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SPECIAL ISSUE

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Mental disorder comorbidity and suicidal thoughts and behaviors in the World Health Organization World Mental Health Surveys International College Student initiative

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Abstract

Objectives: Comorbidity is a common feature of mental disorders. However, needs assessment surveys focus largely on individual disorders rather than on comorbidity even though the latter is more important for predicting suicidal thoughts and behaviors. In the current report, we take a step beyond this conventional approach by presenting data on the prevalence and correlates (sociodemographic factors, college-related factors, and suicidal thoughts and behaviors) of the main multivariate profiles of common comorbid *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-IV disorders among students participating in the first phase of the World Health Organization World Mental Health International College Student initiative.

Method: A web-based mental health survey was administered to first year students in 19 colleges across eight countries (Australia, Belgium, Germany, Mexico, Northern Ireland, South Africa, Spain, United States; 45.5% pooled response rate) to screen for seven common DSM-IV mental disorders: major depression, mania/hypomania,

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generalized anxiety disorder, panic disorder, attention-deficit/hyperactivity disorder, alcohol use disorder, and drug use disorder. We focus on the 14,348 respondents who provided complete data; 38.4% screened positive for at least one 12-month disorder.

Results: Multivariate disorder profiles were detected using latent class analysis (LCA). The least common class (C1; 1.9% of students) was made up of students with high comorbidity (four or more disorders, the majority including mania/hypomania). The remaining 12-month cases had profiles of internalizing–externalizing comorbidity (C2; 5.8%), internalizing comorbidity (C3; 14.6%), and pure disorders (C4; 16.1%). The 1.9% of students in C1 had much higher prevalence of suicidal thoughts and behaviors than other students. Specifically, 15.4% of students in C1 made a suicide attempt in the 12 months before the survey compared with 1.3–2.6% of students with disorders in C2–4, 0.2% of students with lifetime disorders but no 12-month disorders (C5), and 0.1% of students with no lifetime disorders (C6).

Conclusions: In line with prior research, comorbid mental disorders were common; however, sociodemographic correlates of LCA profiles were modest. The high level of comorbidity underscores the need to develop and test transdiagnostic approaches for treatment in college students.

KEYWORDS

college student mental health, comorbidity, mental disorders, suicide thoughts and behaviors

1 | INTRODUCTION

Recent cross-national studies show that approximately one third of college students report mental disorders in the past 12 months (Auerbach et al., 2016; Auerbach et al., 2018). The occurrence of mental disorders during this critical period of development has profound consequences on academic outcomes (college attrition—Auerbach et al., 2016; grades—Bruffaerts et al., 2018), role impairment (e.g., dysfunctional relationships and inability to work or attend class; Alonso et al., 2018), and the occurrence of suicidal thoughts and behaviors (STBs; Mortier et al., 2017). Despite recent attention and awareness about the alarming rates of mental disorders among college students (Blanco et al., 2008; Cho et al., 2015; Eisenberg, Golberstein, & Gollust, 2007; Hunt & Eisenberg, 2010; Kendler, Myers, & Dick, 2015; Mojtabai et al., 2015), less research has focused on clarifying patterns of comorbidity (Eisenberg, Hunt, & Speer, 2013). Addressing this issue is essential given that most mental disorders do not emerge in isolation (Kessler, Chiu, Demler, Merikangas, & Walters, 2005), and perhaps more importantly, college campuses must determine how best to provide appropriate intervention services for students with diverse profiles of mental disorder comorbidity.

Decades of psychiatric research across age groups have shown that comorbidity is the rule rather than the exception with comorbidity rates as high as 79% (Kessler et al., 1994; Kessler, Chiu, et al., 2005). Although it is unequivocal that mental disorders are highly comorbid, a critical question that remains in college students is whether specific patterns of disorders cooccur. Identifying mental disorder risk profiles is an essential next step for research in this population segment, as colleges are quickly pivoting from *identifying* widespread disorders to *intervening* (e.g., Harrer et al., 2018). Somewhat paradoxically, most approaches to treatment hinge on a singular diagnosis (e.g., presence of depression or anxiety), but given that comorbidity is commonplace, developing transdiagnostic interventions that target specific profiles may prove crucial in curbing escalating rates of mental disorders (Auerbach et al., 2016; Auerbach et al., 2018) and STBs (Mortier, Cuijpers et al., 2018) in college students.

The current report includes data from the first phase of the World Health Organization (WHO) World Mental Health International College Student (WMH-ICS) initiative in which baseline surveys were completed by first year college students from 19 colleges across eight countries. In prior publications, we detailed the lifetime and 12-month prevalence of mental disorders (Auerbach et al., 2018) and STBs (Mortier et al., 2018) and, more recently, highlighted role impairment associated with internalizing and externalizing mental disorders (Alonso et al., 2018). Building on this research, our current aim was to assess 12-month psychiatric comorbidity by using a latent class analytic approach. In doing so, the goal was to identify multivariate disorder risk profiles (i.e., clarify patterns of cooccurring disorders) and, then, test whether these profiles were associated with sociodemographic and college-related factors and 12-month STBs.

2 | METHOD

2.1 | Samples

The first wave of WMH-ICS surveys was administered to first year students in a convenience sample of 19 colleges and universities

TABLE 1 World Mental Health International College Student sample characteristics

Country	Number of participating universities	Total size of the universities	Number of incoming freshmen eligible	Number of incoming freshmen participated	Response rate (%)	Survey field dates	Sampling and procedures
Australia	One public	~45,000	9,042	633	7.0	2016	All incoming freshmen were invited to participate through email. Five reminder emails were sent with personalized links to the survey. Conditional incentives were applied (movie passes).
Belgium	One public	~40,000	8,530	4,580	53.7	2014–2016	All incoming freshmen were invited for a psycho-medical check-up in the student mental health center. Surveys were completed in the waiting room. Students who did not show up for the psycho-medical check-up received up to eight reminder emails. Conditional incentives were applied (store credit coupons).
Germany	One public	~40,000	5,064	677	13.4	2016–2017	All incoming freshmen were invited to participate through email. Six reminder emails were sent with personalized links to the survey. Conditional incentives were applied (store credit coupons).
Mexico	Four private/two public	~28,000	5,293	4,199	79.3	2016	All incoming freshmen were eligible for the survey. Initial contact differed by university: survey included in an obligatory health evaluation (one university), as part of obligatory group tutoring sessions (one university), or as part of required classes (two universities) or teacher evaluations (two universities). Two universities sent reminder emails (tutors sent out emails to their tutees; in a required class of personal development, reminders were sent out by faculty). No incentives were applied.
Northern Ireland	One public	~25,000	4,359	739	17.0	2015	All incoming freshmen due to register were invited to participate. Following registration, ID numbers and links to the survey were provided. Five reminder emails/text messages were sent with personalized links to the survey. A sixth reminder involved a researcher telephoning nonresponders. All responders were entered into a number of draws to win an iPad.
South Africa	One public	~30,000	5,338	686	12.9	2015	All incoming freshmen were invited to participate through email. Eight reminder emails and one text message were sent with personalized links to the survey. Conditional incentives were applied (5× R1000 draw).
Spain	Five public	~96,000	16,332	2,118	13.0	2014–2015	All incoming freshmen were eligible for the survey. Initial contact differed by university (information stands, information sessions in classrooms, through the university's website). Four reminder emails were sent with personalized links to the survey. Conditional monetary incentives were applied. Additionally, an end-game strategy was implemented by selecting a random proportion of nonrespondents and offering all of them a monetary incentive.
United States	Three private	~21,800	4,382	739	16.9	2015–2016	All incoming freshmen were invited to participate through email. Three reminder emails were sent with personalized links to the survey. Conditional incentives were applied (gift cards).
Total	12 public/seven private	~326,000	58,340	14,371	45.5*	2014–2017	

*Indicates the weighted response rate.

(henceforth referred to as "colleges") in eight middle- to high-income countries (Australia, Belgium, Germany, Mexico, Northern Ireland, South Africa, Spain, and the United States). Procedures for obtaining informed consent and protecting human participants were approved and monitored for compliance by the institutional review boards of the organizations coordinating the surveys in each country. Details about ethics approval for the WHO WMH-ICS Initiative countries is available in this link: http://www.hcp.med.harvard.edu/wmh/ftpdir/IRB_EthicsApproval_WMH-ICS.pdf. Web-based self-administered questionnaires (SAQs) were administered to incoming first year students in each participating college (seven private and 12 public) between October 2014 and February 2017 (see Table 1).

As noted in a prior report on this survey (Auerbach et al., 2018), 14,371 SAQs were completed, with sample sizes ranging from a low of 633 in Australia to a high of 4,580 in Belgium and response rates ranging from a low of 7.0% in Australia to a high of 79.3% in Mexico. The weighted (by achieved sample size) mean response rate across all surveys was 45.5%. The analyses reported here are based on the 14,348 respondents for whom poststratification weights could be computed.

2.2 | Procedures

All incoming first year students in the participating colleges were invited to participate in the web-based self-report health survey. Mode of contact varied widely across colleges, but in all cases, other than in Mexico, it consisted of an approach that attempted to recruit 100% of incoming first year students either as part of a health evaluation, as part of the registration process, or in a stand-alone survey administered to students via their student email addresses. Contact with initial nonrespondents were then made through a series of personalized reminder emails. Incentives such as a raffle for store credit coupons or movie passes were used in the final stages of recruitment in 10 of these colleges. An additional "end-game" strategy was used in Spain by selecting a random sample of nonrespondents at the end of the normal recruitment period to receive a financial incentive for one last chance at participation, with respondents recruited at that final phase given a weight equal to the inverse of their probability of selection to adjust for the undersampling of these hard-to-recruit students. The sampling scheme was quite different in Mexico, where 100% of entering first year students were invited to participate in the survey in conjunction with mandatory activities that varied from college to college, such as student health evaluations and tutoring sessions, with time set aside in these sessions for completing the surveys via computers or tablets handed out to students attending the sessions. No follow up of nonrespondents was carried out in Mexico because it was felt that students who failed to complete the survey when time was set aside for it during mandatory activities were firm nonrespondents. Informed consent was obtained before administering the SAQs in all countries. The text statement used to obtain informed consent varied across schools and was approved by the institutional review boards of the organizations coordinating the surveys in each country.

2.3 | Measures

The SAQ was developed in English and translated into local languages using a translation, back-translation, and harmonization protocol that expanded on the standard WHO protocol using methods developed by cross-national survey methodologists to maximize cross-national equivalence of meaning and consistency of measurement (Harkness et al., 2008).

2.3.1 | Mental disorders

The SAQ included short validated self-report screening scales for lifetime and 12-month prevalence of seven common *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-IV mental disorders. These included four internalizing disorders (major depressive episode, mania/hypomania, generalized anxiety disorder, and panic disorder) and three externalizing disorders (attention-deficit/hyperactivity disorder, alcohol abuse or dependence, and drug abuse or dependence involving either cannabis, cocaine, any other street drug, or a prescription drug either used without a prescription or used more than prescribed to get high, buzzed, or numbed out). This is a larger set of disorders than used in previous college mental health surveys, most of which either focused only on depression (for a review, see Ibrahim, Kelly, Adams, & Glazebrook, 2013) or included only screening scales of current anxious and depressive symptoms (Mahmoud, Staten, Hall, & Lennie, 2012). Although a larger set of disorders is used in the face-to-face WMH surveys (Scott, Jonge, Stein, & Kessler, 2018), the need for a brief measure prevented the administration of student surveys that would be long enough to include all those disorders. The seven disorders in the core WMH-ICS surveys were a compromise that included the disorders associated with the highest levels of role impairment among college students in the WMH surveys (Auerbach et al., 2016). As an indication of the coverage of these disorders, 83% (unweighted) of the college students in the WMH surveys who reported suicidal ideation in the 12 months before interview met criteria for one or more of these seven disorders during that same time period.

The assessments of five of the seven disorders were based on the Composite International Diagnostic Interview Screening Scales (CIDI-SC; Kessler et al., 2013; Kessler & Ustun, 2004). The exceptions were the screen for alcohol use disorder, which was based on the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), and the screen for attention-deficit hyperactivity disorder (ADHD), which was based on DSM-IV version of the WHO Adult ADHD Self-Report Scale (Kessler et al., 2005). The CIDI-SC scales have been shown to have good concordance with blinded clinical diagnoses based on the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 1994), with area under the curve (AUC) in the range 0.70–0.78 (Kessler et al., 2013; Kessler, Calabrese, et al., 2013). However, validation studies have not yet been carried out in samples of college students. The version of the AUDIT we used, which defined alcohol use disorder as either a total score of 16+ or a score 8–15 with 4+ on the AUDIT dependence questions (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), has been shown to have concordance with clinical diagnoses in the range AUC = 0.78–0.91 (Reinert & Allen, 2002). Additional

items taken from the CIDI (Kessler & Ustun, 2004) were used to assess age-of-onset of each disorder and number of lifetime years with symptoms. The DSM-IV version of the WHO Adult ADHD Self-Report Scale was found to have good concordance with blinded clinical diagnoses based on a standard research diagnostic interview for adult ADHD in two separate clinical studies (Kessler, Adler, et al., 2005; Kessler et al., 2007).

In addition to assessing lifetime prevalence of all the above disorders other than ADHD, brief screening assessments were made for lifetime prevalence of binge-eating disorder, intermittent explosive disorder, and post-traumatic stress disorder. A more thorough assessment would have also asked about 12-month prevalence of these disorders but that was not done in this initial round of the WMH-ICS surveys. This omission has been corrected in the more recent version of the survey that is currently being administered. For the purposes of the analyses reported here, these disorders were coded as lifetime but not 12-month disorders even though it is almost certainly the case that at least some of these disorders were active in the 12 months before interview. The inclusion of these disorders in the current analysis accounts for discrepancies in the proportion of students who are estimated to have lifetime disorders compared with the proportion presented in an earlier report (Auerbach et al., 2018).

2.3.2 | Suicidal thoughts and behaviors

As described in an earlier report from this survey (Mortier, Auerbach, et al., 2018), a modified version of the Columbia Suicidal Severity Rating Scale (Posner et al., 2011) was used to assess STBs, including suicidal ideation and suicide attempts (SA). In addition to lifetime prevalence, respondents were asked about number of months in the past 12 months with suicide ideation (SI) and about presence of a SA in the past 12 months.

2.3.3 | Sociodemographic correlates

Several basic sociodemographic variables were included in the survey. Gender was assessed by asking respondents whether they identified themselves as male, female, transgender (male-to-female, female-to-male), or "other." Respondent age was divided into four categories (16–18, 19, 20–21, 22 or more years old). Parental educational level was assessed for father and mother separately (none, elementary, secondary, some postsecondary, college graduate, and doctoral degree) and was categorized into high (college graduate or more), medium (some postsecondary education), and low (secondary school or less) based on the higher-of-both parents' educational level. Parental marital status was dichotomized into "parents married and both alive" versus "parents either not married or at least one deceased." Respondents were asked about the urbanicity of the place they were raised (large city, small city, town or village, suburbs, and rural area) and their religious background (categorized into Christian, other religion, and no religion). Sexual orientation was classified into heterosexual, gay or lesbian, bisexual, asexual, not sure, and other. Additional questions were asked about the extent to which respondents were attracted to men and women and the gender(s) of people they had sex with (if any) in the past 5 years. Respondents were categorized into the following categories: heterosexual with no same-sex attraction, heterosexual with same-sex attraction, nonheterosexual without same-sex sexual intercourse, and nonheterosexual with same-sex sexual intercourse.

2.3.4 | College-related correlates

Respondents were asked where they ranked academically compared with other students at the time of their high school graduation (from top 5% to bottom 10%; categorized into quartiles) and what their most important reason was to go to university. Based on the results of a tetrachoric factor analysis reported elsewhere (Auerbach et al., 2018), respondents were classified into those whose most important reasons to go to university were extrinsic (i.e., family wanted me to, my friends were going, teachers advised me to, and did not want to get a job right away) versus intrinsic (to achieve a degree, I enjoy learning and studying, to study a subject that really interests me, to improve job prospects generally, and to train for specific type of job). Respondents were also asked where they were living during the first semester of the academic year (parents', other relative's, or own home, college hall of residence, shared house, apartment, or flat/private hall of residence, and other), and if they expected to work during the school year.

2.4 | Analysis methods

2.4.1 | Weighting

We noted above that an "end-game" strategy was used in Spain in which a random sample of nonrespondents at the end of the normal recruitment period was offered a financial incentive for participation. Respondents in this end-phase were given a weight equal to 1/p, where p represented the proportion of nonrespondents at the end of the normal recruitment period included in the end-game, to adjust for the undersampling of these hard-to-recruit respondents. In addition, in an effort to make the WMH-ICS sample in each college as representative as possible of all first year students, the surveys were poststratified by weighting the data to adjust for differences between survey respondents and nonrespondents on sociodemographic information made available about the student body by college officials. Standard methods for poststratification weighting were used for this purpose (Groves & Couper, 1998). In the case of the Spanish survey, this meant that the data were doubly weighted, one to include the end-game weight and then with the poststratification weight applied to those weighted data. Each country was given an equal sum of weights, with the total sum of weights across countries set at 14,348.

Item-level missing data in the completed surveys were imputed using the method of multiple imputation by chained equations (van Buuren, 2012). Four kinds of item-missing data were imputed simultaneously in this way. The first was a 50% random subsampling of the drug use section to reduce interview length in Belgium. The second was the complete absence of the panic disorder section due to a skip logic error in Mexico, Northern Ireland, and South Africa. The third was the complete absence of some sociodemographic variables in various colleges (sexual orientation, current living situation,

expected student job, and most important reason for going to college in Australia, Belgium, and South Africa; parent education and marital status in Australia and Belgium; religion in Australia; and self-reported high school ranking in Belgium) because of a decision not to assess those variables. The fourth was item-level skips or invalid responses to individual questions throughout the survey. The latter was less than 0.1% for lifetime disorders, 0.0–2.3% for 12-month disorders other than AUD, and in the range 3.0–9.3% (3.8–7.0% interquartile range) for AUD, 0.0–12.0% (interquartile range 1.9–2.7%) for disorder age-of-onset, 0.0–24.6% (interquartile range 2.4–8.8%) for disorder persistence, 1.8–25.4% (interquartile range 8.8–24.1%) for most important reasons for attending college, 1.0–10.8% (interquartile range 3.0–3.4%) for high school ranking, and 0.0–7.0% for the other sociodemographic and college-related variables.

2.4.2 | Substantive analyses

Latent class analysis (LCA; Magidson & Vermunt, 2004) was used to examine multivariate profiles among the seven 12-month DSM-IV disorders. Mplus software was used to estimate the models (Muthén & Muthén, 2012). LCA is a person-centered approach to define associations among discrete variables. LCA assumes the existence of two or more distinct unobserved classes of individuals that differ in prevalence of disorders, where presence versus absence of individual disorders is independent across disorders within classes and each person has a probability of class membership that sums to 1.0 within individuals across classes. Analysis consists of simultaneously estimating the vector of class membership probabilities associated with each observed multivariate disorder profile and prevalence of each disorder in each latent class for a fixed number of classes. A standard measure of model fit, the Lo–Mendell–Rubin adjusted likelihood ratio test with *p*-value of 0.05, was used to select a best model from among those estimated with different assumed numbers of latent classes. Once a final model is selected, survey respondents with a given disorder profile can be assigned to the class with the highest probability of membership for purposes of subsequent analysis.

Once we defined and interpreted the latent classes, SAS version 9.4 (SAS Institute Inc., 2010) was used to examine associations of LCA classes with both 12-month sociodemographic variables and 12-month STBs using logistic regression analysis. Area under the receiver operating characteristic curve was calculated to characterize the strength of these associations. The LCA classes were treated as the outcomes in a multinomial logistic regression analysis of sociodemographic predictors. The LCA classes were then treated as the predictors in logistic regression analyses to predict STBs. The extent to which the LCA classes captured the multivariate associations of the seven disorders with STBs was then examined by estimating models that included disorders, classes, and both as predictors of STBs and comparing AUCs across models. Logistic regression coefficients and their 95% confidence intervals (CIs) were exponentiated to create odds ratios (ORs) and associated 95% CIs to facilitate interpretation. All results were pooled across countries. Due to the variable within-country sample sizes, no attempt was made to search for variation in associations across countries.

Statistical significance of individual coefficients was evaluated consistently using two-sided tests with multiple imputation significance level α set at 0.05. But another issue can be raised about the possibility that the significance of some individual predictors was due to chance in the analysis of such a large number of predictors. Our main concern about this issue focused on the LCA classes, as our previous research has documented global significance of sociodemographic variables predicting mental disorders (Auerbach et al., 2018) and mental disorders predicting STBs (Mortier, Auerbach, et al., 2018). We address the concern by reporting global significance tests for the associations of the LCA classes as a set with STBs controlling for the component mental disorders.

3 | RESULTS

3.1 | Sociodemographic distribution of the sample

Sociodemographic information is summarized in Table 2. The majority of respondents (54.8%) were female. Most of the others were male (44.7%), and the small remaining number defined themselves as either transgender or "other" (0.5%). Most respondents were 16–18 years of age (51.1%), and the vast majority (96.5%) were full-time students.

3.2 | Latent class analysis

Prevalence of at least one 12-month disorder was 38.4% in the pooled cross-national analysis that weighted each country to have equal representation in the sample. This is somewhat different from the prevalence found in an earlier analysis in which we did not include ADHD diagnoses and excluded part-time and transgender students (Auerbach et al., 2018). The LCA found that a four-class solution provided the best fit to the data (Table S1). All students in three of the four classes met criteria for at least one 12-month disorder, whereas the largest class included both respondents with exactly one disorder or no 12-month disorders. We separated these two groups in our analysis and also distinguished between respondents with no 12-month disorders depending on whether or not they met criteria for any lifetime disorder, resulting in a total of six classes being included in the analysis.

By far the smallest of these classes was Class 1 (C1; Figure 1). The 1.9% of respondents in C1 all met criteria for four or more 12-month disorders, the vast majority of them including mania/hypomania (77.9%). All had at least one internalizing disorder (especially major depression disorder and generalized anxiety disorder) and virtually all (95.2%) had either substance use disorder and/or ADHD. The next smallest class was C2. Nearly all the respondents in C2 (5.8% of respondents) met criteria for either two (72.0%), three (21.3%), or more (6.0%) 12-month disorders. The most striking differences between C2 and C1 were that respondents in C2 had much lower prevalence of mania/hypomania (14.7% vs. 77.9%) and anxiety disorders (6.8–12.8% vs. 49.3–98.3%) than respondents in C1. Prevalence of at least one externalizing disorder (i.e., substance use disorder or ADHD), in comparison, was relatively similar in C1 (94.8%) and C2 (95.2%).

TABLE 2 The sociodemographic distribution of the pooled cross-national sample (n = 14,348)

Category	%	(*SE*)
Gender		
Male	44.7	(0.6)
Female	54.8	(0.6)
Trans, other	0.5	(0.1)
Age (in years)		
16–18	51.1	(0.6)
19	25.8	(0.6)
20–21	12.2	(0.4)
22+	10.9	(0.4)
Enrollment status		
Full-time	96.5	(0.2)
Part-time, nondegree, other, or missing student status	3.5	(0.2)
Parental education		
College graduate	57.1	(0.7)
Some postsecondary education	24.2	(0.6)
No postsecondary education	18.7	(0.5)
Parental marital intactness		
Both alive and married to each other	73.8	(0.6)
Either deceased or not married to each other	26.2	(0.6)
Place raised		
Large city	26.7	(0.6)
Small city	27.9	(0.6)
Suburbs	17.1	(0.6)
Town/village	20.7	(0.6)
Rural area	7.6	(0.4)
Religion		
Christian	61.7	(0.7)
Another religion	7.4	(0.4)
No religion	30.9	(0.6)
Sexual orientation		
Heterosexual without same-sex attraction	72.4	(0.6)
Heterosexual with same-sex attraction	14.1	(0.4)
Nonheterosexual without same-sex sexual intercourse	8.1	(0.4)
Nonheterosexual with same-sex sexual intercourse	5.4	(0.3)
Current living situation		
Parents or other relative or own home	56.4	(0.7)
University or college hall of residence	27.5	(0.7)
Shared house or apartment/flat	11.1	(0.4)
Private hall of residence	3.3	(0.3)
Other	1.7	(0.2)
Expected to work a student job		
Yes	72.7	(0.6)
No or unsure	27.3	(0.6)
Self-reported ranking in high school		
Top 5%	24.7	(0.6)
Top 6–10%	22.3	(0.6)
Top 11–30%	30.1	(0.6)
Bottom 70%	22.9	(0.6)
Most important reason to go to college		
Intrinsic	89.5	(0.6)
Extrinsic	10.5	(0.4)

Note. The data are weighted so that each country has an equal weight.

C3 was considerably more prevalent (14.6% of respondents) than C1 or C2. All C3 respondents met criteria for at least one 12-month disorder and 77.0% met criteria for two or more disorders. All C3 respondents met criteria for at least one internalizing disorder and a much smaller proportion (42.1%) met criteria for either alcohol use disorder (37.7%) or ADHD (6.9%). None of the C3 respondents met criteria for drug use disorder. The remaining respondents met criteria for either only one (16.1%) or none (61.6%) of the 12-month disorders assessed in the survey. We defined C4 for purposes of analysis as consisting exclusively of students who met criteria for only one disorder. By far the most common disorders in C4 were ADHD (40.3%) and major depression disorder (32.8%). It is noteworthy that the original C4 respondents without any 12-month disorders included roughly equal numbers with a lifetime history of at least one remitted DSM-IV disorder (C5; 29.2% of the total sample) and no lifetime history of any of the DSM-IV disorders assessed in the survey (C6; 32.4% of the total sample). (See Table S2 for a more detailed description of precise prevalence estimates of individual disorders within classes.)

3.3 | Sociodemographic correlates of latent class membership

A number of sociodemographic variables were significant correlates of being in C1, the high comorbidity class (vs. being in C6, the no lifetime disorder class), in a multivariate model that included all these predictors (Table 3). The highest ORs were associated with nonheterosexual orientation either with (OR = 14.5) or without (OR = 16.5) same-sex intercourse (compared with heterosexual without same-sex attraction) and self-identifying as transgender/other gender (OR = 12.6; compared with male). Other significant correlates included being female (OR = 1.6; compared with male), ages 20–21 or 22+ (OR = 2.5–3.2; compared with 16–18), parents either not married or deceased (OR = 2.1), heterosexual with some same-sex attraction (OR = 4.0; compared with no same-sex attraction), not graduating in the top 5% of one's high school class (OR = 2.0–3.5; strongest for the lowest class ranking), and having primary extrinsic reasons for attending college (OR = 2.4). The AUC of a multivariable model with all sociodemographic predictors and country dummies was 0.89. The 10% of respondents with the highest predicted probabilities of being in C1 in that model accounted for 56.4% of all C1 cases.

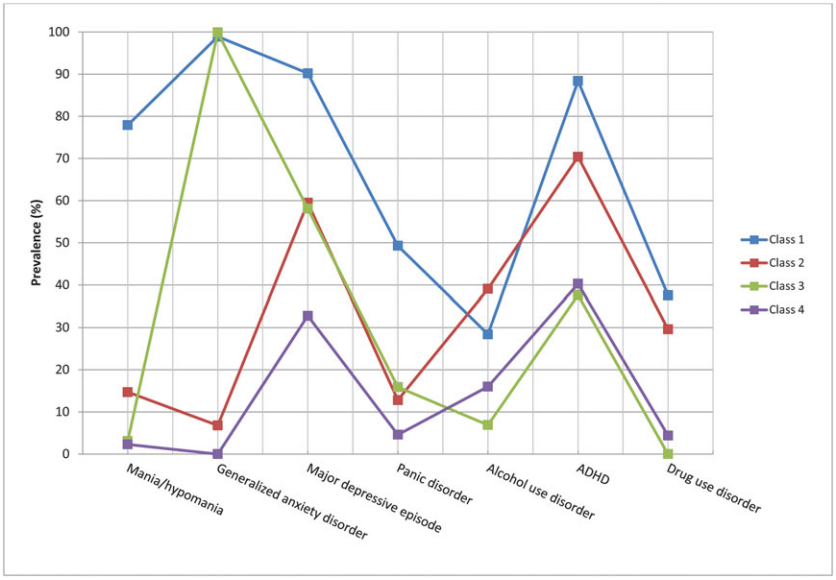

FIGURE 1 Prevalence of disorders within each latent class. ADHD: attention-deficit/hyperactive disorder

As with C1, the strongest sociodemographic correlates of being in C2, the comorbid class characterized by higher prevalence of externalizing than internalizing disorders, were nonheterosexual orientation either with (OR = 8.2) or without (OR = 4.5) same-sex intercourse (compared with heterosexual without same-sex attraction). There was one fewer significant correlate of C2 than C1 and the ORs were less pronounced. These correlates included being male (i.e., significantly reduced relative-odds associated with being female; OR = 0.8), ages 20–21 and 22+ (OR = 1.5–2.1; compared with ages 16–18, weaker effect for ages 22+), parents not both alive and married (OR = 1.6), low parental education (OR = 0.7; compared with high parental education), living in a college residence hall (OR = 1.4; compared with living with parents), no religion (OR = 1.5), heterosexual orientation with some same-sex attraction (OR = 2.8; compared with heterosexual without same-sex attraction), and graduating outside the top 10% of one's high school (OR = 1.7–2.5; compared with being in the top 5% of the class). The AUC of a multivariate model with all sociodemographic predictors of C2 versus C6 was 0.76. The 10% of respondents with highest predicted probabilities of being in C2 in that model accounted for 33.2% of all C2 cases.

The sociodemographic correlates of being in C3, the class associated with lower comorbidity and a much higher prevalence of internalizing than externalizing disorders, and C4, the class with pure 12-month disorders, were strikingly similar to those of C2. The correlates of C3 differed from those of C2 only in including self-identification as transgender/other (OR = 10.0) compared with male, non-Christian (OR = 1.4), and lowest 70% of high school class ranking (OR = 1.4) rather than the two lowest levels in C2, and having generally somewhat weaker ORs with the other correlates than in the prediction of C2. The AUC of a multivariate model with all sociodemographic predictors of C3 versus C6 was 0.75. The 10% of respondents with highest predicted probabilities of being in C3 accounted for 23.6% of all C3 cases.

The correlates of C4 differ from those of C2 only in including self-identification of transgender/other (OR = 3.8; compared with male), age 19 (OR = 1.2), non-Christian religion (OR = 1.8; compared with Christian religion), and residence in group housing (OR = 1.3 compared with living with parents). The significant ORs of sociodemographics with C4 were generally somewhat weaker than those with C3. The AUC of a multivariate model with all sociodemographic predictors of C4 versus C6 was 0.66. The 10% of respondents with highest predicted probabilities of being in C4 in that model accounted for 17.7% of all C4 cases.

The sociodemographic correlates of being in C5, the class associated with one or more lifetime disorders but no 12-month disorders, finally, were the weakest and most inconsistent of all, although with an overall pattern of significance similar to C2–C3 in that ORs were significantly elevated among respondents older than 19 (OR = 1.2–1.6), with parents not both alive and married (OR = 1.3), non-Christian religion (OR = 1.6), nonheterosexual orientation (OR = 1.4–1.7), and having been in the two lowest levels of high school class ranking (OR = 1.2–1.3). The AUC of a multivariate model with all sociodemographic predictors of C5 versus C6 was 0.62. The 10% of respondents with highest predicted probabilities of being in C5 in that model accounted for 13.6% of all C5 cases.

3.4 | Associations of latent classes with 12-month STBs

Pooled cross-national 12-month prevalence of STBs was 17.6% for SI, 9.2% for suicide plan (SP), and 1.1% for SA when the sample was weighted to give equal representation to each country. As shown in an earlier report from this survey (Mortier, Auerbach, et al., 2018), these pooled estimates were somewhat different because of the exclusion of ADHD as a diagnosis, part-time students, and transgender students. A generally monotonic association was found between complexity of comorbidity and prevalence of 12-month STBs across the 12-month LCA classes (Table 4). C1 had by far the highest prevalence of SI (68.6% vs. 17.6% in the total sample), SP (51.5% vs. 9.2% in the total sample), and SA (15.4% vs. 1.1% in the total sample). Prevalence was lower and roughly equal in C2–C3 and successively lower in classes C4, C5, and C6. It is noteworthy that the differences in STB risk across LCA classes differed for SP and SA compared with SI, a

TABLE 3 Associations of sociodemographic and college-related variables predicting 12-month LCA class membership

			Class 1		Class 2		Class 3		Class 4		Class 5	
Correlates	**%**	**(*SE*)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Gender												
Male	44.7	(0.6)										
Female	54.8	(0.6)	1.6*	(1.1, 2.3)	0.8*	(0.7, 1.0)	2.6*	(2.3, 3.0)	0.9	(0.8, 1.1)	1.1*	(1.0, 1.2)
Trans, other	0.5	(0.1)	12.6*	(1.7, 91.4)	2.0	(0.4, 9.7)	10.0*	(4.0, 25.0)	3.8*	(1.5, 9.5)	1.4	(0.5, 3.7)
F_2			5.4*		2.7		108.1*		4.4*		2.4	
Age												
16–18	51.1	(0.6)										
19	25.8	(0.6)	1.2	(0.7, 1.9)	1.2	(0.9, 1.5)	1.1	(0.9, 1.2)	1.2*	(1.0, 1.4)	1.1	(1.0, 1.2)
20–21	12.2	(0.4)	2.5*	(1.4, 4.3)	2.1*	(1.6, 2.8)	1.4*	(1.2, 1.8)	1.2	(1.0, 1.4)	1.2*	(1.0, 1.4)
22+	10.9	(0.4)	3.2*	(1.8, 5.6)	1.5*	(1.1, 2.2)	1.2	(1.0, 1.6)	1.4*	(1.1, 1.8)	1.6*	(1.3, 1.9)
F_3			7.0*		8.1*		4.5*		3.9*		9.0*	
Enrollment status												
Part-time, nondegree, other, or missing student status	3.5	(0.2)	0.8	(0.3, 2.3)	2.4*	(1.5, 4.0)	1.2	(0.8, 1.7)	1.4	(1.0, 1.9)	1.1	(0.8, 1.5)
Parental education												
College graduate	57.1	(0.7)										
Some postsecondary education	24.2	(0.6)	1.2	(0.7, 2.0)	1.1	(0.9, 1.4)	1.0	(0.8, 1.2)	0.9	(0.8, 1.1)	1.0	(0.8, 1.1)
No postsecondary education	18.7	(0.5)	0.8	(0.4, 1.6)	0.7*	(0.5, 0.9)	0.9	(0.8, 1.1)	0.9	(0.7, 1.1)	0.9	(0.7, 1.0)
F_2			0.5		4.5*		0.2		0.8		1.8	
Either deceased or not married to each other	26.2	(0.6)	2.1*	(1.3, 3.5)	1.6*	(1.3, 2.1)	1.5*	(1.3, 1.8)	1.4*	(1.2, 1.6)	1.2*	(1.1, 1.4)
Place raised												
Large city	26.7	(0.6)										
Small city	27.9	(0.6)	0.7	(0.3, 1.3)	0.9	(0.7, 1.2)	1.0	(0.8, 1.2)	0.9	(0.7, 1.1)	1.0	(0.8, 1.1)
Town/village	20.7	(0.6)	1.2	(0.6, 2.2)	1.0	(0.7, 1.4)	1.1	(0.9, 1.3)	1.0	(0.8, 1.2)	1.1	(0.9, 1.3)
Suburbs	17.1	(0.6)	1.6	(0.8, 3.3)	1.2	(0.8, 1.6)	1.2	(1.0, 1.5)	0.9	(0.7, 1.1)	0.8	(0.7, 1.0)
Rural area	7.6	(0.4)	1.7	(0.7, 3.9)	1.0	(0.7, 1.6)	1.1	(0.8, 1.4)	0.9	(0.7, 1.2)	0.9	(0.7, 1.2)
F_4			2.1		0.5		0.9		0.4		1.5	
Religion												
Christian	61.7	(0.7)										
No religion	30.9	(0.7)	1.5	(0.9, 2.6)	1.5*	(1.2, 2.0)	1.4*	(1.2, 1.7)	1.3*	(1.1, 1.5)	1.1	(1.0, 1.3)
Another religion	7.4	(0.4)	2.3	(0.9, 5.6)	1.6	(1.0, 2.4)	1.6*	(1.2, 2.1)	1.8*	(1.4, 2.5)	1.6*	(1.2, 2.1)
F_2			2.0		5.5*		12.1*		12.0*		6.8*	
Sexual orientation												
Heterosexual: no same-sex attraction	72.4	(0.6)										
Heterosexual: some same-sex attraction	14.1	(0.4)	4.0*	(2.2, 7.4)	2.8*	(2.0, 3.9)	2.5*	(2.0, 3.0)	1.9*	(1.6, 2.3)	1.4*	(1.2, 1.7)
Nonheterosexual without same-sex sexual intercourse	8.1	(0.4)	16.5*	(7.8, 34.8)	4.5*	(2.8, 7.3)	3.8*	(2.8, 5.2)	2.9*	(2.2, 3.8)	1.6*	(1.2, 2.0)
Nonheterosexual with same-sex sexual intercourse	5.4	(0.3)	14.5*	(5.5, 38.3)	8.2*	(5.5, 12.4)	4.7*	(3.1, 7.2)	3.1*	(2.0, 4.7)	1.7*	(1.2, 2.5)
F_3			26.5*		40.1*		51.9*		32.4*		9.4*	
Current living situation												
Parents or other relative or own home	56.4	(0.7)										
University or college hall of residence	27.5	(0.7)	1.1	(0.5, 2.4)	1.4*	(1.0, 2.0)	1.0	(0.7, 1.3)	1.4*	(1.1, 1.7)	0.9	(0.8, 1.1)
Shared house or apartment/flat	11.1	(0.4)	1.5	(0.7, 3.3)	1.2	(0.9, 1.7)	0.9	(0.6, 1.2)	1.3*	(1.0, 1.6)	1.1	(0.9, 1.3)
Private hall of residence	3.3	(0.3)	1.8	(0.6, 5.4)	1.6	(0.8, 3.1)	0.9	(0.6, 1.5)	1.5	(1.0, 2.4)	1.0	(0.7, 1.5)
Other	1.7	(0.2)	0.5	(0.0, 6.3)	0.8	(0.3, 2.2)	0.5	(0.2, 1.1)	1.2	(0.6, 2.2)	1.4	(0.9, 2.1)
F_4			0.5		1.6		0.9		3.1*		9.4*	
Expected to work a student job	72.7	(0.6)	1.1	(0.6, 1.9)	1.1	(0.8, 1.4)	0.9	(0.8, 1.1)	1.0	(0.8, 1.2)	1.0	(0.9, 1.2)
Self-reported ranking in high school												
Top 5%	24.7	(0.6)										

(Continues)

TABLE 3 (Continued)

	Class 1				Class 2		Class 3		Class 4		Class 5	
Correlates	**%**	**(*SE*)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Top 6–10%	22.3	(0.6)	2.0*	(1.0, 3.9)	1.1	(0.8, 1.5)	1.2	(1.0, 1.4)	1.1	(0.9, 1.3)	1.1	(0.9, 1.2)
Top 11–30%	30.1	(0.6)	2.1*	(1.1, 4.1)	1.7*	(1.4, 2.2)	1.0	(0.9, 1.2)	1.5*	(1.3, 1.8)	1.5*	(1.1, 1.4)
Bottom 70%	22.9	(0.6)	3.5*	(1.8, 6.7)	2.5*	(1.9, 3.3)	1.4*	(1.1, 1.7)	1.7*	(1.4, 2.0)	1.2*	(1.1, 1.4)
F_3			5.1*		16.1*		4.7*		15.3*		4.7*	
Most important reason to go to college extrinsic	10.5	(0.4)	2.4*	(1.2, 5.0)	1.2	(0.9, 1.8)	1.4*	(1.1, 1.9)	1.2	(1.0, 1.6)	1.2	(1.0, 1.4)
(*n*)	(14,348)		(5,195)		(5,697)		(6,761)		(7,233)		(9,546)	

Note. LCA: latent class analysis. Class 6 is the outcome contrast for all odds ratios (ORs), where ORs are compared with the omitted Class 6, where Class 1 = high comorbidity; Class 2 = other internalizing-externalizing comorbidity; Class 3 = primarily internalizing comorbidity; Class 4 = pure disorders; Class 5 = no 12-month disorders with a lifetime history of at least one disorder; Class 6 = no lifetime disorders.

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

pattern that can be seen by inspecting the ORs in Table 4. Sociodemographics are not controlled in estimating these models. Results are especially striking for C1, where the OR relative to C6 increased from 43.3 in predicting SI to 61.6 for SP and to 175.5 for SA. This increase for C1 can be seen even in comparison with the classes with the next highest risks, C2–C3, where the ratio of ORs is roughly 3:1 for SI (i.e., 43.3 vs. 14.6–13.7) and SP (i.e., 61.6 vs. 21.1–23.1) but becomes 6–10:1 for SA (i.e., 175.5 vs. 17.7–25.4). An analysis of between-class differences in SA among respondents with SI (SA/SI) controlling for SP (detailed results not reported but available on request) shows that C1 had an elevated relative-odds (OR = 6.4; vs. C6) but that the ORs of C2–C5 were not significantly different from C6.

3.5 | The joint associations of classes and disorders with STBs

It is noteworthy that the AUCs of the models in which LCA classes predicted 12-month STBs (0.75–0.87) were roughly comparable with those of the models in which the disorders underlying the classes predicting the same outcomes (0.74–0.89; Table 5). The AUCs increased slightly, though, in most of the models that added disorders to the classes to predict the same outcomes (0.76–0.89). This indicates that disorders might predict within-class differences in STBs. We explored this possibility initially by investigating the extent to which disorders interacted with classes in predicting STBs. None of these interactions were statistically significant.

On the basis of this result, we used stepwise logistic analysis to determine which disorders were significant predictors in overall models that controlled for classes. These associations were much less pronounced for SA than for SI or SP (Table 6). Five disorders were significant in the SI model, four in the SP model, two in the SA model, and only one in the SA/SI model. All 12 of these ORs were positive (in the range 1.3–5.2). The most consistently significant ORs were associated with mania/hypomania (in three of four models; OR = 1.4–2.1) and generalized anxiety disorder (in all four models; OR = 2.2–5.2). The other disorders were significant only in predicting one outcome, either SI (major depressive disorder, ADHD, drug use disorder; OR = 1.3–4.7) or SP (panic disorder, alcohol use disorder; OR = 1.4).

Importantly, the latent classes were significant as a set in all four models. The 15 significant ORs in those models were all positive (in the range OR = 2.2–21.1). The ORs for all classes C1–C5 were roughly comparable in predicting SI (OR = 2.2–3.8), but the OR for CI has the highest in predicting both SP (OR = 8.4) and SA (OR = 21.1) as well as the only significant LCA predictor of SA/SI (OR = 7.3). The significant

TABLE 4 Associations of 12-month LCA classes predicting 12-month suicidal thoughts and behaviors

	Ideation				Plan				Attempt				Attempt/SI			
Class	**%**	**(*SE*)**	**OR**	**(95% CI)**	**%**	**(*SE*)**	**OR**	**(95% CI)**	**%**	**(*SE*)**	**OR**	**(95% CI)**	**%**	**(*SE*)**	**OR**	**(95% CI)**
Class 1	68.6*	(4.8)	43.3*	(31.4, 59.8)	51.5*	(5.1)	61.6*	(42.7, 88.8)	15.4*	(3.4)	175.5*	(54.6, 564.8)	22.5	(4.8)	13.7*	(4.2, 44.5)
Class 2	41.4*	(3.0)	14.6*	(11.5, 18.5)	26.2*	(2.7)	23.1*	(16.6, 32.1)	1.8*	(0.7)	17.7*	(5.0, 62.9)	4.2	(1.6)	2.2	(0.6, 7.7)
Class 3	40.0*	(1.6)	13.7*	(11.5, 16.3)	24.9*	(1.5)	21.1*	(15.9, 28.0)	2.6*	(0.5)	25.4*	(8.2, 78.5)	6.5	(1.3)	3.1	(1.0, 9.6)
Class 4	21.3*	(1.3)	5.8*	(4.8, 7.0)	9.9*	(1.0)	7.5*	(5.5, 10.2)	1.3*	(0.4)	13.2*	(4.1, 41.8)	5.9	(2.0)	3.3*	(1.0, 10.5)
Class 5	11.0*	(0.8)	2.7*	(2.3, 3.3)	3.5*	(0.4)	2.6*	(1.9, 3.6)	0.2	(0.1)	1.8	(0.4, 7.0)	1.5	(0.9)	0.7	(0.2, 2.7)
Class 6	4.4*	(0.5)			1.4*	(0.3)			0.1	(0.1)			2.3	(2.1)		
F_5			247.3*				174.9*				36.5*				10.4*	
Total	17.6*	(0.5)			9.2*	(0.4)			1.1*	(0.1)			6.0*	(0.7)		
(*n*)			(14,348)				(14,348)				(14,348)				(1,843)	

Note. LCA: latent class analysis; SI: suicide ideation. Unlike in Table 3, where the LCA classes are treated as the outcomes in the logistic regression analyses, the classes are treated here as predictors of 12-month suicidality. Prevalence estimates of suicidality are different from those reported by Mortier, Cuijpers et al., 2018 due to the slightly different sample composition.

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

TABLE 5 Area under the ROC curve of alternative models to predict 12-month suicide ideation, suicide plan, suicide attempt, and attempt among ideators

Predictors	Idea	Plan	Attempt	Attempt/SI
Classes	0.79	0.83	0.87	0.75
Disorders	0.79	0.85	0.89	0.74
Classes and disorders	0.81	0.85	0.89	0.76
(*n*)	(14,348)	(14,348)	(14,348)	(1,843)

Note. ROC: receiver operating characteristic; SI: suicide ideation. Pooling across all multiply imputed observations based on models that include dummy predictors for country.

OR for C5 was the lowest in predicting SP (OR = 2.7 vs. OR = 3.7–7.0 for C2–C4) and the only nonsignificant OR in predicting SA (compared with significant ORs = 4.7–7.5 for C2–C4). These significantly elevated ORs for class membership in models that also control underlying disorders are most plausibly interpreted as due to synergistic effects of comorbidity on STBs.

4 | DISCUSSION

The current report from the WHO WMH-ICS initiative provides results from first year college students in 19 colleges across eight countries. The unique contribution of this report is the documentation of the existence of four latent classes of students with multivariate disorder profiles across seven 12-month DSM-IV disorders. The smallest of these classes (1.9% of all students) was characterized by extremely high comorbidity. Two other comorbid classes were characterized, respectively, by primarily internalizing disorders (14.6%) and by a combination of internalizing and externalizing disorders (5.8%). These classes were found to be very strongly predictive of 12-month STBs. Although a number of disorders also predicted STBs, the ORs of the classes remained significantly elevated even after controlling for individual disorders. The latter result documents the existence of interactive predictive effects of the disorders in the classes.

Interestingly, we found a number of sociodemographic and college-related variables that had statistically significant associations with LCA class prevalence. Two prominent correlates of comorbidity included transgender students and sexual minority students (i.e., heterosexual students with some same-sex attraction and nonheterosexual students both with and without same-sexual intercourse). In our previous publication (Auerbach et al., 2018), these students reported high rates of mental disorders compared with other college students, which is unsurprising given that prior to arriving on college campus, many are subject to family rejection, bullying, and social isolation (Dean et al., 2000; Heatherington & Lavner, 2008). Further, once on college campus, these students are frequently marginalized and harassed (Rankin, 2003; Tetreault, Fette, Meidlinger, & Hope, 2013). Despite the greater incidence of mental disorders and comorbidity, transgender and sexual minority students are often less likely to utilize counseling services (e.g., Beemyn, Curtis, Davis, & Tubbs, 2005). Doubtlessly, college campuses have made painstaking efforts to be more inclusive of students with varied needs and backgrounds. That said, there remain critical institutional barriers to clinical care. Some transgender and sexual minority students continue to face insensitivity and discrimination from healthcare workers (e.g., Sperber, Landers, & Lawrence, 2005). And even well-intentioned counselors may feel that they lack the cultural competence or expertise to treat these students and, thus, do not take them on as patients (Shipherd, Green, & Abramovitz, 2010). Collectively, the current findings underscore the need for counseling centers to develop more diverse cultural competencies and outreach strategies to address patient populations that are presenting with escalating rates of mental disorders, the most complex psychiatric comorbidity, and the highest risk for STBs (Mortier, Cuijpers, et al., 2018).

Several important findings emerged in our analysis of the LCA–STB relationship. Notably, the ORs of the LCA classes in predicting STBs were higher for SP than SI and higher for SA than SP (but also were significant for SA/SI). This is quite different from the pattern found in the numerous previous studies that examined individual mental disorders as predictors of STBs, as the most highly elevated ORs on those studies were usually associated with SI, were successively weaker predicting SP and SA, and were usually nonsignificant predicting SA/SI (Kessler, Borges, & Walters, 1999; Nock et al., 2008; but see Nock, Hwang, Sampson, & Kessler, 2010). This kind of successively weaker prediction pattern was found for the individual mental disorders in the models that controlled for LCA classes, with five disorders predicting SI, four predicting SP, two predicting SA, and only one predicting SA/SI. Additionally, the finding that ~15% of C1 respondents made an SA in the past 12 months is noteworthy. Prior research has shown that effectiveness of universal suicide prevention is limited (e.g., improving help-seeking behavior in suicide prevention efforts; Klimes-Dougan, Klingbeil, & Meller, 2013), and coupled with limited resources, it is essential for universities to strategically identify subsets of high-risk students and offer indicated prevention services. Our findings suggest that students reporting high comorbidity may be at elevated risk of SA, which is consistent with prior research (Nock et al., 2010) and highlights a specific role for (hypo)mania and generalized anxiety disorder in predicting SA, which is in line with recent theories on the importance of affective disturbance and overarousal (including core features such as insomnia and irritability) in predicting suicidal intent (particularly when combined with feelings of alienation or helplessness; Stanley, Rufino, Rogers, Ellis, & Joiner, 2016). More broadly, the results underscore that relatively low-cost web-based screening tools may be effective in reaching high-risk students in need of help (Mortier et al., 2017) and, if integrated with prevention and intervention services, may reduce the incidence of STB on college campuses.

Given the limited mental health resources that exist on most college campuses relative to the scope of the problem and the importance of comorbidity for treatment planning, it might be prudent to think in terms of latent classes when targeting treatment outreach efforts. This is especially true given the finding that comorbidity becomes an increasingly important predictor of STB in the progression from SI to SA. Focusing on profiles of disorders rather than a specific diagnosis is consistent with recent transdiagnostic approaches to treatment (e.g., Unified Protocol; Barlow et al., 2017), which target common underlying factors that cut across disorders. Transdiagnostic therapeutic approaches have been designed to tackle the limitations

TABLE 6 Associations of 12-month LCA classes and 12-month disorders predicting 12-month suicidal thoughts and behaviors

	Ideation		Plan		Attempt		Attempt/SI	
Predictors	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Class 1	2.8*	(1.1, 6.8)	8.4*	(4.9, 14.6)	21.1*	(4.9, 91.3)	7.3*	(1.7, 31.8)
Class 2	3.8*	(2.7, 5.4)	6.7*	(4.6, 9.7)	4.7*	(1.2, 18.6)	1.3	(0.3, 5.8)
Class 3	2.2*	(1.1, 4.4)	7.0*	(5.1, 9.7)	7.5*	(2.2, 25.3)	1.8	(0.4, 7.2)
Class 4	2.8*	(2.3, 3.5)	3.7*	(2.6, 5.1)	6.0*	(1.8, 20.4)	2.1	(0.5, 8.6)
Class 5	2.8*	(2.3, 3.3)	2.7*	(1.9, 3.6)	1.8	(0.4, 7.0)	0.7	(0.1, 3.3)
F_5	26.4*		29.7*		5.2*		6.6*	
Internalizing disorders								
Mania/hypomania	1.4*	(1.1, 2.0)	1.6*	(1.2, 2.3)	2.1*	(1.0, 4.1)		
Generalized anxiety disorder	2.2*	(1.2, 4.2)	4.6*	(3.9, 5.6)	5.2*	(3.1, 8.8)	2.0*	(1.1, 3.6)
Major depressive episode	4.7*	(4.0, 5.4)						
Panic disorder			1.4*	(1.1, 1.7)				
Externalizing disorders			1.4*	(1.2, 1.8)				
Alcohol use disorder								
ADHD	1.3*	(1.1, 1.5)						
Drug use disorder	1.4*	(1.1, 1.9)						
(*n*)	(14,348)		(14,348)		(14,348)		(1,843)	

Note. LCA: latent class analysis; SI: suicide ideation; ADHD: attention-deficit/hyperactive disorder.

*Significant at the 0.05 level, two-sided mutually imputed design-corrected test.

of past psychotherapeutic approaches and to address issues of comorbidity (and subthreshold presentations), as these treatments intervene on core deficits that are common among disorders (e.g., behavioral avoidance and emotion dysregulation; Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010). A transdiagnostic approach to treatment also is in line with the focus on *mechanisms of action* to improve therapeutic outcomes. By targeting core therapeutic processes (e.g., alliance and adherence), phenotypes, and/or biological markers that are shared among a range of disorders, the goal is to determine *why* psychotherapeutic and pharmacologic interventions are effective as a means of improving outcomes that have remained relatively stagnant in recent decades (e.g., DeRubeis et al., 2005; Dimidjian et al., 2006). Nevertheless, as transdiagnostic approaches may disregard important differences between participants, a promising alternative might be a person-specific approach in which treatment modules—specifically using internet-based treatments—are based on the comorbidity, symptoms, and other characteristics tailored to each individual student (e.g., Weisel et al., 2018). As a whole, given high rates of comorbidity coupled with suboptimal treatment response rates with traditional tracks of care, there is an urgency to design and disseminate interventions that are effective across different profiles of disorders that are commonplace in college students.

4.1 | Limitations

Our findings should be considered in light of several limitations. First, the cross-national prevalence estimates are based on a convenience sample of colleges with relatively low and quite variable response rates, limiting generalizability of results. Second, not all common mental disorders were assessed in the surveys. Eating disorders, social anxiety disorder, phobias, post-traumatic stress disorder, conduct disorder, oppositional-defiant disorder, and intermittent explosive disorder are especially noteworthy because of their comparatively high prevalence in the WMH surveys (Auerbach et al., 2016), and therefore, the true prevalence of mental disorders among college students may be higher than those reported in the current study, particularly as we are only including first year students who are not yet through the high-risk periods for many common disorders. However, we have developed screening scales for those disorders, and we are experimenting with a design in which subsets of these screening scales are rotated in future iterations of the surveys at random to provide partial information about prevalence and correlates of a wider range of disorders. This approach, which is referred to in the survey methodology literature as *matrix sampling* (Merkouris, 2015), is becoming an increasingly popular approach to reduce respondent burden when the number of questions of interest in a survey exceeds the number that causes respondent burden (Hughes, Beaghen, & Asiala, 2015; Thomas, Raghunathan, Schenker, Katzoff, & Johnson, 2006). Third, although the surveys used well-validated screening scales calibrated to yield unbiased prevalence estimates in general population samples, calibration studies have just begun in samples of college students. That said, we do not know if calibration studies in separate countries will show that concordance of the structured questions in our diagnostic screens are equally valid in all countries. Fourth, the LCA is based on the assumption that true underlying classes exist that lead the disorders to be conditionally independent within classes. If this assumption is incorrect, it might be that other methods would yield more useful characterizations of the multivariate profiles among disorders. This possibility needs to be investigated in future analyses of the WMH-ICS data. Last, although the study provides key information related to the impact of comorbidity on STBs, there are other important issues at large. Namely, future research would benefit from investigating the societal costs (e.g., lost productivity) associated with

different types of comorbidity. Additionally, for many of these disorders, it may be that different types of adversity and stress exposure may be driving the types of comorbidity students experience. Both of these issues remain critical, particularly as it relates to developing public health response plans.

5 | CONCLUSIONS

Consistent with prior epidemiological research, rates of comorbidity are high in college students (Auerbach et al., 2016). Presently, colleges around the world are faced with an increasingly challenging problem: There is a need to provide unparalleled access to cutting edge educational opportunities while contending with rising rates of mental disorders. Given finite resources, colleges will need to be strategic in how resources are distributed, particularly as this relates to prioritizing cases that are at highest risk for STBs. The current report coupled with recent national (e.g., Eisenberg et al., 2007; Kendler et al., 2015; Mojtabai et al., 2015) and cross-national (Auerbach et al., 2018; Mortier, Auerbach, et al., 2018) findings underscore the need to increase access to care, develop novel ways (e.g., internet-based therapies) to reach students in need, and generate ways to triage student mental health services on campus.

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CONFLICTS OF INTEREST

In the past 3 years, Dr. Kessler received support for his epidemiological studies from Sanofi Aventis, was a consultant for Johnson & Johnson Wellness and Prevention, Shire, Takeda, and served on an advisory board for the Johnson & Johnson Services Inc. Lake Nona Life Project. Kessler is a coowner of DataStat, Inc., a market research firm that carries out healthcare research.

Dr. Ebert has received consultant fees and served on the scientific advisory board for several companies, including MindDistrict, Lantern, Schoen Kliniken, and German health insurance companies (BARMER, Techniker Krankenkasse). He also is a stakeholder in the institute for health training online (GET.ON), which aims to implement scientific findings related to digital health interventions into routine care.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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