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Trends in Mood and Anxiety Symptoms and Suicide-Related Outcomes Among US

Undergraduates, 2007-2018: Evidence from Two National Surveys

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## Abstract

**Purpose:** Past work has evidenced increased utilization of mental health services on college campuses, as well as rising rates of mood and suicide-related pathology in adolescents and young adults in recent years. We examined whether such findings are reflective of large-scale, nationwide trends in college student mental health in the past decade. **Methods:** We examined trends in mood, anxiety, and suicide-related outcomes among US college students from 2007 to 2018 across two large national datasets: (1) the National College Health Assessment ( $n = 610,543$ ; mean age = 21.25; 67.7% female; and 72.0% White) and (2) the Healthy Minds Study ( $n = 177,692$ ; 86% 18 to 22 years old; 57% female; and 74% White). Participants, randomly selected by their educational institution, completed self-report measures of past-year mood, anxiety, non-suicidal self-injury, and suicidal thoughts and behaviors. **Results:** In both samples, rates of depression, anxiety, non-suicidal self-injury, suicidal ideation, and suicide attempts markedly increased over the assessed years, with rates doubling over the time period in many cases. Anger, low flourishing, and suicide plans, each assessed in only one dataset, also exhibited upward trends. **Conclusions:** Findings demonstrate a broad worsening of mental health among US college students over the past decade, a concerning result meriting further attention and intervention.

*Keywords:* mood disorder; depression; anxiety; suicide; suicide attempt; suicidal ideation; self-injury; college student; trends

### **Implications and Contribution**

Across two large, national datasets, the self-reported mental health of college students has broadly worsened in the last decade. From 2007 to 2018, rates of depression, anxiety, self-injury, suicidal thoughts, and suicide attempts increased markedly.

## Introduction

Adolescent and young adult mood and anxiety disorders are associated with a variety of negative outcomes, including future mood and anxiety pathology, substance use, lower educational attainment, unemployment, and elevated risk for suicidal thoughts and behaviors [1–7]. Mood and anxiety disorders are also relatively common among college-aged individuals: a recent multi-national study found 18.5% of college students surveyed met past 12-month diagnostic criteria for major depressive disorder and 16.7% met past 12-month diagnostic criteria for a generalized anxiety disorder [8]. In another multi-national study of college students, past 12-month prevalence of suicidal ideation, plans, and attempts was 17.2%, 8.8%, and 1.0%, respectively [9]. Suicidal thoughts and behaviors are potentially costly in themselves, and also predict future mood and anxiety disorders and recurrence of suicidal ideation and attempts [10]. Additionally, earlier onset of psychiatric disorders, as well as suicidal thoughts and behaviors, predict severity, persistence, and treatment non-response throughout life [6,11,12], so their occurrence among young adults is particularly problematic.

In recent years, university counseling centers have reported increased caseloads, with many more students seeking help for mental health issues (particularly mood disorders and suicidal ideation) in the years after 2010 compared to a few years prior [13–15]. A recent analysis of national survey data concluded that college students in the US used mental health services at an increasing rate between 2007 and 2017 [16]. Based on this evidence, it is tempting to conclude that more college students in recent years are suffering from mood disorders. However, increases in service utilization could be caused by many factors other than increased prevalence, including greater awareness, better accessibility of services, improved outreach, or other factors not rooted in a true increase in prevalence.

Although several studies have documented increases in depression [17], suicidal ideation, [18,19] and self-injurious behaviors [20] over time among the general population of adolescents and young adults, it is unclear if these trends extend to college students. College students are a more economically privileged and presumably high-functioning sub-population, and one often provided with ready access to mental health services through on-campus resources. In addition, no peer-reviewed studies of which we are aware have examined trends in anxiety among young adults (college enrolled or not) in the past 10 years. Thus, it is unclear if established mood disorder trends extend to college students, or if anxiety follows a similar pattern.

It is essential to examine these trends in college students specifically, as opposed to extending findings from studies of adolescents or adults. Though some work suggests no differences in mental health disorder prevalence by educational or socioeconomic status, a recent multinational study found that students reported lower rates of mood and various other disorders, though the prevalence of any mental disorder was similar [21]. Thus, others have made a case for the importance of increased attention to psychiatric disorders in college students specifically [8].

Studies of cross-sectional prevalence do not provide sufficient evidence to demonstrate increased rates of mood and anxiety pathology and suicide-related outcomes across years, as cross-sample comparisons are prone to influences of procedural differences, in which different methodologies with regard to sample selection and construct measurement may produce inaccurate fluctuations in results. Studies examining trends in mood, anxiety, and suicide-related outcomes utilizing multi-year assessments administered to similar samples are needed in order to draw valid conclusions on this topic.

### **The Current Study**

In this paper, we examine trends in mood, anxiety, and suicide-related outcomes in two national surveys of college students in the US, the National College Health Assessment (NCHA, administered by the American College Health Association) and the Healthy Minds Study (administered by the University of Michigan and Boston University). Both surveys aimed to collect a broad sample of college students rather than examining only those who sought help from, for example, a college counseling center. Thus, they serve as screening studies, yielding a view of the college population as a whole that is uninfluenced by trends in help-seeking or the availability of counseling resources. We focused on undergraduates rather than all students in the surveys (which included graduate students), as time-lag studies examining cohort/time period differences ideally rely on populations similar in age. We hypothesized that mood disorder indicators and suicide-related outcomes would increase over time. As an additional exploratory aim, we examined trends for male and female participants separately in order to (1) verify that trends were not caused by changes in the gender composition of the samples over time, and (2) determine whether trends varied across genders.

## **Study 1**

### **Method**

#### **Participants and Procedures**

Participants were 610,543 undergraduate US college students who participated in the American College Health Association's National College Health Assessment (NCHA) between Fall 2011 and Spring 2018. The NCHA is a large, national survey of college health administered each semester. Participating universities recruited random samples of enrolled students to complete either paper or web-based surveys of past-year beliefs and behaviors regarding a variety of health and health-risk variables. Participants are required to be age 18 or older.

Participation is voluntary, and response rates averaged 22% from 2011-2018. Data for the current project were drawn from biannual Undergraduate Reference Group Reports made publicly available online by the American College Health Association for the 2011-12 to 2017-18 academic years [22]. We began with Fall 2011 data because the questionnaires changed in this semester, so previous years are not directly comparable to later surveys. Undergraduate-only reports were not available for Fall 2013 and Fall 2014, so only Spring semester data was used for the 2013-14 and 2014-15 academic years. Notably, demographics did not differ between Fall and Spring semesters, and rates of assessed outcomes for the years in which only Spring data were available were consistent with trends displayed by the immediately preceding and following academic years. In this study sample, participant mean age was 21.25 (SD = 4.93, median = 20). The sample was 67.7% female and 72.0% White/Caucasian.

## **Measures**

**Mood, self-injury, and suicide-related outcomes.** The NCHA consists largely of single-item measures querying lifetime and past-year attitudes and behaviors. Single-item measures are not ideal, but they maximize utility, provide fair validity for screening purposes, correlate with validated, multi-item measures, and are frequently used in well-reputed large-scale studies [23–26]. For purposes of the current study, we assessed the following variables: depression (“Have you ever felt so depressed that it was difficult to function?”), anxiety (“Have you ever felt overwhelming anxiety?”), anger (“Have you ever felt overwhelming anger?”), intentional self-injury (“Have you ever intentionally cut, burned, bruised, or otherwise injured yourself?”), suicidal ideation (“Have you ever seriously considered suicide?”), and suicide attempts (“Have you ever attempted suicide?”). Response options for all items were: “No, never,” “No, not in the last 12 months,” “Yes, in the last 2 weeks,” “Yes, in the last 30 days,” and “Yes, in the last 12



months.” For analyses, frequencies of each item endorsed within the last 2 weeks, 30 days, or 12 months were summed to produce an incidence value for 12-month prevalence for each semester. These were then weighted and summed within academic years, resulting in one value per academic year for each item. The wording of these items, and their administration, did not differ during the assessed years.

## **Results**

The prevalence of mood symptoms, intentional self-injury, and suicide-related outcomes increased among US undergraduates from 2011-12 to 2017-18 (see Table 1). Reports of overwhelming anxiety and depression rose markedly over the years (showing relative percentage increases of 24% and 34%, respectively). Troublingly, the largest increases were in intentional self-injury (47%), suicidal ideation (76%), and suicide attempts (58%). Feelings of overwhelming anger increased less (13%). All variables exhibited relatively steadily rising trends across academic years (see Figures 1 and 2).

Analyses examining men and women separately found larger increases in all assessed symptoms, except suicide attempts, for women than for men (see Supplemental Tables 1 and 2). For both sexes, rates of suicidal ideation and suicide attempts increased by 50% or more from 2011-12 to 2017-18, with smaller increases on the other items.

## **Study 2**

Although the NCHA allows an examination of mood, self-injury, and suicide-related outcome trends in a national sample of undergraduates, it assesses these variables using single-item measures, a non-ideal research design as such items are often less valid than multi-item assessments [23–25]. Thus, in Study 2 we turned to the Healthy Minds Study, a screening study of college students that assesses mood disorder symptoms using standard, multi-item scales

shown to be valid and reliable. Items measuring suicide-related outcomes were again assessed with single-item measures; however, phrasing was similar and allowed for replication across the two datasets.

## **Method**

### **Participants and Procedures**

Participants were 177,692 students seeking bachelor's degrees at 196 US colleges and universities who participated in the annual Healthy Minds Survey between 2007 and 2018; the survey was not administered in 2008. The Healthy Minds Survey recruited a random sample of 4,000 students per campus or, at smaller institutions, all students. Participants were required to be 18 years of age or older. Response rates were 43% in 2007 and 2009 and averaged 25% 2010-2018 after study administrators stopped mailing a \$1 pre-incentive to potential participants. Sampling, recruitment and assessment procedures were otherwise consistent across study years. Participants were 57% female and 74% White non-Hispanic; 86% were between 18 and 22 years old.

### **Measures**

Questionnaires were administered using a web-based survey. The wording of each item was consistent for all years that item was included. Measures included:

**Positive mental health.** Positive mental health was assessed using the Flourishing Scale [27]. Sample items include “My social relationships are supportive and rewarding” and “I am a good person and live a good life.” Norms are an average score of 44.97 and a standard deviation of 6.56 [27]. Thus, those scoring 38.41 or less are one standard deviation or more below the norm, which we define in the current study as low in flourishing. Cronbach's alpha in this sample was .90.

**Depression.** Depressive symptoms were assessed with the Patient Health Questionnaire-9 (PHQ-9; [28]). The scale asks participants “Over the last 2 weeks, how often have you been bothered by any of the following problems?” including “feeling down, depressed, or hopeless,” “poor appetite or overeating,” or “feeling tired or having little energy.” Response choices are “not at all” = 0, “several days” = 1, “over half the days” = 2, and “nearly every day” = 3. The cutoff for moderate depression is a PHQ-9 score of 10 or above, and the cutoff for severe depression is a score of 15 or above. Cronbach’s alpha in this sample was .89.

**Anxiety.** Anxiety was assessed with the Generalized Anxiety Disorder (GAD-7) scale [29]. The scale asks participants, “Over the last 2 weeks, how often have you been bothered by the following problems?” including “feeling nervous, anxious, or on edge,” “trouble relaxing,” or “worrying too much about different things.” Response choices are “not at all” = 0, “several days” = 1, “over half the days” = 2, and “nearly every day” = 3. The cutoff for moderate anxiety is a GAD-7 score of 10 or above, and the cutoff for severe anxiety is a score of 15 or above. Cronbach’s alpha in this sample was .91.

**Intentional self-injury.** Engagement in intentional self-injury was determined by an affirmative response to past-year engagement in one or more of five specific self-injurious behaviors included in all years of the survey: “In the past year, have you ever done any of the following intentionally? “cut myself,” “burned myself,” “pulled my hair,” “carved words or symbols into skin,” “rubbed sharp objects into skin.” In order to preserve continuity across study years in assessing prevalence, this calculation does not include additional self-injurious behaviors asked only in some years of the survey. As such, it likely underestimates the total incidence; however, it provides a view of the incidence of these five common self-injurious behaviors.

**Suicide-related outcomes.** Participants were asked “In the past year, did you ever seriously think about attempting suicide?” Those who answered yes were asked the follow-up question, “In the past year, did you make a plan for attempting suicide?” Those who answered yes were asked the follow-up question, “In the past year, did you attempt suicide?”

## Results

Mood disorder indicators, low flourishing, intentional self-injury, and suicide-related outcomes all became increasingly prevalent among US undergraduates between 2007 and 2017-18. The number of students who were low in flourishing, were severely depressed, who engaged in intentional self-injury, and who reported making a suicide plan or attempting suicide doubled between 2012 and 2017-18 (see Table 2). Those experiencing moderate to severe anxiety nearly doubled (a 92% increase), as did the number reporting suicidal ideation (an 81% increase). Most indicators were relatively stable until 2013 and then rose sharply (see Figures 3 and 4).

When examined as means, positive mental health (flourishing), depressive symptoms, and anxiety symptoms increased nearly half a standard deviation in a five-year period. Across the three measures, the increase averaged to  $d = .10$  each year. This is an unusually large increase for such a short period of time ( $d = .01$  to  $d = .02$  per year is more common among time-lag studies of individual differences; [30]).

Analyses examining men and women separately revealed larger increases in low flourishing, depression, and suicide-related outcomes among women than among men (see Supplemental Tables 3 and 4). For example, between 2012 and 2017-18 low flourishing increased 153% among women and 72% among men. Moderate to severe depression increased 74% among women and 49% among men. Increases in anxiety and intentional self-injury were similar. Low flourishing, severe depression, severe anxiety, making a suicide plan, and suicide

attempts doubled or more than doubled among women 2012-13 to 2017-18; severe anxiety, making a suicide plan, and suicide attempts doubled or more than doubled among men 2012-13 to 2017-18.

### **General Discussion**

In both the NCHA and the Healthy Minds Study samples of undergraduate college students, rates of mood and anxiety pathology, as well as suicide-related outcomes, increased between the mid-2000s and 2018. This was true for all assessed variables: anger, depression, anxiety, low flourishing, non-suicidal self-injury, suicidal ideation, suicide plans, and suicide attempts. These increases are alarming, as many were extreme, for example, severe depression, non-suicidal self-injury, suicide plans, and suicide attempts more than doubled over the course of a decade in the Healthy Minds Study. Given the variety of negative social, educational, financial, and health consequences associated with mood, anxiety, and suicide-related symptoms [1–7,10], an increase in any of them merits concern. Additionally, college students are young, and earlier onset of mood pathology is predictive of severity, chronicity, and treatment non-response, as well as future suicide attempts and death by suicide [6,11,12]. These results, indicative of a consistent and marked rise for every assessed outcome across two screening studies, suggest the presence of a real and worrisome trend.

Though assessed outcomes exhibited increases in both Study 1 and Study 2, the magnitude of these rises varied. In all cases, the percentage increase was larger in the Healthy Minds Study data than in the NCHA data. It is unclear why this was the case, as both studies utilized national samples of US college students, who answered similar questions that were administered via a similar procedure and in the same time frame. Response rates were near-identical in both samples. All of these factors suggest the samples were very similar, and so

would be expected to respond in a similar way. It may be that, for some reason, participants were more willing to reveal personal information about mental health when responding to the Healthy Minds Study. Perhaps participants, though assured of their anonymity, felt less comfortable responding honestly to the NCHA, affiliated with an official-sounding and education-linked entity (the American College Health Association). It could also be that the Healthy Minds Study, which included more comprehensive symptom measures and fewer items about alcohol use, illicit substance use, and sexual behavior than the NCHA, was viewed as more aligned with students' needs and values and less judgmental. Alternately, the NCHA's design of querying both current and lifetime outcomes, versus the Healthy Minds Study's approach of querying only past-year outcomes, may have yielded more specific and accurate results, as it required more thought and reflection than a single yes/no response. This could explain, at least in part, the discrepancies in non-suicidal self-injury, suicidal ideation, and suicide attempts.

It does not, however, explain why rates of moderate and severe anxiety and depression, assessed with validated multi-item scales in the Healthy Minds Study versus single items in the NCHA, also rose more quickly and demonstrated higher prevalence overall in Study 2 than Study 1. One notable difference between the datasets is that the Healthy Minds Study uses sample response weights while NCHA does not, so the preponderance of female participants may have had a greater impact. Indeed, we did find that women endorsed higher rates of nearly all assessed outcomes in comparison to men. At this time, we are unable to definitively determine why the increases in prevalence rates differed across samples. More important, however, is that the increase in prevalence was found for all assessed outcomes in both samples. Interestingly, there was also a marked increase in the rate of trends beginning around 2013 across samples, a finding which may be worth closer examination in future projects. The primary

contribution of this two-study project is its evidence of a troubling rise in assessed mental health symptoms and behaviors in college students in the past decade. This rise may be extreme or it may be more moderate, but it is notable regardless. It is also notable that the rise in symptoms beginning in 2013 among undergraduates is a year or two later than the previously identified rise in depression beginning around 2011 or 2012 among high school students and younger adolescents [17–19]. This suggests a generational or cohort effect is operating, with the iGen cohort of young people born in the mid-1990s and later demonstrating a greater tendency toward mood disorders and suicide-related outcomes that follows them as they age.

The trends persisted when analyses were performed separately for men and women, verifying that they were not due to changes in the gender composition of the samples. Consistent with previous research examining trends in mood disorder indicators, intentional self-injury, and suicide-related outcomes [17-20], we found that increases were generally larger for women than for men. The exception to this was suicide attempts in the NCHA, in which the rate of increase was larger for men than for women (64% and 50%, respectively). Future research should explore possible reasons for why women have generally experienced larger increases and which aspects of the changing cultural context have had a greater effect on women.

We examined only “male” and “female” gender options in our exploratory analyses of gender-related trends, as gender minority responses were not included in NCHA summary reports, and options provided differed by year in the Healthy Minds Study (i.e. “other” prior to 2014-2015, then multiple alternative options), limiting the comparability of gender minority statistics over time. Notably, rates of assessed outcomes for men and women separately were generally lower than the average including all participants, possibly due to elevated rates of psychiatric symptoms in gender minority respondents. As evidence suggests gender-minority

individuals have higher rates of mental health issues than cisgender individuals [31], it will be useful for future studies to examine time trends in mental health symptoms in this subgroup.

Our use of aggregate data limited our ability to assess and account for potential explanatory variables, such as demographic features and psychiatric comorbidities, which future work may benefit from including. Future studies may also wish to examine assessments of potential explanatory variables relevant to today's youth such as increased technology use and poor sleep quality [32,33]. It would also be useful to consider past mood and anxiety pathology and history of suicidal thoughts and behaviors. This will allow evaluation of whether the increases trace back to pathology with onset in childhood or adolescence versus pathology emerging in college. Directing interventions towards the life period at which these symptoms first emerge may have the greatest chance of an effective and lasting impact. It will also be useful for future work to integrate more comprehensive assessments of study variables, as all items in the current project relied on self-report, and many were single-item assessments. This may have resulted in under- or over-reporting of study variables. Single-item assessments of mood, anxiety, and suicide-related variables are useful as screening items and display good sensitivity, but often have poor specificity in identifying clinically significant symptoms [23–25]. Use of validated multi-item scales for depression and anxiety in Study 2 provides a level of validity, but there is room for more detailed assessment overall.

An additional limitation of this study was its cross-sectional nature, which prevents conclusions relating to causality or temporality. Though we examined items administered consistently over time to demographically-similar samples, it is possible some unmeasured difference in samples and/or another unmeasured variable could account, at least in part, for findings. The datasets used national samples, but these were recruited from independent sets of



educational institutions, the composition of which differed year to year, so they are not nationally representative and could have differed in unmeasured ways, by year and/or study. Additionally, response rates averaged 22-43%, suggesting that, though the study samples were demographically similar, there may have been clinically relevant differences between students who elected to participate in the study and those who did not. Studies examining the effect of non-response bias among young adults have been mixed, with some studies finding that non-respondents differ from respondents in their rates of psychopathology and health-risk behaviors and others finding no differences [34,35]. As response rates fall over time, any potential bias may have a larger impact. This could partially account for increasing prevalence of symptoms, though the increases in assessed variables over time found here were so large that response bias is unlikely to entirely explain the findings. Of note, the rate of increase for most assessed outcomes remained relatively stable between 2007 to 2009 (when the survey had a 43% response rate) and 2010-2013 (25% response rate) in the Healthy Minds Study, providing some reassurance that decreased response rates were not driving findings.

Last, “overwhelming anger,” our only indicator of externalizing problems, demonstrated a 13% increase over the study period. Though this is a smaller increase than was exhibited by other outcomes, and so could be easily overlooked, an examination of college student trends in a broader range of externalizing symptoms and behaviors may be a fruitful future direction, as this has not, to our knowledge, been examined outside of studies specifically focused on substance use.

In conclusion, we found increasing trends of mood, anxiety, and suicide-related outcomes in US college students between 2007 and 2018, with most increases appearing after 2013. Replication of these rises in two large, national datasets bolsters the validity of findings.

Additionally, participants were drawn from general student populations, so results reflect a broad view of the US undergraduate population, independent of help-seeking or access to care. Another study strength is that datasets administered the same set of questions to demographically similar students, using the same procedures, across study years. This allows a controlled within-study year to year comparison of prevalence of each outcome, which yields a more valid picture of trends over time than can be found by comparing multiple studies of point-prevalence. Our findings are robust and troublesome, demonstrating a broad worsening of mental health among US college students over the past decade that is expected to have numerous downstream negative consequences if not addressed.

### Figure Titles

Figure 1: Mood disorder indicators, intentional self-injury, and suicide-related outcomes in the last year among U.S. undergraduates, National College Health Assessment, 2011/12-2017/18 academic years

Figure 2: Mood disorder indicators, intentional self-injury, and suicide-related outcomes in the past year among U.S. undergraduates, Healthy Minds Study, 2007-2018

Note: Self-injury, suicide plans, and suicide attempts were not assessed in the 2015/16 academic year, and anxiety was not assessed until 2013.

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