**Contextualizing Public Stigma:
Endorsed Mental Health Treatment Stigma on College and University Campuses**

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Abstract: Scholars suggest that public mental health stigma operates at a meso-level and is associated with severity of symptoms, disclosure, self-esteem, and treatment-seeking behavior. However, the operationalization of public stigma nearly always comes from an individual-level generalization of what others believe. Using data from over 60,000 students on 75 U.S. college and university campuses between 2009-2015, we contextualize public stigma by creating a school-level measure of students' individual-level endorsed mental health treatment stigma. We present multilevel logistic regression models for 21 different dependent variables. We find that even after controlling for individual-level stigma scores, school-level stigma is negatively associated with self-reports of suicidal ideation and self-injury, although not associated with screens for depression or anxiety. Moreover, school-level stigma is negatively associated with medication use, counseling and therapy visits, and to a lesser degree, informal support. We suggest that future research should continue to examine the contextual environment of public stigma, while policymakers may be able to implement changes to significantly reduce stigma at this level.

Keywords: United States, stigma, mental health, higher education, institutional context

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INTRODUCTION

“For stigma research to move forward, sociologists and other stigma researchers need to...pursue innovative directions that define critical agendas to understand and alter the landscape of stigma.”
– Pescosolido and Martin 2015.

Since Erving Goffman’s (1963) seminal work on the topic, the volume of research on stigma has rapidly expanded, spawning multiple major review articles in the past two decades alone (Clement et al. 2015; Corrigan, Druss, and Perlick 2014; Gulliver, Griffiths, and Christensen 2010; Link and Phelan 2001; Major and O’Brien 2005; Parcesepe and Cabassa 2013; Pescosolido and Martin 2015). This heightened attention is, in part, due to the important associations between stigma and the severity of mental illness symptoms (Andrade et al. 2014; Brown 2017; Drapalski et al. 2013), disclosure of conditions to friends, family, and healthcare professionals (Dew et al. 2007; Donnelly 2017; Prior et al. 2003), self-esteem (Corrigan 2004; Corrigan and Watson 2002; Corrigan, Watson, and Barr 2006), and treatment-seeking behavior (Clement et al. 2015; Tsang, Fung, and Chung 2010; Vogel, Wade, and Haake 2006). While population estimates suggest that many individuals with symptoms of mental illness do not receive treatment or are undertreated (Kessler et al. 2005; Wang et al. 2005, 2007), scholars, healthcare providers, and other stakeholders hope that stigma reduction efforts will increase treatment-seeking behavior (Clair, Daniel, and Lamont 2016; Hatzenbuehler, Phelan, and Link 2013; Hunter et al. 2017; Pilgrim and Rogers 2005).

Stigma can operate at the micro-, meso-, and macro- levels, often conceptualized as self-stigma, public stigma, and structural stigma, respectively (Pescosolido and Martin 2015), although some debate exists regarding these labels (also see Corrigan and Kosyluk 2014). However, scholars have fallen short in adequately capturing a true meso-level of stigma. Some

suggest that public stigma “attempts to map the levels and nature of stigma in the general population” (Pescosolido and Martin 2015; 94) and the concept of public stigma has been used to examine cross-national differences and changes within societies over time (Angermeyer and Dietrich 2006; Pescosolido and Martin 2007; Pescosolido et al. 2013). Others link public stigma to a group or community level and suggest that this type of stigma may only apply to specific groups, locations, and periods (Livingston and Boyd 2010; Quinn and Chaudoir 2009; Vogel, Wade, and Hackler 2007). However, previous operationalizations of public stigma ask individual respondents to report on perceived stigma from a generic “most people” originally used in Bruce Link’s (1987; Link, Mirotznik, and Cullen 1991) Devaluation-Discrimination scale, with few exceptions (Moses 2010; also see Eisenberg et al. 2009 for discussion of this issue). These inconsistencies regarding the level of analysis at which public stigma truly takes place perhaps explain the mixed findings on whether public stigma has a positive, negative, or no association with severity of symptoms, disclosure, self-esteem, and treatment (Corrigan et al. 2016; Eisenberg et al. 2009; Golberstein, Eisenberg, and Gollust 2008, 2009; Hunter et al. 2017; Sirey et al. 2001).

A true meso-level measurement of stigma must account for the specific context of the time and place of individuals. Rather than simply measuring individual perceptions of *others’* stigma, we suggest that a true measure of public stigma should contextualize the aggregate environment of individual *self-beliefs* about stigma at a specific time and in a specific place. As scholars have suggested in a wide-ranging literature on neighborhood and school contextual effects, individual characteristics and aggregated individual characteristics at the group level may each have their own influence on social processes and outcomes (Harding 2003; Jencks and Mayer, 1990; Kubzansky et al. 2005; Lauen and Gaddis 2013; Sampson, Morenoff, and Gannon-Rowley 2002; Sharkey et al., 2012). In fact, recent work has highlighted the link between

community-level prejudice and health outcomes (Blair and Brondolo 2017; Orchard and Price 2017). Moreover, researchers have found a variety of contextual effects on mental health outcomes (Hill and Maimon 2013; Ivory et al. 2011; Leventhal and Brooks-Gunn 2003; Schulz et al. 2000) including on college and university campuses (Byrd and McKinnery 2012). Surprisingly, however, no research has examined public stigma in a contextualized manner.

In this article we empirically examine the associations between public stigma operating at the meso-level context and (1) self-reports of and screens for mental health conditions, (2) formal treatment-seeking behavior, and (3) informal support. We leverage differences across four mental health conditions – depression, anxiety, self-injury, and suicidal ideation – to suggest that associations with levels of contextualized public stigma may indicate underreporting rather than true lower prevalence of mental health conditions. We then examine the associations between contextualized public stigma and both formal treatment – medication use or counseling and therapy visits – and informal support to highlight the broader detrimental effects of stigma. We conduct our analyses using data from the Healthy Minds Study (HMS), which has surveyed college students about a broad range of mental health topics since 2007. Although the HMS began in 2007, the questions on stigma are only comparable from the 2009 data collection year and beyond. Below, we briefly discuss the reasons why the college and university campus setting is an appropriate avenue to study contextualized public stigma.

The College and University Campus Context

We chose college and university campuses as our means of examining contextualized public stigma for three primary reasons. First, research highlights important links between the young adulthood stage of the life course and the onset of symptoms of mental illness. The first onset of most lifetime mental illnesses occurs by an individual's mid-20s (Kessler et al. 2007).

Approximately 25% of all individuals who develop mood disorders have done so by age 18, whereas 75% of all individuals who develop an anxiety disorder have done so by age 21 and 75% of all individuals who develop any mental health disorder have done so by age 24 (Jones 2013). Previous studies find that not only are mental health conditions prevalent among undergraduate students, but self-reports of treatment-seeking behavior are low (Eisenberg, Golberstein, and Gollust 2007; Eisenberg, Gollust, Golberstein, and Hefner 2007; Eisenberg, Hunt, and Speer 2013).

Second, in many important ways, college and university campus contexts share similarities with other contexts previously studied. The environmental contexts of college and university campuses vary greatly, much like those of neighborhoods and K-12 schools where environmental contexts have been shown to affect academic, social, and health outcomes (Harding 2003; Sampson, 2008; Sharkey et al., 2012). Like neighborhoods and K-12 schools, young people on college and university campuses often spend a lot of time in a specific location, live nearby, and have intense and sustained interactions within that environment for eight to twelve months a year. In this respect, if contextualized public stigma matters anywhere, it should be in the types of environments in which we already know context matters greatly.

Finally, we chose college and university campuses because of the availability of high quality survey data over multiple years for this context. The HMS data have been used in over fifty peer-reviewed publications to date and are arguably the best available to examine mental health in higher education. The HMS collects large representative samples from each campus and asks a battery of questions about mental health conditions, stigma, and treatment. These rich data allow us to contextual public stigma in a way that other data cannot. Previous research has already begun to examine important differences across college and universities at the meso-level and we continue that tradition here (Lipson et al. 2015).

RESEARCH QUESTIONS

We focus on three research questions:

- (1) Is contextualized public stigma against mental health treatment at the school-level associated with self-reports of and screens for mental health conditions?
- (2) Is contextualized public stigma against mental health treatment at the school-level associated with formal treatment-seeking behavior in the form of medication use and counseling and therapy visits?
- (3) Is contextualized public stigma against mental health treatment at the school-level associated with informal support?

Prior work makes it somewhat unclear in what direction we might expect some of these associations to work. We separate self-reports of and screens for mental health conditions because contextualized public stigma may, through social desirability bias, encourage underreporting of mental health conditions, particularly severe ones such as self-injury and suicidal ideation. At the same time, it may be harder for students to underreport depression and anxiety since they are measured with screening tools rather than single self-reported items. The vast prior literature strongly suggests that contextualized public stigma should be negatively associated with formal treatment-seeking behavior, but is less clear on informal support. Environments with high contextualized public stigma may be associated with higher informal support if students are less likely to pursue formal avenues of treatment.

DATA, MEASURES, AND METHODS

Sample

This study makes use of four broad sources to develop our analysis: the Healthy Minds Study (HMS), Barron's Online Profiles of American Colleges (Barron's), the Integrated Postsecondary Education Data System (IPEDS), and the U.S. News and World Report (USNWR). The primary source, the HMS dataset, is an annual web-based survey including random samples of students from over 100 colleges and universities from the US. Web-based surveys are generally considered valuable for examining sensitive topics and in reducing social desirability bias (Aday 1996; McCabe 2004).

The HMS collects data on mental health and similar issues, such as depression, anxiety, and substance use disorders, as well as service utilization by respondents. Given the interest of the study lies mainly in colleges and universities, we exclude professional and specialized institutions such as art and design schools, and medical schools. Ultimately, the sample for this analysis includes 62,756 students at 75 unique institutions that participated in the study between 2009 and 2015. We supplement the HMS student-level data with school-level variables from Barron's, IPEDS, and USNWR.

School-Level Variables

Our primary independent variable of interest is a calculated mean endorsed mental health treatment stigma scale score for each college or university. Students were asked to rate the following 3 questions on a five-point Likert scale (strongly agree to strongly disagree): (1) "I would willingly accept someone who has received mental health treatment as a close friend." (2) "I would think less of a person who has received mental health treatment." (3) "I feel that receiving mental health treatment is a sign of personal failure." We reverse coded item 1 and summed these three variables for each student to construct an individual endorsed mental health

treatment stigma scale score. We then calculated the mean of these individual scores at each college or university.

Our multilevel analyses include six other school-level controls: type of housing, public/private, admissions selectivity, school enrollment size, and type of institutional program. The type of housing variable comes from IPEDS, captures the proportion of students living in campus-owned, -operated, or -affiliated housing, and has values of nonresidential, residential, or highly residential. The sector variable comes from USNWR and has the values of public or private. The admissions selectivity variable comes from Barron's and has values of noncompetitive, less competitive, competitive, very competitive, highly competitive, and most competitive. The school enrollment size variable comes from IPEDS, captures the Carnegie Foundation's definition of institutional size, and has values of small (<3,000 students), medium (3,000-9,999 students), and large ($\geq 10,000$ students). The institutional type variable comes from IPEDS and has values of doctorate-granting, master's, or baccalaureate only.

Mental Health Outcomes

We examine four sets of mental health outcomes: (1) self-reports and screens for mental health conditions, (2) medication use, (3) counseling and therapy visits, and (4) informal support. The mental health conditions include five binary variables identifying if respondents screen positive for depression (PHQ-9), screen positive for anxiety (PHQ anxiety module and GAD-7), self-report having thoughts of suicide during the past twelve months, self-report self-injurious behavior during the past four weeks, or have a positive response on one or more of these four mental health conditions (any). The medication outcomes are four binary variables identifying if respondents have taken anti-depressants, anxiety medication, sleep medication, psychostimulants, or one or more medications in the last twelve months (any). The counseling

and therapy outcomes consist of four binary variables identifying if respondents have sought counseling of therapy from their institution's student services, a local provider outside their institution, a provider in their hometown, or any health professional for their mental or emotional health in the last twelve months. The final group of outcomes on informal support includes seven binary variables identifying if respondents received counseling or support for their mental or emotional health from a family member, religious counselor or religious contact, support group, a friend, a roommate, a significant other, or any informal source in the last twelve months. See Table 1 for a full list and descriptions of these twenty-one dependent variables.

Individual-Level Controls

Our analyses also include controls for individual-level characteristics. These include mother's and father's educational attainment (years of school), race, gender, age, survey year, and the individual endorsed mental health treatment stigma scale score. The stigma scale score, described in more detail above, has a range of 1 to 15. See Table 1 for a full list and descriptions of individual-level controls.

Method of Analysis

We estimate multilevel logistic regressions with random intercepts for each of the mental health outcomes of interest. This procedure allows us to calculate net effects of school-level characteristics on the likelihood of reporting a mental health condition, while controlling for both cross-school and individual-level characteristics (Raudenbush and Bryk 2001). According to the intra-class correlation calculations for each of the models, there is sufficient variation across schools to justify the use of multilevel modeling. When modeling mental health conditions as dependent variables, our analysis sample includes all 62,576 students. However, when modeling

formal treatment or informal support outcomes, we choose to restrict our sample to only those who have a mental health condition (as characterized by a positive response on one or more of the four mental health conditions: depression screen, anxiety screen, self-injury self-report, or suicidal ideation self-report). When modeling medication use outcomes, this reduces our sample size to 21,128; when modeling counseling and therapy visits or informal support outcomes, this reduces our sample size to 19,400. Additionally, our analysis only includes 68 colleges and universities because 7 did not participate in the treatment and informal support modules.

RESULTS

Descriptive Analysis

Tables 2 and 3 show descriptive statistics for the school- and individual-level variables respectively. The school-level descriptive statistics suggest that although schools select into the HMS, we still see significant variation across several important characteristics in the dataset. Figure 1 shows the variation in school-level prevalence of the “any” version of our four types of outcomes (mental health conditions, medication use, seeking counseling or therapy, and informal support). We find significant variation across schools on all four types of measures. Prevalence of any mental health condition ranges from 25.2% to 50.5%, with a mean of 35.2%. Any medication use ranges from 4.1% to 18.7%, with a mean of 10.3%. Any counseling or therapy ranges from 5.3% to 21.4%, with a mean of 11.2%. Any informal support ranges from 18.6% to 42.1%, with a mean of 28.8%. Figure 2 shows fitted lowess curves of the school-level prevalence of the four “any” measures of outcomes on the y-axis against school-level mean endorsed mental health treatment stigma scores on the x-axis. This examination at the school-level suggests a negative association between school-level stigma and prevalence of mental health conditions, medication use, counseling or therapy visits, and informal support.

Logistic Regression Analysis

In Table 4, we report odds-ratio results of multilevel logistic regression analyses predicting an individual respondent's (1) screen for depression, (2) screen for anxiety, (3) self-report of suicidal ideation, (4) self-report of self-injury, and (5) any mental health condition. All models control for a host of individual- and school-level controls. The results suggest that while the individual-level stigma score is positively associated with all five dependent variables, the school-level mean stigma score has *negative* associations and only with the single-item self-report dependent variables. Students on campuses with higher school-level mean stigma scale scores are less likely to report thoughts of suicide or self-injurious behavior, but there is no association between school-level mean stigma scale scores and screens for depression or anxiety.

In Table 5, we show similar models with medication use as the dependent variables. However, in these models we include only students who have a mental health condition according to our “any” variable, essentially adjusting for the prior negative association between school-level stigma and mental health conditions. Once again, we find negative associations between the school-level mean stigma scale score and the dependent variables, even while controlling for individual-level stigma score and individual- and school-level controls. Students on campuses with higher school-level mean stigma scale scores are less likely to report taking medication for depression or anxiety, or any medication. Additionally, there is a marginally significant negative association between the school-level mean stigma scale score and taking psychostimulants.

In Tables 6 and 7, we report odds-ratio results of multilevel logistic regression analyses predicting an individual's likelihood to seek counseling and therapy (Table 6) and informal support (Table 7) for mental health conditions. Among three of the four dependent variables for

counseling and therapy, we find negative associations between the school-level mean stigma scale score and the dependent variables, with particularly large and strong negative effects on counseling or therapy services from the institution. The results for seeking informal support are much more mixed. We find negative associations between the school-level mean stigma scale score and talking to a family member, friend, significant other, or any informal support. However, we do not find significant associations with talking to a roommate or support group. Moreover, we find a marginally significant *positive* association between the school-level mean stigma scale score and seeking informal support through a religious group.

Because we find that school-level mean stigma scale scores are differentially associated with self-report versus screens of mental health conditions, we chose to run a series of robustness checks. We analyzed models similar to those presented in Tables 5 through 7 but instead restricted our sample in one version to only those who had a mental health condition based on a self-report and in a second version to only those who had a mental health condition based on a positive screen. We find no differences across these types of models. These results are available from the authors upon request.

CONCLUSION AND DISCUSSION

Scholars have devoted much attention to mental health stigma, noting that stigma operates at the micro-, meso-, and macro- levels. Known as public stigma at the meso-level, it is often operationalized as an individual response about what “most people” think. However, considering local and community context and measuring public stigma at the proper level of analysis may help elucidate the impact and mechanisms of public stigma. In this research, we contextualized public stigma by creating a school-level measure of students’ individual-level endorsed mental health treatment stigma. We found that even after controlling for individual-

level stigma scores, school-level stigma is negatively associated with self-reports of suicidal ideation and self-injury, although not associated with screens for depression or anxiety. We believe that it is likely that higher levels of contextualized public stigma do not reduce the prevalence of mental health conditions but lead students to underreport these conditions. Moreover, school-level stigma is negatively associated with medication use, counseling and therapy visits, and to a lesser degree, informal support.

Our research has strong implications for higher education administrators, staff, and healthcare providers. The meso-level of stigma likely represents a very important conduit for improving individual mental health, treatment seeking-behavior, and adherence. Communities and organizations might not be able to influence the broader macro-levels of opinions and beliefs about mental illness, but they can enact policies and campaigns to influence local environments. Additionally, individuals may care more about what their local reference group peers think than the generalized other. As an example that merges these ideas, we might imagine that the context of stigma against mental health treatment on a single college or university campus could be influenced by an institutional campaign to reduce stigma via flyers highlighting the prevalence of mental health conditions among the local student body. By targeting all individuals, rather than just those with mental health conditions, the campaign might be successful at changing the entire campus climate surrounding stigma. In fact, many researchers have discussed and documented the importance of similar types of processes in meso-level contexts to help reduce mental illness stigma (Cook et al. 2014; Corrigan and Fong 2014; Kosyluk et al. 2016; Thornicroft et al. 2016). Research suggests that among college students, efforts at mental health education are more effective in reducing stigma than efforts at increasing contact with others who have a mental health condition and overall, targeted interventions are more effective than broad interventions (Mittal et al. 2012; Thornicroft et al. 2016). These findings suggest that colleges and universities

might reduce stigma by investing in localized anti-stigma campaigns with physical and digital materials conveying facts and statistics about mental health. Reducing stigma is particularly important given the strong negative association between school-level stigma and use of an institution's services for counseling or therapy.

This research also has implications for other scholars studying mental health. If public stigma is negatively associated with reports of mental health conditions and treatment in other contexts, researchers must be cautious to interpret population-level statistics. Survey data of self-reports may underestimate true levels of mental health conditions and do so unevenly across populations, neighborhoods, and communities. Scholarly work on mental health and stigma would likely benefit from including contextualized measures of public stigma whenever possible, and researchers should consider data collection designs that allow them to capture contextualized measures of public stigma as well. More research comparing self-reports, institutional records, and other modes of data collection would help scholars adjudicate these issues as well (Cernat, Couper, and Ofstedal 2016; Rhodes et al. 2006).

Limitations & Directions for Future Research

We caution readers that we cannot make claims about causality in this article. While it is possible that the contextual levels of public stigma on college and university campuses directly impact students' likelihoods of reporting mental health conditions, seeking formal treatment, and seeking informal support, it is also possible that the causal arrow goes in the opposite direction. A higher proportion of students who do not have mental health conditions may drive up public stigma on campuses, however this "contact hypothesis" remains unresolved itself (see Eisenberg, Downs, and Golberstein 2012). We believe that recent research on the causal direction of public stigma and mental health (Kendra 2013) as well as our own differences in findings between self-

report and screen measures hints at the causal direction and we suggest that future research should more thoroughly investigate this in a causal framework.

A second limitation concerns the selection of schools into the HMS. Although the student respondents are representative of each college or university, these institutions opt into the HMS each year, often because they are interested in obtaining data about the mental health of their own students. Thus, we must consider that the HMS might not capture schools on the tails of the contextualized public stigma scale – schools where things are going so well on campus that administrators feel no need to pay for the HMS, or schools where things are going so poorly precisely because administrators are not paying attention to mental health on campus. Other researchers may be able to collect data that gives us a better understanding of the entire distribution of contextualized public stigma

Finally, our study does not go into detail about the mechanisms of contextualized public stigma and differences between institutions that lead to variation in contextualized public stigma. Literature on a variety of contextual effects generally suggests that individual actors need not know about all others' individual characteristics. Instead, the aggregated individual characteristics are reflected in the contextual environment through motivation, involvement, expectations, and resources, among other things. In the campus environment, we might imagine that student, faculty, and staff attitudes and beliefs about mental health are enacted through comments and other reactions around campus. Additionally, resources and policies, particularly those related to insurance, service availability, and fees, almost certainly contribute to differences in contextualized public stigma across campuses. Although the HMS lacks data on such institutional characteristics, we have designed supplemental data collection around the HMS, dubbed the Healthy Minds Study Institutional Website Supplement, to broaden the range of research questions scholars can ask about institutional contributions to student mental health. It is

our hope that in future research we can examine what characteristics contribute to contextualized public stigma and provide a roadmap to creating policies to reduce stigma on campuses.

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Table 1. Brief Variable Descriptions

Variables	Level	Source	Other
Outcomes: Mental Health Condition			
Depression	Binary	HMS	PHQ-9 screen
Anxiety	Binary	HMS	PHQ anxiety module or GAD-7 screen
Suicidal ideation	Binary	HMS	Self-report
Self-injury	Binary	HMS	Self-report
Any mental health condition	Binary	HMS	Any of above
Outcomes: Medication Use			
Depression medication	Binary	HMS	
Anxiety medication	Binary	HMS	
Sleeping medication	Binary	HMS	
Psychostimulants	Binary	HMS	
Any mental health medication	Binary	HMS	Any of above
Outcomes: Counseling/Therapy			
Counseling	Binary	HMS	
Local provider	Binary	HMS	
Hometown provider	Binary	HMS	
Any counseling or therapy from health professional	Binary	HMS	Any of above
Outcomes: Informal support			
Family member	Binary	HMS	
Religious group	Binary	HMS	
Support group	Binary	HMS	
Friend	Binary	HMS	
Roommate	Binary	HMS	
Significant other	Binary	HMS	
Any informal support	Binary	HMS	Any of above
Individual-level Controls			
Age	Ordinal	HMS	1 = 18 and 10 = 45+
Mother's educational attainment	Ordinal	HMS	1 = 8th grade 10 = Graduate degree
Father's educational attainment	Ordinal	HMS	1 = 8th grade 10 = Graduate degree
Year	Continuous	HMS	
Year in school	Continuous	HMS	
White/Non-white	Binary	HMS	
Female/Male	Binary	HMS	
Heterosexual/Non-heterosexual	Binary	HMS	
Stigma scale	Scale	HMS	Range: 1 to 15
School-level variables			
Institutional type	Categorical	IPEDS	BA, MA, PhD.
Enrollment	Ordinal	IPEDS	1 = Small 3 = Large
Sector	Binary	USNWR	1 = Public 0 = Private
Housing	Ordinal	IPEDS	1 = Non-residential 3 = Highly residential
Admissions selectivity	Ordinal	Barron's	1 = Low competitive 6 = Most competitive
Mean endorsed stigma scale score	Continuous	HMS	

Table 2. School-Level Descriptive Statistics

		N schools	% schools	N students	% students
<u>Institutional Type</u>	Baccalaureate	14	18.67	9,477	15.10
	Master's	21	28.00	18,053	28.77
	Doctorate	40	53.33	35,226	56.13
<u>Enrollment Size</u>	Small	12	16.00	6,268	9.99
	Medium	14	18.67	10,728	17.09
	Large	49	65.33	45,760	72.92
<u>Sector</u>	Public	45	60.00	37,964	60.49
	Private	30	40.00	24,792	39.51
<u>Housing</u>	Non-residential	19	25.33	12,105	19.29
	Residential	34	45.33	30,543	48.67
	Highly residential	22	29.33	20,108	32.04
<u>Admissions Selectivity</u>	Low competitive	5	6.67	2,438	3.88
	Competitive	34	45.33	18,914	30.14
	Very competitive	13	17.33	11,895	18.95
	Highly competitive	10	13.33	11,170	17.80
	Most competitive	13	17.33	18,339	29.22
<u>Total</u>		75		62,756	
		Mean	SD	Min	Max
Mean endorsed stigma scale score		2.67	0.30	1.87	3.44

Table 3. Individual-Level Descriptive Statistics

Outcomes: Mental Health Conditions (N=52,756)	% “yes”	SD	Min	Max
Depression	0.17	0.37	0	1
Anxiety	0.13	0.33	0	1
Suicidal ideation	0.08	0.26	0	1
Self-injury	0.17	0.37	0	1
Any Mental Health Condition	0.34	0.47	0	1
Outcomes: Medication (N=21,128)				
Any Mental Health Medication	0.25	0.44	0	1
Depression medication	0.17	0.37	0	1
Anxiety medication	0.09	0.29	0	1
Sleeping medication	0.06	0.24	0	1
Psychostimulants	0.07	0.26	0	1
Outcomes: Counseling and Therapy (N=19,400)				
Counseling	0.17	0.37	0	1
Local provider	0.07	0.25	0	1
Hometown provider	0.10	0.29	0	1
Sought health professional	0.30	0.46	0	1
Outcomes: Informal Support (N=19,400)				
Family member	0.52	0.50	0	1
Religious group	0.07	0.25	0	1
Support group	0.03	0.17	0	1
Any informal support	0.80	0.40	0	1
Friend	0.63	0.48	0	1
Roommate	0.28	0.45	0	1
Significant other	0.36	0.48	0	1
Individual-level Controls*	Mean	SD	Min	Max
Age	3.60	1.92	1	10
Mother’s educational attainment	5.19	1.63	1	8
Father’s educational attainment	5.33	1.74	1	8
Year	2012	1.73	2009	2015
White	70.28		0	1
Non-white	29.72		0	1
Male	35.07		0	1
Female	64.93		0	1
Heterosexual	.92	.27	0	1
Year in School	2.71	1.28	1	9
Endorsed stigma scale score	2.64	2.59	0	15

*Note: Restricted to main analysis sample.

Table 4. Multilevel Logistic Regressions Predicting Mental Health Conditions

	(1) Depression	(2) Anxiety	(3) Suicidal Ideation	(4) Self-Injury	(5) Any MH Condition
<u>School-level variables</u>					
Mean endorsed stigma scale score	0.950 (0.0757)	1.075 (0.117)	0.807* (0.0765)	0.861* (0.0521)	0.921 (0.0627)
Residential campus (ref: non-residential)	0.808*** (0.0424)	0.758*** (0.0552)	0.912 (0.0561)	0.907* (0.0364)	0.822*** (0.0374)
Highly residential campus (ref: non-residential)	0.783** (0.0672)	0.570*** (0.0684)	0.934 (0.0921)	1.010 (0.0630)	0.789** (0.0583)
Public institution (ref: private)	1.021 (0.0634)	1.092 (0.0959)	0.862* (0.0600)	0.903* (0.0387)	0.995 (0.0533)
Medium size institution (ref: small)	1.008 (0.0966)	0.705** (0.0925)	0.935 (0.105)	0.870+ (0.0623)	0.890 (0.0730)
Large size institution (ref: small)	1.013 (0.111)	0.705* (0.106)	0.905 (0.116)	0.889 (0.0734)	0.900 (0.0841)
<u>Individual-level controls</u>					
Endorsed stigma scale score	1.073*** (0.00435)	1.025*** (0.00493)	1.035*** (0.00602)	1.019*** (0.00430)	1.040*** (0.00347)
Age	1.001 (0.00791)	1.023** (0.00897)	0.978* (0.0112)	0.892*** (0.00816)	0.970*** (0.00632)
White (ref: non-white)	0.786*** (0.0194)	1.134*** (0.0333)	0.883*** (0.0306)	1.050+ (0.0265)	0.920*** (0.0185)
Female (ref: Male)	1.031 (0.0238)	1.848*** (0.0529)	0.992 (0.0321)	1.097*** (0.0255)	1.158*** (0.0214)
Mother's educational attainment	0.963*** (0.00778)	0.962*** (0.00886)	0.989 (0.0113)	1.002 (0.00833)	0.982** (0.00642)
Father's educational attainment	0.992 (0.00739)	0.993 (0.00839)	0.997 (0.0105)	1.009 (0.00775)	0.996 (0.00601)
Year	1.009 (0.00817)	1.184*** (0.0117)	1.057*** (0.0112)	1.014+ (0.00742)	1.036*** (0.00682)
<u>Random-effects</u>					
Intercept variance	0.120 (0.017)	0.184 (0.022)	0.115 (0.022)	0.060 (0.020)	0.108 (0.015)
N – individuals	62710	62710	62710	62710	62710
N – schools	75	75	75	75	75

Note: Regressions also control for school-level academic rank, school-level type (BA, MA, or doctorate granting), individual-level sexual orientation and year in current degree. Odds ratios shown. Standard errors in parenthesis.
 + = $p < 0.10$, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$

Table 5. Multilevel Logistic Regressions Predicting Medication Use

	(1) Depression Medication	(2) Anxiety Medication	(3) Sleeping Medication	(4) Psycho- stimulants	(5) Any Medication
<u>School-level variables</u>					
Mean endorsed stigma scale score	0.695** (0.0920)	0.711* (0.102)	0.797 (0.115)	0.700+ (0.139)	0.692** (0.0846)
Residential campus (ref: non-residential)	1.136 (0.100)	1.080 (0.100)	1.035 (0.0975)	1.256+ (0.169)	1.149+ (0.0935)
Highly residential campus (ref: non-residential)	1.128 (0.160)	0.946 (0.143)	1.079 (0.160)	1.110 (0.238)	1.086 (0.143)
Public institution (ref: private)	1.034 (0.105)	1.108 (0.117)	1.012 (0.103)	0.985 (0.153)	1.047 (0.100)
Medium size institution (ref: small)	1.131 (0.177)	1.175 (0.195)	1.044 (0.176)	1.024 (0.243)	1.063 (0.155)
Large size institution (ref: small)	1.262 (0.226)	1.263 (0.243)	1.252 (0.241)	1.111 (0.304)	1.202 (0.201)
<u>Individual-level controls</u>					
Endorsed stigma scale score	0.886*** (0.00726)	0.903*** (0.00939)	0.970** (0.0111)	0.931*** (0.0101)	0.901*** (0.00604)
Age	1.212*** (0.0165)	1.206*** (0.0194)	1.216*** (0.0224)	1.084*** (0.0220)	1.205*** (0.0147)
White (ref: non-white)	2.072*** (0.103)	1.882*** (0.118)	1.395*** (0.0984)	1.635*** (0.113)	1.928*** (0.0788)
Female (ref: Male)	1.791*** (0.0803)	1.574*** (0.0893)	1.349*** (0.0894)	0.714*** (0.0399)	1.288*** (0.0469)
Mother's educational attainment	1.063*** (0.0156)	1.063*** (0.0196)	1.032 (0.0227)	1.107*** (0.0233)	1.093*** (0.0138)
Father's educational attainment	1.045** (0.0141)	0.981 (0.0164)	1.014 (0.0204)	1.070*** (0.0207)	1.021+ (0.0117)
Year	1.004 (0.0139)	1.001 (0.0166)	0.883*** (0.0165)	1.019 (0.0201)	1.005 (0.0123)
<u>Random-effects</u>					
Intercept variance	0.190 (0.029)	0.164 (0.038)	0.091 (0.067)	0.297 (0.043)	0.187 (0.026)
N – individuals	21107	21107	21107	21107	21107
N – schools	75	75	75	75	75

Note: Regressions also control for all individual-level controls shown in Table 3 as well as school-level academic rank and school-level type (BA, MA, or doctorate granting). Odds ratios shown. Standard errors in parenthesis.
 + = $p < 0.10$, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$

Table 6. Multilevel Logistic Regressions Predicting Seeking Counseling and Therapy

	(1) Institution's Student Services	(2) Local Provider	(3) Hometown Provider	(4) Any Counseling or Therapy
<u>School-level variables</u>				
Mean endorsed stigma scale score	0.472** (0.109)	0.832 (0.169)	0.707** (0.0864)	0.684*** -0.0683
Residential campus (ref: non-residential)	0.998 (0.159)	0.912 (0.124)	1.309** (0.116)	1.140* -0.0756
Highly residential campus (ref: non-residential)	2.853*** (0.752)	0.858 (0.185)	1.613*** (0.203)	1.399** -0.146
Public institution (ref: private)	0.636* (0.128)	1.321+ (0.204)	1.112 (0.0919)	1.085 -0.08
Medium size institution (ref: small)	1.575 (0.459)	1.230 (0.299)	1.197 (0.168)	1.113 -0.13
Large size institution (ref: small)	1.993* (0.670)	1.544 (0.431)	1.182 (0.191)	1.13 -0.152
<u>Individual-level controls[#]</u>				
Endorsed stigma scale score	0.906*** (0.00730)	0.859*** (0.0111)	0.876*** (0.00925)	0.881*** -0.00566
<u>Random-effects</u>				
Intercept variance	0.432 (0.050)	0.294 (0.047)	0.083 (0.064)	0.126 (0.024)
N – individuals	21093	21093	21093	21093
N – schools	75	75	75	75

Note: Regressions also control for school-level academic rank and school-level type (BA, MA, or doctorate granting). Odds ratios shown. Standard errors in parenthesis. [#] Individual level controls include age, race, sex, parent's educational attainment, sexual orientation, and year in current degree.

+ = $p < 0.10$, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$

Table 7. Multilevel Logistic Regressions Predicting Seeking Informal Support

	(1) Family Member	(2) Religious Group	(3) Support Group	(4) Friend	(5) Roommate	(6) Significant Other	(7) Any Informal Support
<u>School-level variables</u>							
Mean endorsed stigma scale score	0.789** (0.0695)	1.537+ (0.373)	0.778 (0.200)	0.828* (0.0623)	0.957 (0.169)	0.751*** (0.0558)	0.794* (0.0862)
Residential campus (ref: non-residential)	1.011 (0.0543)	1.389* (0.222)	0.951 (0.151)	0.958 (0.0438)	1.783*** (0.207)	0.971 (0.0443)	0.993 (0.0645)
Highly residential campus (ref: non-residential)	0.986 (0.0866)	1.324 (0.347)	1.074 (0.278)	1.079 (0.0802)	1.888*** (0.359)	1.027 (0.0747)	1.031 (0.114)
Public institution (ref: private)	0.954 (0.0587)	1.091 (0.207)	1.139 (0.211)	1.177** (0.0599)	0.974 (0.137)	0.868** (0.0435)	1.176* (0.0913)
Medium size institution (ref: small)	0.935 (0.0975)	0.623 (0.186)	0.839 (0.267)	1.020 (0.0927)	0.783 (0.170)	0.938 (0.0836)	1.064 (0.139)
Large size institution (ref: small)	1.024 (0.125)	0.429* (0.146)	0.910 (0.328)	1.175 (0.125)	0.773 (0.193)	0.968 (0.101)	1.117 (0.172)
<u>Individual-level controls[#]</u>							
Endorsed stigma scale score	0.926*** (0.00518)	0.955*** (0.0106)	0.893*** (0.0170)	0.905*** (0.00514)	0.949*** (0.00617)	0.927*** (0.00552)	0.896*** (0.00584)
<u>Random-effects</u>							
Intercept variance	0.081 (0.025)	0.374 (0.048)	0.258 (0.070)	0.00003 (0.039)	0.289 (0.034)	0.0000086 (0.036)	0.095 (0.032)
N – individuals	19384	19384	19384	19384	19384	19384	19384
N – schools	68	68	68	68	68	68	68

Note: Regressions also control for school-level academic rank and school-level type (BA, MA, or doctorate granting). Odds ratios shown. Standard errors in parenthesis. # Individual level controls include age, race, sex, parent's educational attainment, sexual orientation, and year in current degree.

+ = $p < 0.10$, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$

Figure 1. Distribution of School-Level Prevalence of Four “Any” Outcomes

Note: Each dot represents one school.

Figure 2. School-Level Prevalence of Four “Any” Outcomes by School-Level Stigma

Note: Lowess curve estimates shown.