual orientation (%)						
Female sex at birth	57.9	(0.2)	59.2	(0.3)	54.9	(0.4)
Transgender ^b	1.4	(0.1)	1.9	(0.1)	0.5	(0.1)
Not heterosexual ^c	21.0	(0.2)	24.8	(0.2)	12.8	(0.2)
Parent university education (%)	45.7	(0.2)	47.4	(0.3)	42.2	(0.4)
(n)	(72,288)		(49,638)		(22,650)	

Abbreviations: Est, estimate; SE, standard error.

^a Design-based estimation methods were used to adjust standard errors for the weighting and clustering of observations within universities.

^b 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.

^c Self-reported sexual orientation was gay or lesbian, bisexual, asexual, not sure, or other.

Table 2
Prevalence estimates of the disorders assessed in the surveys.^a

	Lifetime		12-month		12-month persistence ^b	
	%	(SE)	%	(SE)	%	(SE)
Internalizing disorders						
Any internalizing	54.7	(0.2)	43.9	(0.3)	80.8	(0.4)
Bipolar I/II disorder	4.9	(0.1)	4.3	(0.1)	85.9	(0.9)
Generalized anxiety disorder	12.8	(0.1)	11.5	(0.1)	89.0	(0.4)
Major depressive disorder	23.3	(0.2)	20.5	(0.2)	86.5	(0.3)
Panic disorder	9.1	(0.1)	7.2	(0.1)	78.2	(0.8)
Post-traumatic stress disorder	46.5	(0.2)	33.5	(0.3)	71.3	(0.5)
Externalizing disorders						
Any externalizing ^c	44.1	(0.2)	30.7	(0.2)	94.4	(0.2)
Attention deficit/hyperactivity disorder	8.1	(0.1)	8.1	(0.1)	–	–
Alcohol use disorder	23.6	(0.2)	23.6	(0.2)	–	–
Drug use disorder	9.2	(0.1)	6.1	(0.1)	63.0	(0.7)
Any disorder ^c	65.2	(0.2)	57.4	(0.3)	87.6	(0.2)
(n)	(72,288)		(72,288)		(40,803)	

^a Design-based estimation methods were used to adjust standard errors for the weighting and clustering of observations within universities.

^b Twelve-month persistence among lifetime cases focused largely on respondents whose AOO occurred at least two years prior to age-at-interview, as some proportion of respondents with more recent AOO would necessarily have been 12-month cases due to onsets occurring less than 12 months before the interview (e.g., onset near the end of age 18 for a respondent who only recently turned 19 at the time of interview). Consistent with the latter possibility, some respondents with AOO one year before age-at-interview reported being in episode 0 of the past 12 months. On the other hand, some respondents with AOO one year before age-at-interview reported having two years of their life when they had the disorder (e.g., onset near the beginning of age 18 for a respondent who was currently 19 but was soon turning 20 at the time of interview). Based on the latter possibility and given that onset was only dated to the year and information was not available in the survey about birthdate, we included respondents with AOO one year before age-at-interview in the denominator and treated them as persistent cases if they reported two years of their life when they had the disorder.

^c Attention deficit/hyperactivity disorder (ADHD) and alcohol use disorder (AUD) were assessed only for 6- and 12-month prevalence. In calculating lifetime prevalence of any diagnosis, we assumed conservatively that the respondents with 6-month ADHD and 12-month AUD were the only ones who ever had these disorders in their lifetimes. This means that the estimates of lifetime prevalence of any disorder and any externalizing disorder are conservative and that the estimates of 12-month prevalence of any disorder or any externalizing disorder among lifetime cases are anticonservative.

3.3. Pooled within-country socio-demographic correlates of internalizing disorders

Age was not significantly associated with any of the lifetime internalizing disorders, but was inversely, albeit weakly, associated with 12-month prevalence of all these disorders other than GAD (Table 3). In addition, AOO was inversely associated with 12-month persistence of each internalizing disorder, although again only weakly. Time-since-onset was also inversely but weakly associated with persistence of each internalizing disorder. Stronger associations were found for sex at birth, with females having significantly higher lifetime (RR = 1.1–2.0) and 12-month (RR = 1.2–2.1) prevalence of each internalizing disorder and marginally higher 12-month persistence of each internalizing disorder other than GAD (RR = 1.0–1.1). A similar pattern was found for transgender students having significantly higher lifetime (RR = 1.2–1.5) and 12-month (RR = 1.3–1.6) prevalence than other students of each internalizing disorders along with slightly higher 12-month persistence of MDD and PD (RR = 1.0–1.1). Even more pronounced higher lifetime (RR = 1.3–2.0) and 12-month (RR = 1.3–2.1) prevalence along with modestly higher 12-month persistence of internalizing disorders (RR = 1.0–1.1) was found for students who were not heterosexual. Parental education, finally, was for the most part unrelated to either lifetime

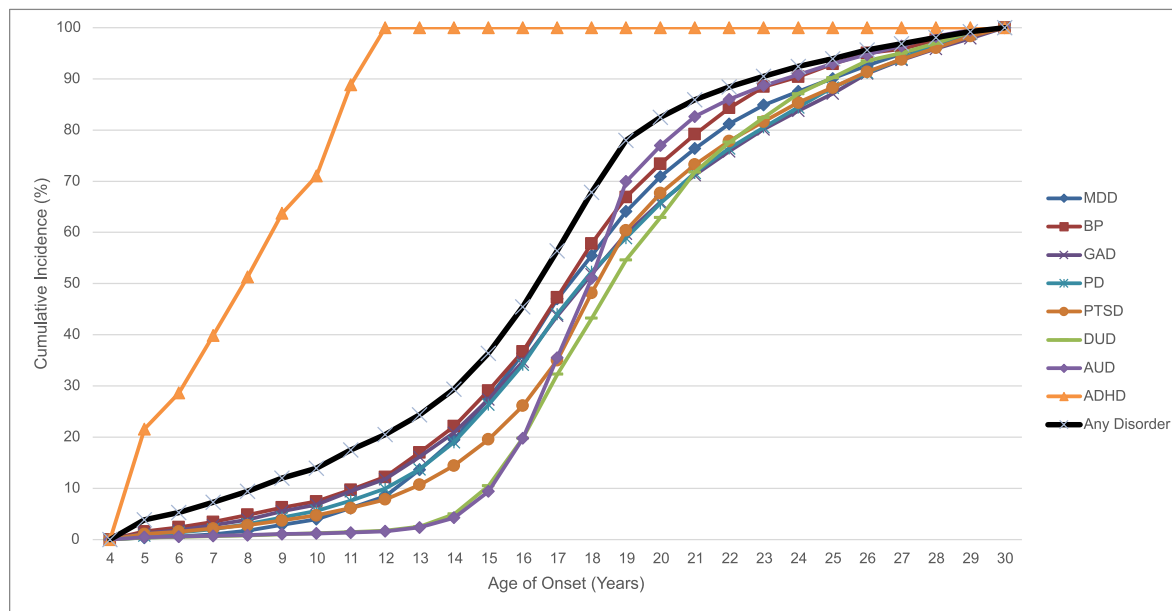


Fig. 1. Age-of-onset curves of total sample.
 Caption: Abbreviations: MDD, major depressive disorder; BP, bipolar I/II disorder; GAD, generalized anxiety disorder; PD, panic disorder; PTSD, post-traumatic stress disorder; DUD, drug use disorder; AUD, alcohol use disorder; ADHD, attention deficit/hyperactivity disorder.

Table 3
 Multivariable socio-demographic correlates of onset and course of internalizing disorders.^a

	BP		GAD		MDD		PD		PTSD	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
Lifetime										
Age ^b	1.0	(0.9–1.0)	1.0	(1.0–1.0)	1.0	(1.0–1.0)	1.0	(1.0–1.1)	1.0	(1.0–1.0)
Female	1.1*	(1.0–1.2)	1.7*	(1.7–1.8)	1.4*	(1.4–1.5)	2.0*	(1.9–2.2)	1.3*	(1.2–1.3)
Transgender ^c	1.3*	(1.0–1.6)	1.5*	(1.3–1.6)	1.3*	(1.2–1.4)	1.5*	(1.3–1.7)	1.2*	(1.1–1.2)
Not heterosexual ^d	2.0*	(1.8–2.1)	1.7*	(1.6–1.7)	1.4*	(1.4–1.5)	1.9*	(1.8–2.0)	1.3*	(1.3–1.3)
Parent education ^e	1.0	(0.9–1.1)	0.9*	(0.9–1.0)	1.0	(1.0–1.0)	1.0	(0.9–1.0)	1.0	(1.0–1.0)
F ₅		53.7*		252.3*		246.2*		206.0*		288.7*
12-month										
Age ^b	0.9*	(0.9–1.0)	1.0	(1.0–1.0)	0.9*	(0.9–1.0)	1.0*	(0.9–1.0)	0.9*	(0.9–1.0)
Female	1.2*	(1.1–1.3)	1.8*	(1.7–1.9)	1.4*	(1.4–1.5)	2.1*	(2.0–2.3)	1.4*	(1.3–1.4)
Transgender ^c	1.4*	(1.1–1.7)	1.5*	(1.4–1.7)	1.4*	(1.3–1.5)	1.6*	(1.4–1.9)	1.3*	(1.2–1.4)
Not heterosexual ^d	2.1*	(1.9–2.3)	1.7*	(1.6–1.8)	1.5*	(1.4–1.5)	2.0*	(1.9–2.1)	1.3*	(1.3–1.4)
Parent education ^e	1.0	(0.9–1.1)	0.9*	(0.9–1.0)	1.0	(1.0–1.0)	1.0	(0.9–1.0)	1.0	(1.0–1.0)
F ₅		63.7*		239.6*		256.7*		187.0*		237.4*
12-month persistence^f										
Age-of-onset ^b	1.0*	(0.9–1.0)	1.0*	(1.0–1.0)	0.9*	(0.9–1.0)	0.9*	(0.9–1.0)	0.9*	(0.9–1.0)
Time-since-onset ^{b,g}	1.0*	(1.0–1.0)	1.0*	(1.0–1.0)	1.0*	(1.0–1.0)	1.0*	(1.0–1.0)	1.0*	(1.0–1.0)
Female	1.0*	(1.0–1.1)	1.0*	(1.0–1.1)	1.0*	(1.0–1.0)	1.1	(1.0–1.1)	1.1*	(1.1–1.1)
Transgender ^c	1.1	(1.0–1.1)	1.0	(1.0–1.1)	1.0*	(1.0–1.1)	1.1*	(1.0–1.2)	1.1	(1.0–1.1)
Not heterosexual ^d	1.1*	(1.0–1.1)	1.0*	(1.0–1.0)	1.0*	(1.0–1.1)	1.1*	(1.0–1.1)	1.1*	(1.0–1.1)
Parent education ^e	1.0	(1.0–1.0)	1.0	(1.0–1.0)	1.0	(1.0–1.0)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
F ₆		6.4*		9.2*		28.4*		7.8*		22.1*

Abbreviations: BP, bipolar I/II disorder; GAD, generalized anxiety disorder; MDD, major depressive disorder; PD, panic disorder; PTSD, post-traumatic stress disorder; RR, relative risk; 95% CI, 95% confidence interval of RR.

*Significant at the 0.05 level, two-sided design-based test.

^a Based on robust Poisson regression models. Models are multivariable, with control variables for country, year of survey, and whether students were surveyed in the first three months of the academic year, generating pooled within-country/within-year regression coefficients. Design-based estimation methods were used to adjust standard errors for the weighting and clustering of observations within universities.

^b Standardized to a mean of 0 and variance of 1.

^c 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.

^d Self-reported sexual orientation was gay or lesbian, bisexual, asexual, not sure, or other.

^e Parent education reflects having at least one parent with a college degree or more.

^f See footnote a to Table 2 for a description of the definition of 12-month persistence.

^g RR = 0.98 for PD and RR = 0.99 for all other disorders.

prevalence, 12-month prevalence, or 12-month persistence other than for statistically significant but substantively modest inverse associations between parent education and both lifetime (RR = 0.9) and 12-month (RR = 0.9) prevalence of GAD.

3.4. Pooled within-country socio-demographic correlates of externalizing disorders

DUD was the only externalizing disorder for which lifetime prevalence was assessed. Age was significantly and positively associated with lifetime prevalence (RR = 1.1), but not with 12-month prevalence, resulting in statistically significant but substantively modest negative associations between both AOO (RR = 0.9) and time-since-onset (RR = 1.0) with 12-month persistence (Supplementary Table 3). Females had significantly lower lifetime (RR = 0.5) and 12-month (RR = 0.5) prevalence of DUD than males as well as significantly lower 12-month persistence than males (RR = 0.9). Identifying as transgender and as not heterosexual, in comparison, were both associated with significantly higher lifetime (RR = 1.4–1.6) and 12-month (RR = 1.5–1.7) prevalence of DUD and, in the case of being not heterosexual, statistically significant but modestly higher 12-month persistence (RR = 1.1). Parent education, finally, was positively associated with both lifetime (RR = 1.2) and 12-month (RR = 1.2) prevalence of DUD but not with 12-month persistence.

The other externalizing disorders were only assessed for 6-month (ADHD) and 12-month (AUD). Age (RR = 0.9) was significantly and inversely associated with both these disorders (Table 4). Female sex at birth had a substantively modest but statistically significant positive association with ADHD (RR = 1.0) but a significant negative association with ADHD (RR = 0.7). Identifying as transgender was positively associated with ADHD (RR = 1.5) but inversely associated with AUD (RR = 0.9). Not being heterosexual was positively associated with both ADHD (RR = 1.5) and AUD (RR = 1.1). Parent education, finally, was not associated with ADHD but positively associated with AUD (RR = 1.2).

Table 4
Multivariable socio-demographic correlates of 12-month externalizing disorders.^a

	ADHD		AUD		DUD	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
Age ^b	0.9*	(0.9–0.9)	0.9*	(0.9–1.0)	1.0	(1.0–1.0)
Female	1.0*	(1.0–1.1)	0.7*	(0.6–0.7)	0.5*	(0.5–0.5)
Transgender ^c	1.5*	(1.4–1.6)	0.9*	(0.7–1.0)	1.5*	(1.2–1.8)
Not heterosexual ^d	1.5*	(1.5–1.6)	1.1*	(1.1–1.1)	1.7*	(1.6–1.9)
Parent education ^e	1.0	(1.0–1.1)	1.2*	(1.1–1.2)	1.2*	(1.1–1.3)
F ₅	299.1*		201.8*		168.0*	

Abbreviations: ADHD, attention deficit/hyperactivity disorder; AUD, alcohol use disorder; DUD, drug use disorder; RR, relative risk; 95% CI, 95% confidence interval of RR.

*Significant at the 0.05 level, two-sided design-based test.

^a Based on robust Poisson regression models. Models are multivariable, with control variables for country, year of survey, and whether students were surveyed in the first three months of the academic year, generating pooled within-country/within-year regression coefficients. Design-based estimation methods were used to adjust standard errors for the weighting and clustering of observations within universities.

^b Standardized to a mean of 0 and variance of 1.

^c 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.

^d Self-reported sexual orientation was gay or lesbian, bisexual, asexual, not sure, or other.

^e Parent education reflects having at least one parent with a college degree or more.

3.5. Prevalence by country

Given the large sample sizes, it is not surprising that cross-national differences in lifetime prevalence (F₁₇ = 161.4, p < 0.001), 12-month prevalence (F₁₇ = 127.7, p < 0.001), and 12-month persistence (F₁₇ = 14.1, p < 0.001) were all statistically significant. The countries with overall prevalence (i.e., prevalence of having at least one disorder) above the IQR included three countries in Europe (Belgium, France, Netherlands) and New Zealand (72.6–81.2% lifetime; 66.0–77.2% 12-month) (Supplementary Table 4). The countries with overall prevalence below the IQR were Canada, China, Mexico, and Saudi Arabia (48.3–51.8% lifetime; 37.4–45.7% 12-month). The rank-order of 12-month persistence was somewhat different. Highest persistence was in two of the same four countries with highest prevalence (Belgium, New Zealand) along with Kenya and the Republic of Ireland (90.8–93.3%). Lowest persistence was in three of the same four countries with lowest prevalence (China, Mexico, Saudi Arabia) along with Sweden (74.4–84.5%).

Inspection of disorder-specific cross-national differences showed that these differences, although again for the most part statistically significant, varied considerably across disorders. The countries with overall prevalence above the IQR were above the IQR in prevalence of only between two and five of the eight individual disorders. Two of the countries with overall prevalence below the IQR (China and Mexico) were below the IQR for the great majority of the individual disorders, but the other two countries with overall prevalence below the IQR (Canada and Saudi Arabia) were below the IQR for only about half the individual disorders (Supplementary Tables 5 and 6). Similar cross-national inconsistencies were found in disorder-specific rank-orders of 12-month persistence (Supplementary Table 7).

4. Discussion

We found that approximately two-thirds of students had a lifetime history of at least one mental disorder. It is noteworthy, though, that our diagnostic thresholds were calibrated in other samples, raising the possibility of bias due to miscalibration. This, in turn, might account for the prevalence estimates reported here being higher than in the 2014–2017 WMH-ICS surveys (Auerbach et al., 2018; Bruffaerts et al., 2019). The COVID-19 pandemic might also have increased prevalence (Van de Velde et al., 2021; Wang et al., 2020), a possibility consistent with prospective studies in smaller samples (Browning et al., 2021; Li et al., 2021). Although our new surveys spanned the pandemic, we could not examine effects of the pandemic because different countries and schools were surveyed before and after the pandemic.

Importantly, the prevalence estimates both in our earlier WMH-ICS surveys and the current surveys are considerably higher than in surveys of the adult general populations (Scott et al., 2018). This might reflect an increase in prevalence in the most recent generation of emerging adults, which was suggested in epidemiological studies even before the pandemic (Kauhanen et al., 2023). But methodological explanations are also plausible involving selection bias of students with mental disorders into survey participation (noting the low response rates in the WMH-ICS surveys). We have no way of adjudicating between these possibilities here.

Past methodological studies that obtained either screening information or archival records for nonrespondents in mental health surveys in high-income countries generally found that prevalence of mental disorders was underestimated in such surveys (Wright et al., 2023). However, at least part of that bias was due to difficulties gaining access to people with mental disorders either because of differences in living situations (i.e., homeless, institutionalized, or residing in group quarters that are often excluded from household surveys) or contact (i.e., less likely to respond to contact attempts made by strangers or, in the case of people with substance use disorder, less likely to be at home at the time of call attempts). Such difficulties do not exist in institutional surveys

where an email address is available for each member of the population. In settings of this sort, where anonymity is guaranteed and recruitment materials make it clear that results will be used to help university officials improve services for students with emotional problems, it might well be that students with emotional problems are more likely than other students to participate. Even if this was the case, though, prevalence estimates as high as those found here are very concerning.

Our findings related to sex differences are consistent with long-standing evidence that females have elevated prevalence of internalizing disorders and males have elevated prevalence of externalizing disorders (Rosenfield and Smith, 2009). Our findings related to age, in comparison, are inconsistent with previous cross-national studies (Bruffaerts et al., 2018) in that we observed no statistically significant association between age and risk of lifetime mental disorders and found an inverse association with 12-month mental disorders. One possible explanation for these discrepancies with prior research is that we focused on first-year students, where older age is likely to be associated with unknown selection biases regarding causes of delayed university entry (Kessler et al., 2007b). It is also possible that older age makes entering students better equipped to manage the stresses of university life.

The increased risk of mental health problems among transgender and/or non-heterosexual students is consistent with extensive literature and aligns with Minority Stress Theory (Meyer, 2003). In a university student context, it is likely that the stresses associated with being a member of a minority group (e.g., worries about disclosure, stigma) are amplified amongst the additional stressors of transitioning to university (e.g., shifting academic and social landscapes). Thus, students who identify as members of these communities may experience greater levels of distress, thereby increasing and compounding their vulnerability to mental disorders (Frost and Meyer, 2023; Schimanski and Treharne, 2018). The inverse relationship between being transgender and risk of AUD may be associated with greater fears and incidence of negative alcohol-related events among transgender individuals (Coulter et al., 2015; Dermody et al., 2022).

The association of high parent education with reduced risk of GAD, finally, might reflect the effects of academic preparedness and familial understandings of the university experience in helping to reduce the anxieties associated with transitioning to student life relative to first-generation students (Dennis et al., 2005). It is also possible that first-generation students experience greater pressure or perceived responsibilities to achieve to help their families improve their socio-economic positions (Covarrubias et al., 2018; Noel et al., 2023). Whatever the explanation may be, this association of parental education with reduced risk of GAD is consistent with other studies (Mohammadi et al., 2020). The finding that parent education is positively associated with risk for AUD and DUD, in comparison, also consistent with prior evidence (Busto Miramontes et al., 2021), may reflect greater financial access to drugs and alcohol (Hauser and Warren, 1997) or may reflect a selection bias whereby these disorders are a greater impediment to university entry among high school students from lower SES backgrounds.

4.1. Strengths & limitations

Key strengths of this study were the existence of a large cross-national sample and the fact that we provided the first cross-national estimates of mental disorder prevalence among university students using DSM-5 criteria. However, three noteworthy limitations also existed. First, survey response rates were low, which could have introduced bias into estimates. Second, ADHD and AUD were assessed only for 6- and 12-month prevalence. Third, results relied on self-report screening scales and in some cases were imputed, raising the possibility of mis-calibration bias.

4.2. Summary

The need to understand mental health problems among university students is essential for administration officials, policymakers, and student health services. We found that roughly two-thirds of first-year students screened positive for at least one lifetime mental disorder and that the great majority of these students continued to meet criteria for these lifetime disorders in the year-of-survey. Given that the primary period of disorder onset predated university entrance, preventative interventions are less likely to be helpful than curative interventions once students matriculate to university. But the magnitude of these problems is so high that efforts are needed to consider the use of scalable interventions that go beyond the conventional treatments provided at student mental health clinics (Brown et al., 2023). Although a discussion of such interventions is beyond the scope of the current report, it is noteworthy that growing evidence exists that scalable interventions can be effective in treating the emotional problems experienced by university students (Taylor et al., 2024) but that treatment rates of such students remain low (Pei et al., 2024). An understanding of barriers to access to and acceptance of such interventions, a topic we take up in a subsequent report, is consequently of vital importance (Abouzeid and Lal, 2024).

CRediT authorship contribution statement

Andre Mason: Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Conceptualization. **Charlene Rapsey:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Funding acquisition, Data curation, Conceptualization. **Nancy Sampson:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Methodology, Data curation. **Sue Lee:** Writing – review & editing, Writing – original draft, Validation, Supervision, Investigation, Data curation. **Yesica Albor:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Ahmad N. Al-Hadi:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Jordi Alonso:** Writing – review & editing, Validation, Supervision, Investigation, Funding acquisition, Data curation. **Nouf Al-Saud:** Writing – review & editing, Data curation. **Yasmin Altwaijri:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Claes Andersson:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Lukoye Atwoli:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Randy P. Auerbach:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Caroline Ayuya:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Patricia M. Báez-Mansur:** Writing – review & editing, Data curation. **Laura Ballester:** Writing – review & editing, Data curation. **Jason Bantjes:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Harald Baumeister:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Marcus Bendtsen:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Corina Benjet:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Anne H. Berman:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Erik Bootsma:** Writing – review & editing, Data curation. **Silver C.N. Chan:** Writing – review & editing, Data curation. **Irina Cohut:** Writing – review & editing, Data curation. **María Anabell Covarrubias Díaz Couder:** Writing – review & editing, Data curation. **Pim Cuijpers:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Oana David:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Dong Dong:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **David D. Ebert:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Mireia Felez**

Nobrega: Writing – review & editing, Data curation. **Jorge Gaete:** Writing – review & editing, Data curation. **Carlos García Forero:** Writing – review & editing, Data curation. **Margalida Gili:** Writing – review & editing, Data curation. **Raúl Gutiérrez-García:** Writing – review & editing, Data curation. **Josep Maria Haro:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Penelope Hasking:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Kristen Hudec:** Writing – review & editing, Data curation. **Xanthe Hunt:** Writing – review & editing, Data curation. **Petra Hurks:** Writing – review & editing, Data curation. **Mathilde Husky:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Florence Jaguga:** Writing – review & editing, Data curation. **Leontien Jansen:** Writing – review & editing, Data curation. **Fanny Kählke:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Elisabeth Klinkenberg:** Writing – review & editing, Data curation. **Ann-Marie Küchler:** Writing – review & editing, Data curation. **Álvaro I. Langer:** Writing – review & editing, Data curation. **Irene Léniz:** Writing – review & editing, Data curation. **Yan Liu:** Writing – review & editing, Data curation. **Scarlett Mac-Ginty:** Writing – review & editing, Data curation. **Vania Martínez:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Muthoni Mathai:** Writing – review & editing, Data curation. **Margaret McLafferty:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Andrea Miranda-Mendizabal:** Writing – review & editing, Data curation. **Elaine Murray:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Catherine M. Musyoka:** Writing – review & editing, Data curation. **Catalin Nedelcea:** Writing – review & editing, Data curation. **Chun Ho Ngai:** Writing – review & editing, Data curation. **Daniel Núñez:** Writing – review & editing, Data curation. **Siobhan O’Neill:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Jose A. Piqueras:** Writing – review & editing, Data curation. **Codruta A. Popescu:** Writing – review & editing, Data curation. **Kealagh Robinson:** Writing – review & editing, Data curation. **Tiscar Rodriguez-Jimenez:** Writing – review & editing, Data curation. **Damian Scarf:** Writing – review & editing, Data curation. **Oi Ling Siu:** Writing – review & editing, Data curation. **Dan J. Stein:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Sascha Y. Struijs:** Writing – review & editing, Data curation. **Cristina Tomoiaaga:** Writing – review & editing, Data curation. **Karla Patricia Valdés-García:** Writing – review & editing, Data curation. **Sanne van Luenen:** Writing – review & editing, Data curation. **Daniel V. Vigo:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Angel Y. Wang:** Writing – review & editing, Data curation. **Reinout Wiers:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Samuel Y.S. Wong:** Writing – review & editing, Resources, Investigation, Funding acquisition, Data curation. **Ronald C. Kessler:** Writing – review & editing, Writing – original draft, Supervision, Software, Resources, Project administration, Methodology, Funding acquisition, Conceptualization. **Ronny Bruffaerts:** Writing – review & editing, Writing – original draft, Supervision, Software, Resources, Project administration, Methodology, Funding acquisition, Conceptualization.

Data availability statements

The data analyzed in this study is subject to the following licenses/restrictions: The WMH-ICS data sharing agreement limits access of this data to members of the consortium.

Funding

Funding to support this initiative was received from the National Institute of Mental Health (NIMH) R56MH109566 (RPA), and the content is solely the responsibility of the authors and does not necessarily

represent the official views of the National Institutes of Health or NIMH.

The World Mental Health International College Student (WMH-ICS) initiative is carried out as part of the World Mental Health (WMH) Survey Initiative. The WMH survey is supported by the National Institute of Mental Health NIMH R01MH070884, the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and R01 DA016558), the Fogarty International Center (FIRCA R03-TW006481), the Pan American Health Organization, Eli Lilly and Company, Ortho-McNeil Pharmaceutical, GlaxoSmithKline, and Bristol-Myers Squibb (RCK).

Local funding for surveys in each country is listed below:

Australia: PH has received funding for this work from Suicide Prevention Australia, the Feilman Foundation, and the National Health and Medical Research Council (ID, 2032058).

Belgium: The Belgian Fund for Scientific Research (11N0514N/11N0516N/1114717N), the King Baudouin Foundation (2014-J2140150-102905) (RB), the Ministry of Education, Flanders - Grant# EDC-E3738, institutional payment, awarded to RB, and Eli Lilly (IIT-H6U-BX-1002).

Canada: Health Canada - Substance Use and Addictions Program. Grant for the Mental Health Systems and Services Laboratory at the University of British Columbia.

Chile: ANID – Millennium Science Initiative Program (project number NCS2021_081) and the Chilean National Fund for Scientific and Technological Development, FONDECYT (project number 1221230). SM-G, reports funding support from ANID/PFCHA/DOCTORADO EN EL EXTRANJERO BECAS CHILE/2019–72200092.

China: Wofoo Joseph Lee Consulting and Counselling Psychology Research Centre, Hong Kong Special Administrative Region (SAR).

France: Institut Universitaire de France.

Germany: BARMER, a health care insurance company, for project StudiCare.

Mexico: Consejo Nacional de Ciencia y Tecnología (Mexican National Council of Science and Technology). Grant CONACYT 285548 awarded to institution (National Institute of Psychiatry Ramon de la Fuente Muñiz) with CB as PI.

The Netherlands: ZonMw (Netherlands Organisation for Health Research and Development; grant number 636110005) and the PFGV (PFGV; Protestants Fonds voor de Geestelijke Volksgezondheid) in support of the student survey project.

New Zealand: The WMH-ICS NZ surveys were supported by a Rutherford Discovery Fellowship awarded to Associate Professor Damian Scarf, with additional support from the James Hume Bequest Fund and a research grant from University of Otago.

Northern Ireland: The Student Psychological Intervention Trial (SPIT) was supported by Clinical Healthcare Intervention Trials in Ireland Network (CHITIN). CHITIN has received €10.6 million funding from the European Union’s INTERREG VA programme managed by the Special EU Programmes Body (SEUPB) with match funding from the Departments of Health in NI and ROI (CHI/5433/18)

Romania: This work was supported by Romanian National Authority for Scientific Research, CNCS—UEFISCDI, Grant number PN-III-P2-2.1-PED-2021-3882, awarded to OD.

Saudi Arabia: The Saudi University Mental Health Survey is conducted by the King Salman Center for Disability Research; funded by Saudi Basic Industries Corporation, King Abdulaziz City for Science and Technology, Ministry of Health and King Saud University. Funding in-kind was provided by King Faisal Specialist Hospital & Research Center, and Ministry of Economy & Planning, General Authority for Statistics, Riyadh.

South Africa: South African Medical Research Council under the MCD Programme (awarded to JB and XH).

Spain: The PROMES-U study, is supported by Instituto de Salud Carlos III (ISCIII) and cofunded by the European Union, grant number PI20/00006; the Departament de Recerca i Universitats of the Generalitat de Catalunya (AGAUR, 2021 SGR 00624); and CIBER -Consorcio

Centro de Investigación Biomédica en Red- (CB06/02/0046), Instituto de Salud Carlos III, Ministerio de Ciencia e Innovación and Unión Europea. For surveys directed by Parc Sanitari Sant Joan de Déu, funding was provided by Fundació Sant Joan de Déu.

Sweden: CA, MB and AHB received funding for this work from the Swedish Research Council (ID, 2019–01127) as well as from a Public Health Agency in Sweden (ID 04252-2021-2.3.2). Both grants awarded to AHB.

Declaration of competing interest

AM acknowledges that research was conducted during tenure of a Health Sciences Career Development Award of the Ōtakou Whakaihu Waka - University of Otago. In the past 3 years, **RPA** has received payment and stock options from Get Sonar, Inc. CA, MB, **CB** reports funding from the National Institute of Health (US), awarded to the National Institute of Psychiatry Ramon de la Fuente Muñiz, with Benjet as PI. **AHB** received funding for this work from the Swedish Research Council (ID, 2019–01127) as well as from a Public Health Agency in Sweden (ID 04252-2021-2.3.2), and has served as a consultant for National Board of Health and Welfare (Sweden), received financial support for conference participation from Karolinska Institutet, royalties from Gothia Fortbildning, relating to textbooks on addiction and crime, and has served as President of International Society of Behavioral Medicine (isbm.info). **DD** received grants from Research Grants Council (RGC) (Hong Kong); Health and Medical Research Fund; Save the Children Hong Kong and Merck & Co. Inc. and has served as a board member for several rare disease advocacy groups in Asia. **DDE** has served as a consultant to/on the scientific advisory boards of Sanofi, Novartis, Minddistrict, Lantern, Schoen Kliniken, Ideamed and German health insurance companies (BARMER, Techniker Krankenkasse) and a number of federal chambers for psychotherapy and is shareholder of GET.ON Institute/HelloBetter a provider of digital mental health care products and services. In Chile the study was funded by ANID-Millennium Science Initiative Program-NCS2021_081 and ANID/FONDECYT 1221230. **JMH** reports grant funding from Eli Lilly & Co. and consulting fees from Otsuka. **XH** has received grants from Sexual Violence Research Institute, Volkswagen Foundation, Wellspring Philanthropies, Foreign, Commonwealth and Development Office (UK government), PANDA Holding Limited, National Research Foundation of South Africa, Center for Inclusive Policy. **XH** reports consulting fees from Mastercard Foundation, Missing Billion Initiative, UNICEF, International Food Policy Research Institute and the African Union. Hunt has received funding support to attend conferences from Mastercard Foundation and Charité University (Germany). **PH** has received funding for this work from Suicide Prevention Australia, the Feilman Foundation, and the National Health and Medical Research Council (ID, 2032058). **MH** reports consulting fees from Child Mind Institute, New York. **AMK** has received lecture fees for mental health workshops and presentations for German statutory health insurance company, Techniker Krankenkasse. **YL** received grant support from Taishan Scholars Program of Shandong Province. **AM** acknowledges that research was conducted during tenure of a Health Sciences Career Development Award of the Ōtakou Whakaihu Waka - University of Otago. **DJS** reports personal fees from Discovery Vitality, Johnson & Johnson, Kanna, L'Oreal, Lundbeck, Orion, Sanofi, Servier, Takeda and Vistagen. **DVV** reports grant support from Health Canada, Canadian Institutes for Health Research, Provincial Health Services Authority and an internal research grant from the University of British Columbia. The BC Ministry of Health and the Department of Interior Health made payments to Dr. Vigo with respect to contracts for projects related to mental health service provision. **RW** received lecture fees for presentations from Clinical Psychology Training, The Netherlands. In the past 3 years, **RCK** was a consultant for Cambridge Health Alliance, Canandaigua VA Medical Center, Child Mind Institute, Holmusk, Massachusetts General Hospital, Partners Healthcare, Inc., RallyPoint Networks, Inc., Sage Therapeutics and University of North Carolina. He has

stock options in Cerebral Inc., Mirah, PYM (Prepare Your Mind), Roga Sciences and Verisense Health.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychires.2025.02.016>.

References

- Abouzeid, N., Lal, S., 2024. The role of sociodemographic factors on the acceptability of digital mental health care: a scoping review protocol. *PLoS One* 19, e0301886. <https://doi.org/10.1371/journal.pone.0301886>.
- Alonso, J., Mortier, P., Auerbach, R.P., Bruffaerts, R., Vilagut, G., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Ennis, E., Gutierrez-Garcia, R.A., Green, J.G., Hasking, P., Lochner, C., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Zaslavsky, A.M., Kessler, R.C., WHO WMH-ICS Collaborators, 2018. Severe role impairment associated with mental disorders: results of the WHO world mental health surveys international college student project. *Depress. Anxiety* 35, 802–814. <https://doi.org/10.1002/da.22778>.
- Auerbach, R.P., Alonso, J., Axinn, W.G., Cuijpers, P., Ebert, D.D., Green, J.G., Hwang, I., Kessler, R.C., Liu, H., Mortier, P., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L.H., Benjet, C., Caldas-de-Almeida, J. M., Demyttenaere, K., Bruffaerts, R., 2016. Mental disorders among college students in the world health organization world mental health surveys. *Psychol. Med.* 46, 2955–2970. <https://doi.org/10.1017/S0033291716001665>.
- 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. *J. Abnorm. Psychol.* 127, 623–638. <https://doi.org/10.1037/abn0000362>.
- Babor, T.F., Higgins-Biddle, J.C., Saunders, J.B., Monteiro, M.G., World Health Organization, 1992. AUDIT: the Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Health Care. World Health Organization. <https://www.who.int/publications/i/item/WHO-MSD-MSB-01.6a>. (Accessed 22 July 2024).
- Bantjes, J., Kessler, M., Lochner, C., Breet, E., Bawa, A., Roos, J., Davids, C., Muturiki, M., Kessler, R.C., Stein, D.J., 2023. The mental health of university students in South Africa: results of the national student survey. *J. Affect. Disord.* 321, 217–226. <https://doi.org/10.1016/j.jad.2022.10.044>.
- Benjet, C., Gutiérrez-García, R.A., Abrego-Ramírez, A., Borges, G., Covarrubias-Díaz, A., Durán, M.D.S., González-González, R., Hermsillo-de la Torre, A.E., Martínez-Martínez, K.I., Medina-Mora, M.E., Mejía-Zarazúa, H., Pérez-Tarango, G., Zavala-Berbená, M.A., Mortier, P., 2019. Psychopathology and self-harm among incoming first-year students in six Mexican universities. *Salud Publica Mex.* 61, 16–26. <https://doi.org/10.21149/9158>.
- Brown, A.D., Ross, N., Sangraula, M., Laing, A., Kohrt, B.A., 2023. Transforming mental healthcare in higher education through scalable mental health interventions. *Glob. Mental Health (Camb.)* 10, e33. <https://doi.org/10.1017/gmh.2023.29>.
- Browning, M., Larson, L.R., Sharaievska, I., Rigolon, A., McAnirlin, O., Mullenbach, L., Cloutier, S., Vu, T.M., Thomsen, J., Reigner, N., Metcalf, E.C., D'Antonio, A., Helbich, M., Bratman, G.N., Alvarez, H.O., 2021. Psychological impacts from COVID-19 among university students: risk factors across seven states in the United States. *PLoS One* 16, e0245327. <https://doi.org/10.1371/journal.pone.0245327>.
- Bruffaerts, R., Mortier, P., Auerbach, R.P., Alonso, J., Hermsillo De la Torre, A.E., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Stein, D.J., Ennis, E., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Vilagut, G., Zaslavsky, A. M., Kessler, R.C., WHO WMH-ICS Collaborators, 2019. Lifetime and 12-month treatment for mental disorders and suicidal thoughts and behaviors among first year college students. *Int. J. Methods Psychiatr. Res.* 28, e1764. <https://doi.org/10.1002/mpr.1764>.
- Bruffaerts, R., Mortier, P., Kiekens, G., Auerbach, R.P., Cuijpers, P., Demyttenaere, K., Green, J.G., Nock, M.K., Kessler, R.C., 2018. Mental health problems in college freshmen: prevalence and academic functioning. *J. Affect. Disord.* 225, 97–103. <https://doi.org/10.1016/j.jad.2017.07.044>.
- Busto Miramontes, A., Moure-Rodríguez, L., Mallah, N., Diaz-Geadá, A., Corral, M., Cadaveira, F., Caamano-Isorna, F., 2021. Alcohol consumption among freshman college students in Spain: individual and pooled analyses of three cross-sectional surveys (2005, 2012 and 2016). *Int. J. Environ. Res. Public Health* 18, 2548. <https://doi.org/10.3390/ijerph18052548>.
- Campbell, F., Blank, L., Cantrell, A., Baxter, S., Blackmore, C., Dixon, J., Goyder, E., 2022. Factors that influence mental health of university and college students in the UK: a systematic review. *BMC Public Health* 22, 1778. <https://doi.org/10.1186/s12889-022-13943-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 Med. Res. Methodol.* 18, 63. <https://doi.org/10.1186/s12874-018-0519-5>.
- Coulter, R.W., Blossnich, J.R., Bukowski, L.A., Herrick, A.L., Siconolfi, D.E., Stall, R.D., 2015. Differences in alcohol use and alcohol-related problems between transgender and nontransgender-identified young adults. *Drug Alcohol Depend.* 154, 251–259. <https://doi.org/10.1016/j.drugalcdep.2015.07.006>.

- Covarrubias, R., Valle, I., Laiduc, G., Azmitia, M., 2018. You never become fully independent: family roles and independence in first-generation college students. *J. Adolesc. Res.* 34, 381–410. <https://doi.org/10.1177/0743558418788402>.
- Crockett, M.A., Martínez-Nahuel, V., Mac-Ginty, S., Núñez, D., Langer, A.I., Gaete, J., 2024. Differences in mental health problems in LGBT+ first year college students in Chile during the pandemic. *Soc. Psychiatr. Psychiatr. Epidemiol.* 59, 2339–2349. <https://doi.org/10.1007/s00127-024-02683-5>.
- Cuijpers, P., Auerbach, R.P., Benjet, C., Bruffaerts, R., Ebert, D., Karyotaki, E., Kessler, R. C., 2019. The world health organization world mental health international college student initiative: an overview. *Int. J. Methods Psychiatr. Res.* 28, e1761. <https://doi.org/10.1002/mpr.1761>.
- Dennis, J.M., Phinney, J.S., Chuateco, L.I., 2005. The role of motivation, parental support, and peer support in the academic success of ethnic minority first-generation college students. *J. Coll. Student Dev.* 46, 223–236. <https://doi.org/10.1353/csd.2005.0023>.
- Dermody, S.S., Lamb, K.M., Kerr, D.C.R., 2022. Heavy drinking and drinking harms for cisgender and transgender college students. *Psychol. Addict. Behav.* 36, 466–476. <https://doi.org/10.1037/adb0000778>.
- Frost, D.M., Meyer, I.H., 2023. Minority stress theory: application, critique, and continued relevance. *Curr. Opin. Psychol.* 51, 101579. <https://doi.org/10.1016/j.copsyc.2023.101579>.
- Georgescu, T., Nedelcea, C., Gorbănescu, A., Papasteri, C., Cosmoiu, A.M., Vasile, D.L., Letzner, R.D., 2024. Psychometric evaluation of the PCL-5: assessing validity, diagnostic utility, and bifactor structures. *Eur. J. Psychotraumatol.* 15, 2333222. <https://doi.org/10.1080/20008066.2024.2333222>.
- Hansen, M., Vaegter, H.B., Ravn, S.L., Andersen, T.E., 2023. Validation of the Danish PTSD checklist for DSM-5 in trauma-exposed chronic pain patients using the clinician-administered PTSD scale for DSM-5. *Eur. J. Psychotraumatol.* 14, 2179801. <https://doi.org/10.1080/20008066.2023.2179801>.
- Harkness, J., Pennell, B.E., Villar, A., Gebler, N., Aguilar-Gaxiola, S., Bilgen, I., 2008. Translation procedures and translation assessment in the world mental health survey initiative. In: Kessler, R.C., Ustun, T.B. (Eds.), *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. Cambridge University Press, pp. 91–113.
- Hausser, R.M., Warren, J.R., 1997. Socioeconomic indexes for occupations: A review, update, and critique. *Soc. Methodol.* 27, 177–298. <https://doi.org/10.1111/1467-9531.271028>.
- Kauhanen, L., Wan Mohd Yunus, W.M.A., Lempinen, L., Peltonen, K., Gyllenberg, D., Mishina, K., Gilbert, S., Bastola, K., Brown, J.S.L., Sourander, A., 2023. A systematic review of the mental health changes of children and young people before and during the COVID-19 pandemic. *Eur. Child Adolesc. Psychiatr.* 32, 995–1013. <https://doi.org/10.1007/s00787-022-02060-0>.
- Kerr, D.C., Capaldi, D.M., 2011. Young men's intimate partner violence and relationship functioning: long-term outcomes associated with suicide attempt and aggression in adolescence. *Psychol. Med.* 41, 759–769. <https://doi.org/10.1017/S0033291710001182>.
- 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. *Psychol. Med.* 35, 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., 2007a. Validity of the world health organization adult ADHD self-report scale (ASRS) screener in a representative sample of health plan members. *Int. J. Methods Psychiatr. Res.* 16, 52–65. <https://doi.org/10.1002/mpr.208>.
- Kessler, R.C., Angermeyer, M., Anthony, J.C., Graaf, R.D.E., Demyttenaere, K., Gasquet, I., Girolamo, G.D.E., Gluzman, S., Gureje, O., Haro, J.M., Kawakami, N., Karam, A., Levinson, D., Medina Mora, M.E., Oakley Browne, M.A., Posada-Villa, J., Stein, D.J., Tsang, C.H.A., Aguilar-Gaxiola, S., Alonso, J., Lee, S., Heeringa, S., Pennell, B.-E., Berglund, P., Gruber, M.J., Petukhova, M., Chatterji, S., Ustun, T.B., 2007b. Lifetime prevalence and age-of-onset distributions of mental disorders in the world health organization's world mental health survey initiative. *World Psychiatry* 6, 168–176. <https://www.ncbi.nlm.nih.gov/pubmed/18188442>.
- Kessler, R.C., Calabrese, J.R., Farley, P.A., Gruber, M.J., Jewell, M.A., Katon, W., Keck, P. E., Nierenberg, A.A., Sampson, N.A., Shear, M.K., Shillington, A.C., Stein, M.B., Thase, M.E., Wittchen, H.U., 2013a. Composite International Diagnostic Interview screening scales for DSM-IV anxiety and mood disorders. *Psychol. Med.* 43, 1625–1637. <https://doi.org/10.1017/S0033291712002334>.
- 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., 2013b. 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). *Int. J. Methods Psychiatr. Res.* 22, 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. *Int. J. Methods Psychiatr. Res.* 33, e2012. <https://doi.org/10.1002/mpr.2012>.
- Kramer, L.B., Whiteman, S.E., Petri, J.M., Spitzer, E.G., Weathers, F.W., 2023. Self-rated versus clinician-rated assessment of posttraumatic stress disorder: an evaluation of discrepancies between the PTSD checklist for DSM-5 and the clinician-administered PTSD scale for DSM-5. *Assessment* 30, 1590–1605. <https://doi.org/10.1177/10731911221113571>.
- Li, Y., Zhao, J., Ma, Z., McReynolds, L.S., Lin, D., Chen, Z., Wang, T., Wang, D., Zhang, Y., Zhang, J., Fan, F., Liu, X., 2021. Mental health among college students during the COVID-19 pandemic in China: a 2-wave longitudinal survey. *J. Affect. Disord.* 281, 597–604. <https://doi.org/10.1016/j.jad.2020.11.109>.
- McGrath, J.J., Al-Hamzawi, A., Alonso, J., Altwajri, Y., Andrade, L.H., Bromet, E.J., Bruffaerts, R., de Almeida, J.M.C., Chardoul, S., Chiu, W.T., 2023. Age of onset and cumulative risk of mental disorders: a cross-national analysis of population surveys from 29 countries. *Lancet Psychiatry* 10, 668–681. [https://doi.org/10.1016/S2215-0366\(23\)00193-1](https://doi.org/10.1016/S2215-0366(23)00193-1).
- Meyer, I.H., 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Bull.* 129, 674–697. <https://doi.org/10.1037/0033-2909.129.5.674>.
- Mohammadi, M.R., Pourdehghan, P., Mostafavi, S.A., Hooshyari, Z., Ahmadi, N., Khaleghi, A., 2020. Generalized anxiety disorder: prevalence, predictors, and comorbidity in children and adolescents. *J. Anxiety Disord.* 73, 102234. <https://doi.org/10.1016/j.janxdis.2020.102234>.
- Noel, J.K., Lakhani, H.A., Sammartino, C.J., Rosenthal, S.R., 2023. Depressive and anxiety symptoms in first generation college students. *J. Am. Coll. Health* 71, 1906–1915. <https://doi.org/10.1080/07448481.2021.1950727>.
- Pei, J., Amanvermez, Y., Vigo, D., Puyat, J., Kessler, R.C., Mortier, P., Bruffaerts, R., Rankin, O., Chua, S.N., Martínez, V., Rapsey, C., Fodor, L.A., David, O.A., Garcia, C., Cuijpers, P., 2024. Sociodemographic correlates of mental health treatment seeking among college students: a systematic review and meta-analysis. *Psychiatr. Serv.* 75, 556–569. <https://doi.org/10.1176/appi.ps.20230414>.
- Porru, F., Schuring, M., Hoogendijk, W.J.G., Burdorf, A., Robroek, S.J.W., 2023. Impact of mental disorders during education on work participation: a register-based longitudinal study on young adults with 10 years follow-up. *J. Epidemiol. Community Health* 77, 549–557. <https://doi.org/10.1136/jech-2022-219487>.
- Raghunathan, T.E., Grizzle, J.E., 1995. A split questionnaire survey design. *J. Am. Stat.* 90, 54–63. <https://doi.org/10.1080/01621459.1995.10476488>.
- Rosenfield, S., Smith, D., 2009. Gender and mental health: do men and women have different amounts or types of problems? In: Scheidt, T.L., Brown, T.N. (Eds.), *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. Cambridge University Press, pp. 256–267. <https://doi.org/10.1017/CBO9780511984945.017>.
- Schimanski, I.D., Treharne, G.J., 2018. Extra marginalisation within the community: queer individuals' perspectives on suicidality, discrimination and gay pride events. *Psychol. Sex* 10, 31–44. <https://doi.org/10.1080/19419899.2018.1524394>.
- Scott, K.M., de Jonge, P., Stein, D.J., Kessler, R.C. (Eds.), 2018. *Mental Disorders Around the World: Facts and Figures from the WHO World Mental Health Surveys*, first ed. Cambridge University Press. <https://doi.org/10.1017/9781316336168>.
- Scott, K.M., Lim, C., Al-Hamzawi, A., Alonso, J., Bruffaerts, R., Caldas-de-Almeida, J.M., Florescu, S., de Girolamo, G., Hu, C., de Jonge, P., Kawakami, N., Medina-Mora, M. E., Moskalewicz, J., Navarro-Mateu, F., O'Neill, S., Piazza, M., Posada-Villa, J., Torres, Y., Kessler, R.C., 2016. Association of mental disorders with subsequent chronic physical conditions: world Mental Health Surveys from 17 countries. *JAMA Psychiatry* 73, 150–158. <https://doi.org/10.1001/jamapsychiatry.2015.2688>.
- Singer, J.D., Willett, J.B., 1993. It's about time: using discrete-time survival analysis to study duration and the timing of events. *J. Educ. Stat.* 18, 155–195. <https://doi.org/10.3102/10769986018002155>.
- Taylor, M.E., Liu, M., Abelson, S., Eisenberg, D., Lipson, S.K., Schueller, S.M., 2024. The reach, effectiveness, adoption, implementation, and maintenance of digital mental health interventions for college students: a systematic review. *Curr. Psychiatry Rep.* 26, 638–693. <https://doi.org/10.1007/s11920-024-01545-w>.
- 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 Alcohol Depend.* 202, 39–49. <https://doi.org/10.1016/j.drugalcedep.2019.01.030>.
- Van Buren, S., 2012. *Flexible Imputation of Missing Data*, first ed. CRC Press, Taylor & Francis Group, New York. <https://doi.org/10.1201/b11826>.
- Van de Velde, S., Buffel, V., van der Heijde, C., Coksan, S., Bracke, P., Abel, T., Busse, H., Zeeb, H., Rabiee-Khan, F., Stathopoulou, T., Van Hal, G., Ladner, J., Tavalacci, M., Tholen, R., Wouters, E., 2021. Depressive symptoms in higher education students during the first wave of the COVID-19 pandemic. An examination of the association with various social risk factors across multiple high- and middle-income countries. *SSM Popul. Health* 16, 100936. <https://doi.org/10.1016/j.ssmph.2021.100936>.
- Villarosa-Hurlock, 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. *Am. J. Drug Alcohol Abuse* 46, 531–545. <https://doi.org/10.1080/00952990.2020.1712410>.

- Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., Sasangohar, F., 2020. Investigating mental health of US college students during the COVID-19 pandemic: cross-sectional survey study. *J. Med. Internet Res.* 22, e22817. <https://doi.org/10.2196/22817>.
- Ward, C., McLafferty, M., McLaughlin, J., McHugh, R., McBride, L., Brady, J., Bjourson, A.J., Walsh, C.P., O'Neill, S.M., Murray, E.K., 2022. Suicidal behaviours and mental health disorders among students commencing college. *Psychiatry Res.* 307, 114314. <https://doi.org/10.1016/j.psychres.2021.114314>.
- 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). Scale available from: the National Center for PTSD at www.ptsd.va.gov.
- Wright, E., Pagliaro, C., Page, I.S., Diminic, S., 2023. A review of excluded groups and non-response in population-based mental health surveys from high-income countries. *Soc. Psychiatr. Psychiatr. Epidemiol.* 58, 1265–1292. <https://doi.org/10.1007/s00127-023-02488-y>.
- Ziobrowski, H.N., Adler, L.A., Zainal, N.H., Anbarasan, D., Sampson, N.A., Puac-Polanco, V., Kessler, R.C., 2023. Adult attention-deficit/hyperactivity disorder self-report scale (ASRS). In: Krägeloh, C.U., Alyami, M., Medvedev, O.N. (Eds.), *International Handbook of Behavioral Health Assessment*, pp. 1–32.
- 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). *Depress. Anxiety* 36, 790–800. <https://doi.org/10.1002/da.22942>.