



Suicidal thoughts and behaviors among college students and same-aged peers: results from the World Health Organization World Mental Health Surveys

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Abstract

Purpose The primary aims are to (1) obtain representative prevalence estimates of suicidal thoughts and behaviors (STB) among college students worldwide and (2) investigate whether STB is related to matriculation to and attrition from college.

Methods Data from the WHO World Mental Health Surveys were analyzed, which include face-to-face interviews with 5750 young adults aged 18–22 spanning 21 countries (weighted mean response rate = 71.4%). Standardized STB prevalence estimates were calculated for four well-defined groups of same-aged peers: college students, college attriters (i.e., dropouts), secondary school graduates who never entered college, and secondary school non-graduates. Logistic regression assessed the association between STB and college entrance as well as attrition from college.

Results Twelve-month STB in college students was 1.9%, a rate significantly lower than same-aged peers not in college (3.4%; OR 0.5; $p < 0.01$). Lifetime prevalence of STB with onset prior to age 18 among college entrants (i.e., college students or attriters) was 7.2%, a rate significantly lower than among non-college attenders (i.e., secondary school graduates or non-graduates; 8.2%; OR 0.7; $p = 0.03$). Pre-matriculation onset STB (but not post-matriculation onset STB) increased the odds of college attrition (OR 1.7; $p < 0.01$).

Conclusion STB with onset prior to age 18 is associated with reduced likelihood of college entrance as well as greater attrition from college. Future prospective research should investigate the causality of these associations and determine whether targeting onset and persistence of childhood–adolescent onset STB leads to improved educational attainment.

Keywords Suicidal thoughts and behaviors · Young adult · College student · Academic performance · Epidemiology

Introduction

Suicide is the second leading cause of death worldwide for individuals aged 15–29 years [1], and an increasing subgroup of these individuals consists of college students [2]. College surveys suggest that relatively high proportions of students have lifetime and 12-month suicidal thoughts and behaviors (STB) [3]. The majority of prior research on STB among college students, however, has been limited by low response rates and confined to a small number of (mostly high-income) countries, limiting generalizability of findings

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[3]. Further, a direct comparison of college student STB prevalence with same-aged peers not in college is restricted to one study from the U.S. [4]; yet, this study did not compare students with attriters (i.e., college dropouts) nor did the results differentiate between pre- and post-matriculation onset STB. Direct comparison of STB prevalence between college students and well-defined groups of same-aged peers could reveal whether STB is associated with lower college entrance or increased attrition from college. To address these limitations, the current study utilizes general population representative data including both students and non-students from community epidemiological surveys completed in 21 different countries in the World Health Organization (WHO) World Mental Health (WMH) Survey Initiative.

Method

Sampling and procedures

The WMH surveys are a cross-national series of community epidemiological surveys aimed at obtaining representative estimates of prevalence and correlates of common mental disorders, including STB. Each survey was based on a multi-stage clustered area probability sample of households in the target population and used weighting to adjust for differential probabilities of selection within and between households. A full description of the WMH surveys' sampling and field procedures can be found elsewhere [5]. The data reported here come from the subset of 23 WMH surveys carried out in 21 countries: Australia, Belgium, Bulgaria, Brazil, Colombia, France, Italy, Iraq, Peru, Nigeria, People's Republic of China, Lebanon, the Netherlands, New Zealand, Northern Ireland, Mexico, Poland, Portugal, Romania, Spain, and the USA. Response rates ranged between 50.4% (Poland) and 97.2% (Colombia), with a weighted mean of 71.4% across surveys. These represent the subset of WMH surveys with a sufficiently large sample to study STB prevalence separately among four subgroups of young adults aged 18–22 ($n = 5750$): college students (i.e., individuals who had completed secondary school and were currently students [either part-time or full-time]; $n = 1572$); attriters (i.e., individuals who completed some college but did not graduate and were no longer students; $n = 702$); nonstudents (i.e., secondary school graduates who never went to college; $n = 1571$); and those who never completed secondary school ($n = 1905$). The 18–22 year age range was chosen because college students were predominantly in that age range across countries.

Measures

STB were assessed using version 3.0 of the WHO Composite International Diagnostic Interview (CIDI) [5]. The CIDI contains a Suicidality Module that assesses lifetime occurrence, age of onset (AOO), and recency of each separate STB outcome, i.e., suicidal ideation (“Have you ever seriously thought about committing suicide?”), suicide plans (“Have you ever made a plan for committing suicide?”), and suicide attempts (“Have you ever attempted suicide?”). Recency measures were used to determine 12-month prevalence of the STB outcomes; AOO was used to differentiate between pre- and post-matriculation onset STB, i.e., whether any history of STB occurred prior to or after the typical age of beginning college (i.e., AOO 0–17 years vs. 18+ years). Respondents reporting STB were additionally assessed for having seen any person on a pre-defined list of general medical or mental health care providers “for problems with emotions, nerves, or use of alcohol or drugs.”

Analyses

All analyses were carried out using data weighted for the complex sample survey design in the WMH surveys. To check the comparability of the predefined subgroups with regard to onset distributions of STB (i.e., onset of STB as well as current age), we estimated median AOO for each STB outcome and mean age at survey by STB outcome across the four predefined subgroups of young adults aged 18–22 (see Supplementary Materials 1). Next, a series of cross-tabulations were used to estimate prevalence of the outcomes under study across the subgroups of young adults under study. We compared lifetime prevalence of STB with AOO 0–17 years among college entrants vs. secondary school graduates as well as among college entrants vs. all those that never entered college (i.e., both secondary school graduates and non-graduates). This was done to explore the association between childhood–adolescent onset STB and subsequent college matriculation. We next explored the association between STB and attrition from college by comparing lifetime STB prevalence among college students vs. college attriters, separately for pre- and post-matriculation onset lifetime STB (i.e., AOO 0–17 years vs. 18+ years). We next estimated 12-month STB prevalence among college students and directly compared these estimates with parallel estimates among college attriters and all other respondents (i.e., those who never entered college whether or not they graduated from secondary school). Finally, we estimated rates of treatment for 12-month STB separately among college

students, attriters, and all other respondents. In order to increase precision of prevalence comparisons, the joint age-sex distributions of students and non-students within each country were standardized to equal the pooled student distribution across all countries combined. Measures of pairwise association were obtained using logistic regression analysis, reported as odds ratios (OR) and associated 95% confidence intervals (95% CI). Dummy control variables for surveys were consistently included in the models to obtain pooled within-survey coefficients. The design-based Taylor series method [6] implemented in the SAS software system [7] was used to adjust for the weighting and clustering of observations.

Results

Mean age at survey ranges from 19.8 to 20.6 across STB outcomes for the four subgroups of young adults aged 18–22 under study; for median AOO of suicidal ideation, plans, and attempts, this is 15–16, 15–17, and 15–16 years, respectively (see Supplementary Materials 1). These narrow ranges suggest high comparability of subgroups with regard to onset distributions (i.e., AOO vs. age at survey) of STB in the subsequent analyses on STB prevalence by subgroup.

Lifetime prevalence of STB with onset prior to age 18 (i.e., the typical age of beginning college) is consistently lower among college entrants (both students and attriters) than secondary school graduates who did not matriculate to college—7.2 vs. 7.7% for ideation, 2.3 vs. 3.0% for plan, 1.9 vs. 2.6% for attempt; however, none of these differences is statistically significant after adjusting for between-survey variation in the associations of age and sex with student status (OR 0.6–0.8, *ps* = .07–.28; see Table 1). However, prevalence estimates become significantly different when we include secondary school non-graduates in the comparisons (OR 0.5–0.7, *ps* = .001–.10) due to elevated odds of ideation and attempts among secondary school non-graduates.

Among college entrants, pre-matriculation STB is associated with lower odds of staying in college as compared to attriting from college (OR 0.4–0.6, *ps* = .005–.015; see Table 2). STB with post-matriculation onset, in comparison, is not significantly associated with attrition among college entrants (OR 0.9–1.5, *ps* = .24–.89).

Twelve-month prevalence of STB, which includes both incident cases and persistent cases with earlier onsets, is consistently lower for students than attriters (1.9–3.4% ideation, 0.3–1.0% plan, 0.2–1.2% attempts), although the adjusted OR is significantly reduced only among attempts (OR 0.2, *p* = .011; see Table 3). Attrition was not dated with sufficient precision to know if this significant association is due to attempts that preceded college dropout, occurred only after dropout, or some combination of the two. As a

Table 1 Lifetime prevalence of STB with onset prior to age 18^a among college entrants, secondary school graduates, and all non-college attenders

	College entrants (CE) ^b		Secondary school graduates (SS) ^c		All non-college attenders (NC) ^d		CE vs. SS ^e		CE vs. NC ^e					
	%	SE	%	SE	%	SE	OR	95% CI	χ^2	<i>p</i>	OR	95% CI	χ^2	<i>p</i>
Suicidal ideation	7.2	0.7	7.7	0.8	8.2	0.5	0.8	0.6–1.2	1.1	0.285	0.7*	0.6–1.0	4.9	0.026
Suicide plan	2.3	0.3	3.0	0.5	2.7	0.3	0.7	0.4–1.1	2.5	0.113	0.7	0.5–1.1	2.7	0.102
Suicide attempt	1.9	0.3	2.6	0.5	3.0	0.3	0.6	0.4–1.0	3.2	0.072	0.5*	0.4–0.8	10.5	0.001

Respondents were limited to those in the Part II sample who were 18–22 years old at the time of interview and had not graduated from college. Significant odds ratios (OR) are shown in bold and marked with an asterisk (*) (α = 0.05)

^aAge 18 was used to determine STB prior to the typical age of beginning college

^b“College entrants” were defined as both current students and college attriters

^c“Secondary school graduates” were defined as all secondary school graduates who never entered college

^d“All non-college attenders” were defined as those who never entered college whether or not they graduated from secondary school

^eBased on a pooled within-survey logistic regression model adjusting for between-survey variation in the association of age-sex with student status

Table 2 Prevalence of pre- matriculation^a and post-matriculation^b onset STB among current students or college attriters

	Students			Atritters			Students vs. attriters ^c						
	Pre- %	SE	Post- %	Pre- %	SE	Post- %	Pre-		Post-		χ^2	p	
							OR	95% CI	OR	95% CI			
Suicidal ideation	5.4	0.8	2.2	11.1	1.4	2.4	0.6	0.6*	0.4–0.8	1.5	0.8–2.7	1.4	0.239
Suicide plan	1.5	0.3	0.7	4.1	0.8	1.2	0.5	0.5*	0.3–0.9	0.9	0.3–2.9	0.1	0.815
Suicide attempt	1.2	0.3	0.8	3.5	0.6	1.2	0.5	0.4*	0.2–0.8	0.9	0.3–3.0	0.0	0.889

Respondents were limited to those in the Part II sample who were 18–22 years old at the time of interview and had not graduated from college. Significant odds ratios (OR) are shown in bold and marked with an asterisk (*) ($\alpha=0.05$)

^aPre-matriculation onset STB were defined as those with onsets at ages 0–17

^bPost-matriculation onset STB were defined as those with onsets at ages 18+

^cBased on a pooled within-survey logistic regression equation adjusting for between-survey variation in the association of age-sex with student status

point of comparison, though, 12-month STB prevalence is even higher among respondents who never matriculated to college, leading to significantly reduced ORs of all STB indicators among students vs. all others (OR 0.2–0.5, $ps = .001-.049$).

A higher proportion of students with 12-month suicidal ideation receive treatment for emotional problems within that time period (56.4%) than comparable attriters (15.7%; OR 3.6, $p = .18$) or other respondents (15.6%; OR 4.4, $p = .043$; see Table 4). Suicidal students who received treatment include the vast majority of those who made an attempt (84.9%; compared to 32.9% of non-college attenders who made attempts); treatment for 12-month suicide plans was very low across the three subgroups (i.e., 0.0–19.1%).

Discussion

This study reports the first large-scale, cross-national assessment of STB among college students. In countries with marked differences in culture, language, and level of socioeconomic development, lifetime prevalence of STB among college entrants is 7.2%, and 12-month prevalence of STB in college is 1.9%. Surprisingly, these prevalence rates are three to six times lower than the lifetime and 12-month prevalence in a recent meta-analysis of 36 college student probability samples worldwide [3]. Methodological issues may explain these conflicting results. First, relative to prior studies, the current study presented weighted prevalence estimates (using weights composed of non-response adjustment weights) and has a high response rate. In studies with low response rates, there is a tendency to overestimate STB prevalence. This can be explained by differences in sample gender composition according to participation rate which were not accounted for by nonresponse adjustment weighting procedures [3]. An alternative explanation is that individuals with vested topic interest (i.e., students with a history of STB) may be more inclined to complete the survey [8]. Second, the majority of studies on this topic rely on single-item STB assessments, which often lead to false-positive STB cases [9]; yet, the current study utilized a well-validated clinical interview to assess STB. Third, the majority of previous studies come from the United States [3], where STB prevalence has found to be high [10], whereas the current study presents a well-balanced sample of college students worldwide.

If our findings are confirmed, college students may have lower STB than adolescents aged 13–18 years [11, 12], and than the general adult population aged 18–64 years [10, 13]. Direct comparisons with same-aged peers not in college revealed that low college student STB prevalence may be explained, in part, by reduced matriculation among non-students who report high rates of STB during secondary

Table 3 Twelve-month prevalence of STB among current students, college attriters, and non-college attenders

	Students (ST)		Attriters (AT)		Non-college attenders (NC) ^a		ST vs. AT ^b		ST vs. NC ^b		
	%	SE	%	SE	%	SE	OR	χ^2	OR	χ^2	
12-month suicidal ideation	1.9	0.3	3.4	0.7	3.4	0.3	0.6	2.6	0.105	10.4	0.001
12-month suicide plan	0.3	0.2	1.0	0.4	1.1	0.2	0.2	2.6	0.104	3.9	0.049
12-month suicide attempt	0.2	0.1	1.2	0.4	0.8	0.2	0.2*	6.4	0.011	4.7	0.030

Respondents were limited to those in the Part II sample who were 18–22 years old at the time of interview and had not graduated from college. Significant odds ratios (OR) are shown in bold and marked with an asterisk (*) ($\alpha = 0.05$)

^a“Non-college attenders” were defined as those who never entered college whether or not they graduated from secondary school

^bBased on a pooled within-survey logistic regression model adjusting for between-survey variation in the association of age-sex with student status

Table 4 Proportions of respondents with 12-month STB who received treatment in the 12 months before the interview, separately for current students, college attriters, and non-college attenders

	Students (ST)		Attriters (AT)		Non-college attenders (NC) ^a		ST vs. AT ^b					ST vs. NC ^b		
	%	SE	%	SE	%	SE	OR	95% CI	χ^2	<i>p</i>	OR	95% CI	χ^2	<i>p</i>
12-month suicidal ideation	56.4	9.9	15.7	6.7	15.6	4.8	3.6	0.5–23.6	1.8	0.183	4.4*	1.0–18.6	4.1	0.043
12-month suicide plan	0.0	0.0	20.9	16.5 ^c	19.1	8.4	–	–	–	–	–	–	–	–
12-month suicide attempt	84.9	13.8	36.4	26.9 ^c	32.9	10.2	–	–	–	–	8.6	0.7–110.7	2.7	0.098

Respondents were limited to those in the Part II sample who were 18–22 years old at the time of interview and had not graduated from college. Significant odds ratios (OR) are shown in bold and marked with an asterisk (*) ($\alpha=0.05$)

^a“Non-college attenders” were defined as those who never entered college whether or not they graduated from secondary school

^bBased on a pooled within-survey logistic regression equation adjusting for between-survey variation in the association of age-sex with student status

^cEstimate not significantly different from zero

school and thus, fail to matriculate into college. Indeed, rates of STB with onset prior to age 18 were high, and were associated with both the inability to enter college as well as with attrition from college. These findings are in line with previous research on selection effects at college entrance due to adverse mental health [14, 15] but also on the negative association between STB and academic performance during college [16, 17]. Importantly, we could not find support for a direct protective effect of the college environment on STB, as rates of post-matriculation STB did not significantly differ between students and attriters.

Presently, prevention programs targeting STB among college students are largely ineffective [18], while evidence for STB prevention among young people in general is also not well established [19]. Our findings suggest that two concurrent efforts may more effectively address STB and STB-related academic consequences in early life. First, as documented here, the vast majority of STB emerge in adolescence prior to the typical age of college matriculation. This finding is consistent with previous research [11, 12]. Thus, a shift of focus for primary prevention towards childhood-adolescence may be indicated. Pre-college primary interventions may be especially relevant since STB onset during college is also associated with a wide range of pre-college risk factors [20]. In addition, such interventions may be beneficial for both students (by decreasing college attrition rates) and nonstudents (by increasing college entry rates). Second, depending on the academic setting within countries, the campus environment may be ideally suited to identify individuals at high risk for persistent STB and provide interventions (i.e., secondary prevention of STB). To that extent, it is also encouraging that we found higher help seeking for STB among college students relative to the general population [21]. This underscores the importance of screening college students for mental health issues [20], and then, providing access to personalized interventions (e.g., face-to-face, internet-based prevention and treatment programs) [22]. Collectively, this dual approach may, ultimately, lead to improved educational attainment and reduce the loss of life among this important population segment.

These results should be interpreted in the context of several limitations. First, we were not able to adjust for potentially important confounder or mediator variables (e.g., respondents' cognitive functioning, indicators of socio-economic situation, mental disorders) in the association between STB and college entrance or attrition. Future research should use prospective research designs to fully map any causal network between childhood-adolescent onset STB and subsequent loss in college education. Second, the number of college students in the WMH surveys was too small to conduct separate analyses by country, or by groups of high-, upper-middle-, and lower-middle/low-income countries. Relatively low statistical power may also explain why some pairwise

comparisons failed to reach statistical significance despite STB prevalence being consistently higher or lower across groups for each separate STB outcome. However, it should be noted that all analyses were adjusted for age and gender, constituting all significant effects reported in this study as robust findings. Third, not all WMH surveys included group housing in their sample frames, possibly underrepresenting students living in campus dormitories or fraternity-sorority houses. Most WMH surveys also failed to distinguish between students living in off-campus housing with their families vs. with roommates. It is reassuring, however, that many previous studies have not found a significant effect of place of residence on STB occurrence among students [20, 23, 24]. Finally, there is some degree of imprecision in our timing of STB onset, matriculation and attrition, which makes it impossible to draw firm distinctions between STB that occurred before vs. after matriculation, or that occurred before vs. subsequent to attrition. This was addressed by using a conservative approach in which only STB with onset prior to the age of 18 years was operationalized as being pre-matriculation onset STB. As a result, correction of this problem would only lead to an increase in the strength of our finding that the vast majority of STB among college students is pre-matriculation STB. We cannot exclude, however, that the inability to establish the exact timing of college attrition explains our finding that post-matriculation onset STB was not related to college attrition.

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Compliance with ethical standards

Conflict 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 co-owner of DataStat, Inc., a market research firm that carries out healthcare research. In the past 3 years, Dr. Demyttenaere has received personal fees from Lundbeck, Johnson & Johnson and Servier, as well as grant funding from Foundation ‘Ga voor Geluk’. In the past 3 years, Dr. Haro has received personal fees from Eli Lilly & Co., Lundbeck and Otsuka. The other authors report no biomedical financial interests or potential conflicts of interest.

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