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Prevalence and Correlates of Depression, Anxiety, and Suicidality Among University Students

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Mental health among university students represents an important and growing public health concern for which epidemiological data are needed. A Web-based survey was administered to a random sample at a large public university with a demographic profile similar to the national student population. Depressive and anxiety disorders were assessed with the Patient Health Questionnaire (R. L. Spitzer, K. Kroenke, J. B. W. Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999). Nonresponse weights were constructed with administrative data and a brief nonrespondent survey. The response rate was 56.6% ($N = 2,843$). The estimated prevalence of any depressive or anxiety disorder was 15.6% for undergraduates and 13.0% for graduate students. Suicidal ideation in the past 4 weeks was reported by 2% of students. Students reporting financial struggles were at higher risk for mental health problems (odds ratios = 1.6–9.0). These findings highlight the need to address mental health in young adult populations, particularly among those of lower socioeconomic status. Campus communities reach over half of young adults and thus represent unique opportunities to address mental health issues in this important age group.

Keywords: college students, university students, depression, anxiety, correlates

Mental disorders are estimated to account for nearly one half of the total burden of disease for young adults in the United States (World Health Organization, 2002). In addition, a growing body of evidence suggests that mental health problems are numerous and increasing among students in institutions of higher education, which the majority of young adults attend (U.S. Department of Education, National Center for Education Statistics, 2005a). For example, in a 2005 national survey of undergraduates, 10% reported "seriously considering attempting suicide" (American College Health Association, 2006), and in a 2005 national survey of college counseling center directors, 86% reported an increase in severe psychological problems among students (Gallagher, 2005).

Mental health has been shown to vary across several characteristics in the general population (Kessler, Chiu, Demler, & Walters, 2005; U.S. Department of Health & Human Services, 1999), but less is known about potential risk factors within young adults, and student populations in particular. Much of the literature on risk factors among students has focused on suicidality and has found higher risks for students who are over age 25 or male undergraduates (Silverman, Meyer, Sloane, Raffel, & Pratt, 1997), have experienced sexual victimization (Stepakoff, 1998), are dealing with issues related to sexual identity or problematic relationships (Kisch, Leino, & Silverman, 2005), or are engaging in substance use (Brener, Hassan, & Barrios, 1999) or other risky behaviors (Barrios, Everett, Simon, & Brener, 2000). Lower socioeconomic status is a known risk factor in the general population for mental health problems (Yu & Williams, 1999), but much less is known about students from lower socioeconomic backgrounds in the university setting. A British study found that students with greater financial strains and more hours spent working at a job had poorer mental health (Roberts, 1999).

The benefits from an improved understanding of mental health among young adults, and students in particular, are likely to be substantial. Mental health in early adulthood has implications for many aspects of well-being, including alcohol and substance abuse (Angst, 1996; Weitzman, 2004), academic success (Kessler, Foster, Saunders, & Stang, 1995), and future employment and relationships (Ettner, 1997; Kessler, Walters, & Forthofer, 1998). Most lifetime mental disorders have first onset during or shortly before the typical college age (Kessler, Berglund, Demler, Merikangas, & Walters, 2005), and these problems may be precipitated or exacerbated by the variety of stressors in college life, including irregular sleep patterns, flux in personal relationships, and academic pressures (Kadison, 2004). Universities are well positioned to promote mental health among young people because they encompass several important aspects of students' lives: academics, health services, residences, social networks, and extracurricular activities (Mowbray et al., 2006). An improved understanding of mental health in this setting might be readily translated to multiple campuses and thus reach a large proportion of the young adult population.

This research advances knowledge of student mental health using data from the *Healthy Minds* study, a survey of students at a large midwestern public university with a similar demographic profile to that of the national population of students. A clinically validated screening instrument, the Patient Health Questionnaire

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(PHQ), was used to estimate the prevalence of current depressive and anxiety disorders. Suicidal thoughts and behavior were assessed with questions from the National Comorbidity Survey Replication (Kessler, Berglund, Borges, Nock, & Wang, 2005). Possible nonresponse bias was adjusted for using two sources of information: data regarding the full population from the university registrar's database and a shorter survey of a random sample of nonrespondents. To our knowledge, this is the only study of student mental health in the past 30 years (Greenley & Mechanic, 1976) to use clinically validated instruments and extensive adjustments for nonresponse bias in a random, population-based sample.

Method

Sample and Data Collection

We conducted a Web-based survey of undergraduate and graduate students at a large midwestern public university in Fall 2005. This population is roughly similar to the national population of both undergraduate and graduate students at all degree-granting institutions in terms of gender (50% female at the sample university vs. 58% nationwide) and race/ethnicity (68% White, non-Hispanic, 8% Black, 5% Hispanic, and 13% Asian/Pacific Islander at the sample university vs. 64%, 13%, 11%, and 7%, respectively, nationwide) (U.S. Department of Education, National Center for Education Statistics, 2005b). In other respects, such as being a large and academically competitive research university, the institution is not necessarily representative of colleges and universities in general.

The present analysis focuses on the measures related to depression, anxiety, and suicidality within the overall study, which covered a range of other topics including mental health service use, awareness and attitudes about service use, social support, and health-related behaviors. An initial sample of 5,021 students (2,495 undergraduates and 2,526 graduate and professional students), ages 18 and higher, was randomly selected from the registrar's database of all currently enrolled students. Relative to the overall population ratio of about 2 undergraduates for every graduate and professional student, this reflects an oversampling of graduate and professional students, which was done because their mental health has been particularly understudied. The survey was fielded in October–November 2005. The timing of the study was chosen to avoid the beginning and end of the semester, when students are typically undergoing a variety of stresses associated with moving, settling into a routine, or preparing for final exams and projects. The university does not have a standard time period for midterm exams, so these would not have had a systematic influence on the results. To recruit subjects, first we sent an introductory letter by mail along with $2 as a token of appreciation. Then, up to four e-mail reminders were sent with a link to the survey for those who had yet to respond. Subjects were also notified that they had been entered into a cash sweepstakes, regardless of their participation. All participants completed an online informed consent form. The study was approved by the university's institutional review board. As a precaution, an emergency number was shown in the upper corner of the screen throughout the survey, and a full list of mental health resources was shown at the end. Also, subjects who reported having recent suicidal thoughts were urged at the end of the survey to consider using these resources.

A Web-based survey mode was chosen for a number of reasons. First, Web surveys of college populations have been shown to produce results similar to those of mail surveys for questions related to substance use and other sensitive topics (McCabe, 2004). Second, because this research investigates sensitive topics, a self-administered survey may be preferable to a face-to-face or telephone interview to reduce social desirability bias (Aday, 1996). Third, college students generally have excellent Internet access and computer literacy (Couper, 2000).

Accounting for Nonresponse Bias

The set of respondents may differ from the full student population along dimensions that are important to this study. For example, students with mental health problems may be more likely to respond on average because they have a vested interest in the topic. Alternatively, such students may be less motivated to participate because of symptoms of depression and other mental health problems. To address the possibility of such biases, weights were constructed to adjust for differences between responders and nonresponders. These weights made use of two sources of information. First, information regarding several demographic and academic characteristics of the full recruited sample was obtained from the university registrar's database. Second, to assess whether there was nonresponse bias on key mental health measures, a brief version of the survey was sent the following semester (late January–February 2006) to 485 randomly selected nonrespondents from the main survey. This brief survey used a different recruitment strategy, offering multiple modes for completing the survey (telephone, mail, and Web) and larger incentives. It included a subset of the questions from the main survey: the PHQ-9 depression instrument, which yields results when self-administered that are nearly identical to results when administered over the phone (Pinto-Meza, Serrano-Blanco, Penarrubio, Blanco, & Haro, 2005), two questions about mental health service use, and questions about age, race/ethnicity, degree program, and field of study. Additional details about the construction of nonresponse weights are available in the online appendix of another article from the study (Eisenberg, Gollust, & Golberstein, 2007).

Measures of Mental Health

Depression was measured with the PHQ-9, a nine-item instrument based on the *Diagnostic and Statistical Manual for Mental Disorders* (American Psychiatric Association, 1994) criteria for a major depressive episode. This instrument asks the respondent to indicate the frequency of various symptoms over the past 2 weeks. With the standard algorithms for interpreting the PHQ-9 (Spitzer et al., 1999), people were categorized as screening positive for major depression, other depressive disorder (this includes less severe depression, such as dysthymia, or depression not otherwise specified), or neither. This screening tool has been validated as being highly correlated with diagnosis by mental health professionals (Diez-Quevedo, Rangil, Sanchez-Planell, Kroenke, & Spitzer, 2001; Henkel et al., 2004; Kroenke, Spitzer, & Williams, 2001; Lowe, 2004) and other depression assessment tools (Henkel et al., 2004; Kroenke et al., 2001; Lowe, 2004; Martin, Winfried, Klaiberg, & Braehler, 2006) in a variety of populations. In the original validation study, the sensitivity and

specificity were 73% and 98%, respectively, for major depression among primary care patients (Spitzer et al., 1999).

Anxiety was also measured using items from the PHQ. These items ask about symptoms of panic disorder and generalized anxiety disorder over the past 4 weeks. We used the standard algorithm to categorize people as screening positive for panic disorder, generalized anxiety disorder, both, or neither (Spitzer et al., 1999). In the original validation study, the sensitivity and specificity of the PHQ Anxiety scale were 81% and 99%, respectively, for panic disorder; and 63% and 97%, respectively, for generalized anxiety disorder (Spitzer et al., 1999).

Some researchers suggest measuring functional impairments to help assess the severity of mental disorders and discriminate between disorders that may be mild or self-limiting and those that more seriously affect functioning (Kessler, Chiu, et al., 2005; Mechanic, 2003). More restrictive definitions of positive screens were constructed in the present study, requiring that respondents also indicated impairments in their academic activities that were related to mental health in the past 4 weeks. Because of space constraints in the survey, respondents were not asked about nonacademic impairments, such as those related to relationships or sleep patterns.

Three questions from the National Comorbidity Survey Replication (NCS-R; Kessler, Berglund, Borges, Nock, & Wang, 2005) were used to assess suicidality in the past 4 weeks. These questions asked whether in the past 4 weeks the respondent ever seriously thought about committing suicide, made a plan for committing suicide, or attempted suicide.

Potential Risk Factors

Associations were examined between mental disorders and the following characteristics: gender, age, race/ethnicity, nationality (U.S. or international), sexual orientation, living situation, current financial situation, past financial situation when growing up, and current relationship status. In addition, because of the timing of the survey, shortly after Hurricane Katrina, respondents were asked whether they or their close family members or friends were "personally present when hurricane force winds or flooding occurred as a result of the storm or [they] evacuated the area ahead of the storm."

Statistical Analysis

All analyses reflect the full study population by using the nonresponse adjustment weights described earlier and were performed using the Stata 9.0 program. In analyses including both undergraduates and graduate students, poststratification weights were also used to reflect the undergraduate versus graduate composition of the overall university student population (which is approximately 2 to 1). Logistic regressions with dichotomous mental health measures as the dependent variables were used to examine the independent associations between mental health measures and potential risk factors.

Results

A total of 2,843 students completed the main survey, yielding a 56.6% completion rate. Graduate students were more likely to complete the survey (65.8%) than undergraduates (47.3%), and females more likely (61.2%) than males (50.8%). The only statistically significant difference in completion rate by broad race/ethnicity group (White, Black, Hispanic, Asian) was a slightly lower rate for Black students (46.4%) than for other groups. Tables 1 and 2 present selected demographic and social characteristics of

Table 1
Distribution of Students' Demographic Characteristics

	Undergraduates			Graduates		
	Female (N = 677) Weighted %	Male (N = 604) Weighted %	All (N = 1,181) Weighted %	Female (N = 819) Weighted %	Male (N = 843) Weighted %	All (N = 1,662) Weighted %
Age						
18–22	95.1	93.0	94.0	10.0	7.1	8.4
23–25	3.1	5.8	4.5	34.9	29.0	31.7
26–30	1.0	0.5	0.8	36.7	40.4	38.7
31+	0.8	0.6	0.7	18.4	23.5	21.2
Race/ethnicity						
White/Caucasian, non-Hispanic, non-Arab	68.6	68.1	68.4	56.5	53.9	55.1
African American/Black, non-Hispanic	7.7	6.3	7.0	7.4	5.0	6.1
Hispanic/Latino	3.1	3.8	3.4	3.9	4.5	4.2
Asian or Pacific Islander	15.0	15.9	15.5	24.4	30.8	27.9
Arab/Middle Eastern or Arab American	0.2	1.9	1.1	1.6	1.7	1.7
More than one of the above	5.3	3.8	4.5	5.5	3.6	4.5
Other	0.3	0.2	0.2	0.7	0.8	0.7
Nationality						
International student	4.3	6.9	5.6	16.3	27.3	22.4
Sexual orientation						
Heterosexual	97.2	96.0	96.6	92.6	93.6	93.1
Gay/lesbian/queer	0.1	2.5	1.3	3.2	4.5	3.9
Bisexual	2.6	1.5	2.0	3.6	1.0	2.2

Table 2
Distribution of Students' Living and Economic Characteristics

	Undergraduates			Graduates		
	Female (N = 677) Weighted %	Male (N = 604) Weighted %	All (N = 1,181) Weighted %	Female (N = 819) Weighted %	Male (N = 843) Weighted %	All (N = 1,662) Weighted %
Living situation						
Off-campus and not with parent/ guardian	48.9	44.9	46.9	90.4	85.2	87.5
Campus residence hall	44.3	45.3	44.8	2.5	2.1	2.2
Fraternity or sorority house	2.6	5.8	4.2	0.0	0.9	0.5
Other University housing	1.5	1.4	1.5	5.0	10.5	8.0
Parent or guardian's home	2.7	2.6	2.6	2.2	1.4	1.7
Current financial situation						
"It's a financial struggle"	14.6	13.8	14.2	16.2	12.0	13.9
"It's tight but I'm doing fine"	50.6	47.8	49.2	61.3	61.3	61.3
"Finances aren't really a problem"	34.8	38.5	36.6	22.4	26.7	24.8
Financial situation, growing up						
"Poor, not enough to get by"	1.2	1.3	1.3	3.9	2.7	3.3
"Enough, not many extras"	22.0	22.6	22.3	33.0	34.2	33.7
"Comfortable"	57.4	57.4	57.4	49.1	54.9	52.3
"Well to do"	19.3	18.7	19.0	14.0	8.2	10.8
Affected by Hurricane Katrina	8.2	7.3	7.8	6.2	5.5	5.8

the sample, respectively, by gender and undergraduate/graduate status.

Of the 485 students randomly selected for the brief nonrespondent survey, 263 (54.2%) completed the survey. Completion rates were 54.2% for males, 54.3% for females; and 56.8% for graduate students, and 51.7% for undergraduates. As in the main survey, Black students had a lower response rate than other groups (44.1%). Asian students, by contrast, had a higher response rate than other groups (66.7%). In terms of mental health, this brief survey did indicate nonresponse bias in the main survey. Respondents to the main survey had significantly more positive screens for depression (14.1%, unweighted) than respondents to the nonrespondent survey (6.1%, unweighted). Results from the nonrespondent survey (a detailed description is available in the online appendix to Eisenberg, Goldstein, & Gollust, 2007) were used to construct weights but were not included otherwise in the main analysis. These weights adjust the estimates to be representative of the full sample population. All analyses mentioned from this point forward utilized nonresponse weights.

According to the PHQ, 15.6% of undergraduates and 13.0% of graduate students screened as positive for a depressive or anxiety disorder (see Table 3). The prevalence of positive screens for depression (major or other) was 13.8% for undergraduates and 11.3% for graduate students. The prevalence of overall positive screens for depression was identical by gender among undergraduates and slightly higher for females among graduate students. More students screened positive for other depression, compared with major depression (8.6% vs. 5.2% for undergraduates, and 7.2% vs. 4.1% for graduate students). Positive screens for either panic disorder or generalized anxiety disorder were less prevalent: 4.2% for undergraduates, 3.8% for graduate students. Most were positive screens for generalized anxiety disorder (2.9% of undergraduates, 3.1% of graduate students) rather than panic disorder (1.8%, 1.1%). Females were more than twice as likely as males to screen positive for anxiety disorders.

Suicidal thoughts in the past 4 weeks were reported by 2.5% of undergraduates and 1.6% of graduate students. Less than 1% of both groups reported making a suicidal plan in the past 4 weeks, and only 1 student in the entire sample reported a suicide attempt. Missing academic obligations in the past 4 weeks because of mental health was reported by 18.4% of undergraduates and 14.1% of graduate students. Also, 44.3% of undergraduates and 41.2% of graduate students reported that mental or emotional difficulties affected their academic performance in the past 4 weeks. When the definition of a positive screen for depression or anxiety was restricted to students who reported at least one of the aforementioned functional limitations, prevalence estimates fell but not substantially. For example, positive screens for depression fell from 13.8% to 11.4% for undergraduates and from 11.3% to 9.5% for graduate students.

Of those who screened positive for at least one of the conditions described earlier (major depression, other depression, panic disorder, generalized anxiety disorder, or suicidal thoughts), 22.4% screened positive for at least one more of these conditions. Prevalence estimates of comorbid pairs of these mental health problems are reported in Table 4. Some of the strongest associations were between generalized anxiety disorder and major depression (50.1% of those who screened positive for generalized anxiety disorder also screened positive for major depression) and between suicidal thoughts and depression (42.8% of those with suicidal thoughts screened positive for major depression, and 24.1% screened positive for other depression).

In multivariate logistic regressions (see Table 5), a number of sociodemographic characteristics positively predicted current mental health problems at $p < .05$ (two-tailed t tests, $df = 2{,}812$). Females were more likely to screen positive for anxiety disorders than males. Students who checked "other race" were more likely than White students to screen positive for depression. Self-identified bisexual students were more likely to screen positive for depression than self-identified heterosexual students. Compared

Table 3
Prevalence of Mental Health Problems in a University Student Population

	Undergraduates			Graduates		
	Female (N = 677) Weighted %	Male (N = 604) Weighted %	All (N = 1,181) Weighted %	Female (N = 819) Weighted %	Male (N = 843) Weighted %	All (N = 166) Weighted %
Any depression (PHQ-9)	13.8	13.8	13.8	12.5	10.3	11.3
Major depression	6.5	3.9	5.2	4.2	3.9	4.1
Other depression	7.3	9.9	8.6	8.3	6.4	7.2
Any anxiety (PHQ)	6.1	2.2	4.2	5.4	2.6	3.8
Panic disorder	2.7	0.8	1.8	1.5	0.9	1.1
Generalized anxiety disorder	4.2	1.6	2.9	4.5	1.9	3.1
Any depression or anxiety (PHQ)	16.6	14.6	15.6	15.4	11.1	13.0
Functional impairments, past 4 weeks						
Missed academic obligations due to mental health	22.4	14.3	18.4	18.2	10.8	14.1
Mental health affected academic performance	51.1	37.4	44.3	49.5	34.6	41.2
Mental disorders with functional impairment						
Any depression	11.9	10.8	11.4	10.5	8.7	9.5
Any anxiety	5.4	2.0	3.7	4.7	2.1	3.3
Any depression or anxiety	13.9	11.6	12.8	12.8	9.2	10.8
Suicidality, past 4 weeks						
Ideation	2.1	2.9	2.5	1.1	2.0	1.6
Plan	0.7	0.2	0.4	0.1	0.6	0.4
Attempt	0.1	0.0	0.1	0.0	0.0	0.0

with students living in off-campus housing and not with parents or guardians (the most common living situation), students living with parents or guardians were more likely to report suicidal thoughts. Students reporting current financial struggles were more likely to screen positive for depression and anxiety disorders. Students reporting that they grew up in a poor family were more likely to screen positive for depression and anxiety disorders, and more likely to have suicidal thoughts, compared with those who reported that they grew up in a comfortable financial situation. Perhaps surprisingly, students who reported that they grew up in "well-to-do" families were also more likely to report suicidal thoughts, compared with those who reported that they grew up in a comfortable financial situation. Finally, students reporting that they, their close friends, or their relatives experienced Hurricane Katrina were more likely to report suicidal thoughts, although this result was marginally significant (p = .06).

In contrast, characteristics associated with fewer mental health problems included being older than 25 (compared with being 18–22), living in a campus residence hall (compared with living off campus and not with parents or guardians), and being married or in a domestic partnership (compared with being single).

Discussion

Previous epidemiological studies of students with measures of mental health, such as the National College Health Assessment and the Centers for Disease Control and Prevention's (CDC's) National College Health Risk Behavior Survey, have largely been based on self-assessments of depression or emotional well-being (American College Health Association, 2006; CDC, 1997). The present study contributes to this literature by using instruments validated against clinical diagnoses, with multiple strategies to adjust for nonresponse bias. In a randomly selected sample of students at a single large public university, 13.8% of undergraduates and 11.3% of graduate students screened positive for major or other depression, 4.2% of undergraduates and 3.8% of graduate students screened positive for current panic disorder or generalized anxiety disorder, and 2.5% of undergraduates and 1.6% of gradu-

Table 4
Co-occurring Mental Health Problems in a University Student Population

Of those who screened positive for:	Major depression (N = 182)	Other depression (N = 238)	Panic disorder (N = 54)	Generalized anxiety disorder (N = 111)	Suicidal thoughts (N = 70)
Weighted percentage who also screened positive for:					
Major depression	100	n/a	29.5	50.1	42.8
Other depression	n/a	100	19.4	14.5	24.1
Panic disorder	9.4	3.7	100	14.7	14
Generalized anxiety disorder	30.4	5.3	28.1	100	20.6
Suicidal thoughts	20	6.8	20.6	15.8	100

ate students reported suicidal thoughts in the past 4 weeks. Females and males were about equally likely to screen positive for depression, and females were about twice as likely to screen positive for anxiety. The similar prevalence of depression by gender contrasts with findings in other populations, in which females typically have higher prevalence (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993), but is consistent with previous studies that have found comparable prevalence by gender in college populations (e.g., Gladstone & Koenig, 1994; Nolen-Hoeksema, 1990). However, females were found to be more likely to screen positive for major depression.

The present results for undergraduate students can be compared with data on 18–24-year-olds in the NCS-R. The present study's estimate of 5.2% with current major depression is higher than the NCS-R's estimate of 2.4% with major depression in the past 30 days. Also, a higher prevalence of generalized anxiety disorder (2.9% vs. 1.0%) and panic disorder (1.8% vs. 1.0%; Kessler, 2006) was found. These differences are likely due, at least in part, to the use of a screening tool (the PHQ) in the present study, whereas the NCS-R was based on diagnostic interviews with more restrictive criteria.

Limitations

Certain limitations should be kept in mind when interpreting the results of this study. In the present study, we focused on depression, anxiety, and suicidality and thus did not examine the full range of mental health problems prevalent in student populations. Also, the PHQ instruments used to screen for depression and anxiety have been validated against clinical diagnoses but are not equivalent to diagnoses. It is important to note, however, that the sensitivities and specificities from the original validation studies suggest the tool can be used for reasonably accurate prevalence estimates (Spitzer et al., 1999).

Table 5
Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Predictors of Mental Health Problems

	Depression (major or other) (N = 2,686)		Anxiety (panic disorder or GAD) (N = 2,681)		Suicidal thoughts (N = 2,678)	
	OR	95% CI	OR	95% CI	OR	95% CI
Female	1.02	(0.78, 1.34)	2.41**	(1.57, 3.70)	0.65	(0.35, 1.21)
Age 18–22						
Age 23–25	0.72	(0.42, 1.22)	0.65	(0.33, 1.27)	1.15	(0.47, 2.80)
Age 26–30	0.52*	(0.31, 0.88)	0.71	(0.32, 1.61)	1.26	(0.49, 3.23)
Age 31+	0.46*	(0.24, 0.88)	0.44	(0.16, 1.21)	0.75	(0.18, 3.13)
White, non-Hispanic, non-Arab						
African-American/Black, non-Hispanic	1.15	(0.62, 2.14)	0.68	(0.30, 1.55)	0.58	(0.18, 1.84)
Hispanic/Latino	0.57	(0.28, 1.14)	1.73	(0.75, 4.02)	‡	
Asian or Pacific Islander	1.12	(0.75, 1.68)	0.95	(0.44, 2.05)	1.12	(0.42, 2.99)
Arab/Middle Eastern or Arab-American	0.49	(0.17, 1.68)	1.83	(0.58, 5.81)	1.27	(0.16, 10.20)
More than one of the above	0.58	(0.30, 1.12)	1.33	(0.61, 2.90)	1.26	(0.40, 3.98)
Other	4.27*	(1.27, 14.30)	0.96	(0.12, 7.68)	‡	
U.S citizen or permanent resident						
International student	0.99	(0.61, 1.59)	0.39	(0.15, 1.05)	0.55	(0.29, 1.60)
Heterosexual						
Bisexual	3.91**	(2.09, 7.32)	0.88	(0.29, 2.67)	1.13	(0.12, 10.47)
Gay/lesbian/queer	1.31	(0.67, 2.56)	1.54	(0.56, 4.23)	1.39	(0.12, 5.34)
Off-campus and not with parent/guardian						
Campus residence hall	0.76	(0.52, 1.11)	0.41**	(0.21, 0.78)	0.33**	(0.12, 0.91)
Fraternity or sorority house	0.87	(0.40, 1.90)	1.04	(0.32, 3.41)	1.61	(0.39, 6.73)
Other University housing	1.13	(0.66, 1.96)	1.32	(0.54, 3.26)	1.50	(0.45, 5.00)
Parent or guardian's home	1.66	(0.73, 3.79)	0.76	(0.21, 2.74)	3.98**	(1.45, 10.96)
"Finances aren't really a problem"						
"It's a financial struggle"	1.64*	(1.06, 2.55)	2.86**	(1.50, 5.45)	2.33	(0.90, 6.01)
"It's tight but I'm doing fine"	1.12	(0.83, 1.50)	1.29	(0.77, 2.16)	1.40	(0.68, 2.87)
"Comfortable"						
"Poor, not enough to get by"	2.88**	(1.28, 6.48)	3.02*	(1.24, 7.35)	8.99**	(2.69, 30.03)
"Enough, not many extras"	1.25	(0.92, 1.70)	1.08	(0.67, 1.76)	1.54	(0.77, 3.07)
"Well to do"	1.05	(0.72, 1.52)	0.85	(0.45, 1.60)	2.42*	(1.08, 5.41)
Single						
In a relationship	0.76	(0.57, 1.01)	0.79	(0.51, 1.23)	0.72	(0.37, 1.39)
Married or domestic partnership	0.58*	(0.38, 0.91)	0.65	(0.34, 1.24)	0.45	(0.19, 1.09)
Divorced or widowed	1.73	(0.49, 6.05)	2.23	(0.32, 15.48)	2.14	(0.14, 33.13)
Affected by Katrina	1.21	(0.75, 1.95)	1.13	(0.57, 2.24)	2.37	(0.96, 5.87)

Note. Odds ratios are calculated from three multivariate logistic regressions (one for each condition). Other covariates included in the regressions were degree program dummies (Bachelor's, Master's, JD, MD, PhD or equivalent) and year in program dummies (1–5+). For categorical variables, the most common category is listed first and is used as the reference category.
*$p < .05$. **$p < .01$.
‡Variable dropped from model due to perfect prediction.

For example, if the true prevalence of major depression in a population is 5.0%, the PHQ-9 would be expected to produce an estimate of (5% · 0.73) + (95% · 0.02) = 5.55%. Another potential limitation is that these instruments have not yet been validated specifically for use in a Web survey. However, the questions were presented on the screen in the same layout as they appear in the self-administered paper mode, and other types of instruments have been shown to produce similar results on the Web, compared with paper, in a survey of college students about substance use (McCabe, 2004).

Finally, the sample was drawn from a single university. As noted earlier, this university is similar to the national population in terms of gender and racial make-up. However, this university also has certain characteristics, such as being a highly competitive, research-oriented institution, that are not representative of colleges and universities in general, thus limiting the generalizability of the present findings. The issues investigated in this study may look quite different in small liberal arts schools, community colleges, commuter colleges, or other types of institutions.

Implications for Research

The findings of this study highlight the importance of investigating nonresponse bias in mental health survey research. Although the 57% response rate was high for a Web-based survey (Cook, Heath, & Thompson, 2000) and within 14 percentage points of the NCS-R (Kessler, Berglund, Demler, et al., 2005), the brief survey of randomly selected nonrespondents in the present study revealed significant response bias in terms of depression symptoms and use of mental health services. It appears that not collecting this additional information to construct weights would have led to overestimation of the prevalence of depressive and anxiety disorders. For example, the unweighted estimated prevalence of depression for undergraduates was 17.1%, whereas the weighted estimate was 13.8%. The results regarding risk factors, by contrast, were similar whether weighted or unweighted (unweighted results are available from me on request).

A few findings related to risk factors suggest priorities for future research. First, it would be useful to investigate the extent to which the elevated risk of suicidal thoughts for students living with parents or guardians is due to a selection effect (more vulnerable students remain living with family) or to a true causal effect (perhaps by stunting the individuation process). Also, students who reported growing up in a well-to-do family (the highest category) were found to be more likely to report suicidal thoughts than those who reported growing up in a comfortable financial situation (the next highest category). To our knowledge, this is a new finding in the college mental health literature and warrants further investigation. Finally, the finding that bisexual students experienced higher levels of mental health problems is consistent with some previous literature for the general population of adults, but the reason for this difference warrants further investigation. Some authors have speculated that this difference may stem in part from a sense of "double oppression" from both the heterosexual and gay/lesbian/queer communities (Rothblum & Factor, 2001).

Implications for Prevention, Service Delivery, and Policy

Perhaps the most striking finding was that students who reported they grew up in poor families were substantially more likely (odds ratios above 3) to screen positive for depression or anxiety disorders and to report suicidal thoughts. These results demonstrate that significant socioeconomic disparities in mental health exist even within a setting that is often thought of as representing a privileged segment of society. It is also noteworthy that this large disparity exists even though all students in the sample university had access to free short-term counseling and basic medical services. Given that reduced financial barriers to care appear insufficient to reduce disparities in mental health problems, other strategies such as education and outreach may be crucial for these students. As enrollment of students from low socioeconomic backgrounds rises (Black & Sufi, 2002), understanding and addressing their mental health needs is essential for assuring the conditions for successful educational experiences.

A few factors were associated with significantly lower risks of mental health problems and may therefore represent protective factors. Two of these factors are related to social support: living in a campus dormitory and being married or in a domestic partnership. Many studies have shown strong correlations between social support and better mental health (Coyne & Downey, 1991), and one previous study of college students found that students who live with a spouse or partner are less likely to have suicidal thoughts (Brener, Hassan, & Barrios, 1999). The apparent protectiveness of living in a dormitory may be relevant for the debate over whether schools should suspend suicidal students because of concerns about legal liability (for a discussion of this debate, see, e.g., Appelbaum, 2006). If remaining in a dormitory is beneficial for some students experiencing mental health problems, then schools should weigh this carefully before deciding to remove them.

Three quarters of individuals reporting lifetime mental disorders have their first onset by age 24 (Kessler, Berglund, Demler, et al., 2005). College and university communities reach over half of each cohort of youths and thus represent opportunities to help prevent mental health problems before they occur or before they become more serious. These efforts can help counter the unfortunate reality that the average delay in seeking care for a mental illness is 8–10 years (Wang et al., 2005). Data such as those presented in this study may be used to help determine an appropriate mix and amount of treatment resources and other initiatives to improve mental health for young adults and students in particular. The gains from doing so could be substantial.

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