Graduate Student Mental Health:

Lessons from American Economics Departments*

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Abstract

We study the mental health of graduate students at 8 top-ranked economics PhD programs in the U.S. using clinically validated surveys. We find that 24.8% experience moderate or severe symptoms of depression or anxiety - more than two times the population average. Though our response rate was 45.1% and sample selection concerns exist, conservative lower bounds nonetheless suggest higher prevalence rates of such symptoms than in the general population. Mental health issues are especially prevalent at the end of the PhD program: 36.7% of students in years 6+ of their program experience moderate or severe symptoms of depression or anxiety, versus 21.2% of first-year students. 25.2% of economics students with these symptoms are in treatment, compared to 41.4% of graduate students in other programs. A similar percentage of economics students (40-50%) say they cannot honestly discuss mental health with advisers as say they cannot honestly discuss research progress or non-academic career options. Only 26% find their work to be useful always or most of the time, compared to 70% of economics faculty and 63% of the working age population. We provide recommendations for students, faculty, and administrators on ways to improve graduate student mental health.

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1 Introduction

Recent deaths by suicide among graduate students and faculty in economics have raised questions and concerns about mental health in the profession. In response, we developed a study of graduate student mental health with the aim of addressing these questions and concerns with data. The results we present here contribute to a literature in education and psychiatry by being the first to document the prevalence and severity of graduate student mental health problems in economics departments. This work is also, consequently, the first systematic study of the mental health of economists.

How common and how severe are symptoms of depression, anxiety, and suicidal ideation among aspiring economists? Is there something about the economics PhD environment that contributes to these symptoms? If so, what can we do about it?

To answer these questions, we put together three survey instruments: (1) an initial student survey about 25 minutes in length that covered mental health, experiences in the PhD program, and personal background information; (2) a 10-minute follow-up student survey that covered mental health and experiences in the program; and (3) a 10-minute survey of faculty in each participating department that covered experiences with students, reflections on the work environment, and recommendations on how to help students struggling with mental health issues.[1] Due to initial feedback we received from departmental leaders, we chose not to include mental health assessments in the faculty survey for fear of a low response rate. We administered the initial student survey and the faculty survey in the Fall of 2017, with the student follow-up survey administered in the Spring of 2018. The follow-up survey allowed us to see whether our results were robust to seasonal differences and to understand the nature of attrition between surveys.

With support from members of the American Economic Association's (AEA) Executive Committee, we contacted Department Chairs and Deans of Graduate Studies at 15 U.S. departments in an effort to recruit programs to participate. Our objective was to obtain buy-in

[1] We promised confidentiality and anonymity, making it impossible for us to reach out to students who were experiencing serious mental health issues while participating in the study. To address this limitation, our consent form and the final page of the surveys provided students with mental health resources.

from departmental leaders on the importance of the study, including a commitment to encourage student and faculty participation and to take our findings seriously. The downside of this approach was a sample that in the end included only 8 top-ranking departments and gave us a lens into only a particular segment of the entire economics graduate student population. The upside, we believe, was a high response rate from both students and faculty. Fruitful future work could expand our study to other departments, fields of study, and countries, exploring differences and similarities with the findings we report here.

1,138 economics PhD students received our first survey via e-mail and 513 of them (45.1%) participated (Table 1).[2] Concurrently with the first student survey, Department Chairs sent the faculty survey to approximately 448 faculty members, of whom 187 (42%) participated. We did not provide participation incentives for any of the surveys. The final list of participating institutions included: Columbia University, Harvard University, University of Michigan, Massachusetts Institute of Technology (MIT), Princeton University, UC Berkeley, UC San Diego, and Yale University.[3]

We find that the prevalence of poor mental health in these economics PhD programs is substantial. Our main tools of measurement are the clinically validated Patient Health Questionnaire-9 (PHQ-9), which measures symptoms of depression, and the General Anxiety Disorder-7 (GAD-7), which measures symptoms of anxiety. We find that 17.7% of students are experiencing moderate or severe symptoms of depression, 17.6% are experiencing such symptoms of anxiety, and 24.8% are afflicted with one or the other. These rates are 2 to 3 times the national prevalence, but are similar, if not lower than, estimates produced by other studies of graduate student mental health (e.g., UCOP (2017), Evans et al. (2018), CDC (2018a)).

Although students with moderate or severe symptoms are highly likely to have a diagnosable clinical disease, only 25.2% of them are receiving treatment (Kroenke and Spitzer (2002),

[2]In an earlier draft, we wrote that 1,185 students were contacted, for a response rate of 43%. We did in fact email 1,185 students, but only 1,138 of them were actually enrolled in their PhD program at the time. Some of the email addresses we received from departments were of students who remained on the department mailing list even though they were no longer enrolled. We were explicit in our e-mails and consent form that only currently enrolled students should take the surveys.

[3]For more information on sample characteristics, please see Table B.1 in the Appendix.

Spitzer et al. (2006), Plummer et al. (2016)). In contrast, a study across graduate programs at Harvard found that 41.4% of students with such symptoms are currently receiving treatment (Dench et al. (2020)). Suicidal ideation is 1.5 times more prevalent among our survey respondents than among young adults between the ages of 18 and 25, the highest-risk group in the general population (CDC (2015), Garcia-Williams et al. (2014)). Other strong correlates of depression and anxiety symptoms, like loneliness, are also common among our respondents (Mushtaq et al. (2014)).

The prevalence of serious mental health issues is fairly stable across cohorts in the PhD programs, but climbs substantially in the final years. 21.2% of first-year students experience moderate or severe depression or anxiety symptoms, compared with 36.7% of those who are in years 6+ of their program. Similarly, 8.1% of first-year students report suicidal ideation in a 2-week period, compared to 23.3% of those in years 6+. While 9.8% of 5th year students and 13.3% of 6+ year students were diagnosed with a mental illness prior to starting their program, an additional 19.5% and 28.8% of these students, respectively, received a diagnosis during the program.

Since our response rate is 45.1%, one may have concerns about the representativeness of our results. We perform several robustness checks to address potential selection issues. First, weighting our prevalence estimates by the actual gender shares of students enrolled in the participating programs, we obtain similar results: 24.0% of students, for example, are afflicted with moderate or severe symptoms of depression or anxiety. Weighting by location of undergraduate degree produces an estimate of 24.7%. Second, we go a step further and assume that all 54.9% of students who do not participate in our study are well, and not experiencing any serious symptoms. Even in this extreme lower-bounding exercise, our prevalence estimates are about as high or higher than in the general population: 11.2%, for example, are experiencing serious symptoms of depression or anxiety in this scenario.

We also study the nature of student experiences in their PhD programs. Many students struggle with finding meaning in their work. Only 26% report feeling that their work is useful always or most of the time, compared with 70% of our faculty respondents and 63% of the

entire working age population. 19% of students feel that they have opportunities to make a positive impact on their community or society, compared with 58% of faculty and 53% of the working age population. We find that the intensity of such experiences is negatively correlated with mental health, providing us with more suggestive evidence of a connection between the graduate experience and student well-being.

While the number of times a student meets with his or her advisers is not correlated with mental health outcomes, a student's ability to be honest with those advisers, feeling that the advisers care about the student's research, and feeling that they care about the student as a person are associated with better mental health. Though few students say they can talk to their advisers about mental health issues, few students also say they *want* to talk about these issues with advisers. The topics that students want to discuss openly with advisers, but cannot, are for the most part professional: non-academic career options, preparing for the job market, and research progress top the list.

Many students report that they are unaware of how to address concerns about advising. When a problem with advising arises, only 42% of students say they know where to turn for help and only 36% say they are moderately or very likely to do so. This is in contrast to issues with mental health: 87% of students say they would know where to turn for help if facing a mental health issue and 55% say they would be moderately or very likely to do so. Such findings lead us to believe that a key challenge for departments is to improve the quality of communication between faculty and students and to create clear, safe channels through which advising issues can be resolved.

Overall, our work points to the importance of having effective advising relationships, improving collegiality, encouraging collaboration, helping students find meaning in their work, and lowering barriers to high quality mental health care. We see these as the keys to improving graduate student mental health. Prior work on the importance of easy access to strong sources of support suggests that doing these things early in the program should help students build resiliency for the later, particularly taxing years of the program (e.g., Mousavi et al. (2018)).

Our results echo findings in the education and psychiatry literatures that indicate a high

prevalence of emotional distress among university students (e.g., Hysenbegasi et al. (2005), Hyun et al. (2006), Eisenberg et al. (2007), Garlow et al. (2008), Hunt and Eisenberg (2010), Eisenberg et al. (2013), Lipson et al. (2016), Lipson et al. (2018), Duffy et al. (2019)). Like us, other researchers have administered surveys to measure the prevalence and severity of student mental health problems. Many of these studies focus either only on undergraduates or on a sample that combines undergraduate and graduate student populations.

More recent studies that have focused solely on graduate students suggest that these students may experience mental health problems at a higher rate than undergraduates (e.g., Graduate-Assembly (2014), Garcia-Williams et al. (2014), Rummell (2015), UCOP (2017), Levecque et al. (2017), Evans et al. (2018), Twenge et al. (2019), and Dench et al. (2020)). Fear of failure, perseveration on setbacks and struggles, self-consciousness, fears of judgment, conflicted advising relationships, financial concerns, and general anxiety are the most common sources of stress highlighted by existing research on graduate student mental health.

In the following section, we discuss the clinical screening tools we use in our study and address sample selection concerns. Section 3 presents our main findings and Section 4 discusses potential connections between graduate student mental health and work experiences. Section 5 concludes with specific recommendations for how to make progress on the issues we identify. The Appendix provides advice offered by faculty and includes copies of the survey instruments themselves.

2 Methodology

2.1 Screening Tools

Depression: PHQ-9

We utilize several standardized screening tools from the mental health literature to assess symptoms of common mental health disorders in our population. To examine depressive symptoms, we use the PHQ-9 survey instrument. The PHQ-9 has nine questions related to core symptoms of Major Depressive Disorder, assessing mood, sleep, interest, guilt, energy, concentration, attention, psychomotor slowing, and suicidality. The nine symptoms assessed

are classic clinical features of Major Depressive Disorder, a diagnosis that can only be made by a licensed clinician (APA, 2013).

In the PHQ-9, respondents are asked to report how often they have experienced the nine symptoms over the previous two weeks, with four available answer choices to assess both presence and severity of the symptom: not at all (0 points), several days (1 point), more than half the days (2 points), or nearly every day (3 points). Hence, the allowable range of scores is 0 (no presence of any symptom) to 27 (full severity of each of the 9 symptoms). With a cutoff threshold of greater than or equal to 10, the PHQ-9 has an 88% sensitivity and an 88% specificity for the diagnosis of Major Depressive Disorder (Kroenke and Spitzer, 2002). Sensitivity tells us the probability of testing positive for depression (PHQ-9 $\geq$ 10) when the disease is present, while specificity shows the probability of testing negative (PHQ-9 $<$ 10) for depression when the disease is absent.

The PHQ-9 is widely used not only as a tool for epidemiological measurement, but also for clinical screening in physicians' offices and hospitals (Kocalevent et al., 2013). Since diagnosis of Major Depressive Disorder must involve an interview with a licensed clinician, we are able to gather information on the prevalence of symptoms, not to report the measured prevalence of the disorder itself. As noted above, the PHQ-9 relies on the self-report of symptoms. These, in turn, are predictive of diagnosis and of biological changes due to an interaction of genes with environmental stressors (Sapolsky, 2003). While many active efforts are underway to identify biomarkers of mental health issues, self-description of symptoms remains a core feature of the American Psychiatric Association's diagnostic criteria (APA, 2013).

Other instruments commonly used to measure depressive symptoms include the Beck Depression Inventory II (BDI-II), the Hamilton Depression Rating Scale (HAM-D), and the Center for Epidemiologic Studies Depression Scale (CES-D). Numerous studies comparing these instruments have found high internal consistency among the measures (e.g., Schwenk et al. (2010), Kung et al. (2013), Choi et al. (2014)). We chose to use the PHQ-9 in our study because it is short, free, widely used, and has a high sensitivity and specificity. A number of other studies of graduate and professional student mental health have also utilized the

PHQ-9, allowing us to directly compare out results to other settings in higher education (e.g., Garcia-Williams et al. (2014), Evans et al. (2018), Dench et al. (2020)). Instrument internal consistency, however, also allows us to make comparisons across studies that use these other instruments (e.g., UCOP (2017)).

Anxiety: GAD-7

Our assessment of symptoms of anxiety proceeded similarly, using the GAD-7 survey instrument. The GAD-7 assesses the severity of common symptoms of anxiety, including feeling nervous, not being able to control worrying, and feeling afraid as if something awful might happen. The scoring system resembles the PHQ-9: points are assessed from 0 to 3 for each symptom, depending on its reported presence and severity over the past two weeks. Using a cutoff threshold of greater than or equal to 10, the GAD-7 has a sensitivity of 89% and specificity of 82% for the diagnosis of Generalized Anxiety Disorder (Spitzer et al., 2006). As with depression, a clinician is required for the diagnosis of this disorder; our results here indicate the prevalence of symptoms of anxiety, not of the disorder itself. The GAD-7 is widely used for epidemiological estimation and as a clinical screening tool for Generalized Anxiety Disorder (Stein and Sareen (2015), Plummer et al. (2016)).

Suicidality: PHQ-9 Item 9 and SBQR

We assess the presence of suicidal risk through responses to the final question (Item 9) of the PHQ-9, which asks "over the last two weeks, how often have you been bothered by thoughts that you would be better off dead, or hurting yourself in some way?" Thoughts of death and self-harm measured through this question have been demonstrated to be a predictor of suicidal behavior and completed suicide, which is why we refer to it as a measure of suicidal ideation and suicidality (e.g., Uebelacker et al. (2011), Simon et al. (2013), and Rossom et al. (2017)). The question is also widely used as an indicator of suicidality in the epidemiologic literature and as a clinical assessment tool in behavioral health offices (Arenson et al., 2018). For robustness, we use an additional screening tool for suicidality, the Suicide Behaviors Questionnaire-Revised (SBQR), which assesses the presence of self-reported suicidal ideation in the previous year

(Osman et al., 2001). While we focus on PHQ-9 Item 9 results throughout the paper, both measures produce similar results.

Other Survey Instruments

We also assess loneliness, a psychological state that is closely related to several common mental health disorders (Mushtaq et al., 2014). We measure loneliness through a validated, 3-question version of the UCLA Loneliness Scale, a tool utilized by the vast majority of studies on loneliness (e.g., Russell et al. (1980), Oshagan and Allen (1992), and Hughes et al. (2004)). Additional questions borrowed from other instruments, including the RAND American Working Conditions Survey and *Nature*'s 2017 survey of graduate student work experiences, are discussed in-depth throughout Section 3.

2.2 Sample Selection

One should be cautious with extrapolating our results to all economics PhD programs for two reasons. First, we surveyed only 8 programs that are highly ranked among R1 research universities. Second, the students who participated in our study did so voluntarily and thus are likely not fully representative of even the 8 programs themselves. While we hope that future research sheds light on the representativeness of our results beyond top-ranked R1 programs, we take several steps here to address the second issue.

Working with administrators at each of the participating programs, we obtained information on gender and undergraduate institution breakdowns by year in the program. Overall, 28.4% of the students enrolled in these programs in the 2017-2018 academic year, the year of our study, were women. By comparison, 34.7% of the participants in our study were women, making them over-represented in our sample (Table 2). A chi-squared joint test shows the differences in female share in the enrolled and respondent groups to be statistically different from each other. Given that the prevalence of mental health issues is higher among women than men (in our study as in the general population), this could be biasing our headline prevalence rates upwards.

The percentage of enrolled students who have an undergraduate degree from the U.S. is

evenly split with the percentage of enrolled students with a non-U.S. undergraduate degree, 50.8% to 49.2%.[4] Of those who took our survey, 53.5% were U.S. students, suggesting that our sample is also over-representing these students. Since U.S. students report a slightly higher prevalence of depression and anxiety symptoms than international students in our sample, this is likely also biasing our headline prevalence rates upwards.

Table 3 addresses these concerns by providing enrollment-weighted prevalence estimates for our key measures, as well as lower and upper bounds. Since our enrollment statistics are unidimensional (for example, we do not know how many of the U.S. students are female), we calculate gender-weighted (Gender Wgt) and undergraduate country-weighted (Country Wgt) prevalence estimates separately. While these estimates are slightly lower, as anticipated, than our headline estimates, they are qualitatively comparable.

The last two columns of Table 3 report lower and upper bounds for our prevalence rates using a special case of Horowitz and Manski (1998). These bounds are "worst-case" bounds in that they assume that non-response to our survey is either perfectly negatively (lower bound) or perfectly positively (upper bound) correlated with the prevalence of mental health issues. Thus, the lower bound for depression, for example, assumes that everyone who does not participate in the study scores less than 10 on the PHQ-9 and only has mild or better symptoms of depression.[5] We also use the 10-point cutoff on the GAD-7 to bound our anxiety estimates and for suicidality assume that the non-participants would all respond "Not at all" to Item-9 on the PHQ-9. While extreme, these assumptions are straightforward and nonetheless offer insightful estimates. Specifically, the lower bound estimates for our economics PhD students are approximately the same as the representative estimates for the general U.S. population (see Section 3.1 for detailed comparisons).

One could also take this approach to calculating lower and upper bounds to each year in the PhD program using response rates in Table 2 and prevalence rates in Table 4. Here too, the "worst-case" lower bounds for years 5 and 6+ in the program continue to be higher than

[4] Throughout the rest of the paper, we refer to these students as U.S. students and international students, respectively.

[5] Horowitz and Manski (1998) propose bounds of this form conditional on covariates. Our approach assumes that covariates are constant across respondents and non-respondents.

the lower bounds for earlier years, preserving our conclusion that students in the final years of their programs are most likely to be experiencing serious mental health issues.[6]

In addition to these estimates, participation in the Spring 2018 follow-up survey also holds information on the robustness of our results.[7] For example, if the students who took both the Fall 2017 and the Spring 2018 surveys generally had better mental health results in the Fall 2017 survey than those students who attrited and did not take the Spring 2018 follow-up, we would have suggestive evidence that those with worse mental health are less likely to engage with our surveys. In this example, our sample selection could be biasing our headline prevalence rates downward.

Performing this kind of check, we do not find evidence that the attriting sample of students is different in its mental health from the sample of students who continuously engage with our study. The share of students scoring above critical thresholds for depression, anxiety, and suicidality in the Fall 2017 survey is almost identical in the two samples, and the shares of women and U.S. students scoring above these thresholds in the two samples are comparable as well. Table B.2 reports these shares, along with chi-squared tests of differences between the two samples. None of these tests show statistically significant differences, with the exception that U.S. undergraduates make up a larger share of respondents in the follow-up survey (59.6%) than in the Fall 2017 survey (46%). Put differently, our key prevalence rates would remain virtually unchanged if we study our full sample (513 students) or if we study only those students who disengage after taking the first survey (263 students).

Of course, attrition between the two survey waves could be driven by forces that are very different from those that drive sample selection in the initial survey. Exam-related busyness, for example, could arguably be a bigger factor in May than in November when it comes to survey engagement. In general, we cannot rule out the possibility that the mental health of students who do not take our surveys is considerably worse (or better) than the mental health of our participants. However, taken together with our enrollment-weighted estimates and bounds on key mental health measures, these results suggest that our conclusions should

[6] For example, the lower bound estimates for depression prevalence across years 1 through 6+ are 6.5%, 8.4%, 7.0%, 5.5%, 11.8%, and 9.1%, respectively.

[7] Only those who participated in the Fall 2017 survey were invited to participate in the Spring 2018 follow-up.

be qualitatively robust to sample selection.

For more extensive demographic characteristics of our study participants, please see Table B.1 in the Appendix.[8]

3 Results

3.1 Mental Health

Depression

The prevalence of depressive symptoms we find in our sample is higher than for the U.S. population of the same age range, but lower than for other samples of graduate students. 17.7% of our economics students score in the moderate or severe symptom zone and would likely be diagnosed with depression upon seeing a mental health professional (Table 5 and Figure 1). Women (18.3%) are slightly more likely than men (16.4%) to be experiencing such symptoms, and depression is more prevalent among U.S. students (19.2%) than international students (15.5%). While minority (15.7%) and first-generation (16.2%) students have prevalence rates that are comparable to the sample average, students who report being gay, lesbian, or bisexual are especially afflicted (28%) (Tables 5 and 6).

For comparison, 8.1% of the general U.S. population and 7.7% of Americans between the ages of 20 and 39 experience moderate or severe symptoms of depression (CDC, 2018b). As Table 3 shows, these numbers are in the vicinity of our lower bound estimate of 8% for depression prevalence and are about half the rate we measure in our sample. Women in the general population are about twice as likely as men to be experiencing these symptoms (10.4% vs. 5.5%), whereas women are only about 11.6% (18.3% vs. 16.4%) more likely to be experiencing these symptoms than men in our sample. Prior work has also shown prevalence rates of depression for African American (8.9%) and Hispanic (10.8%) adults that are elevated relative to the general population, but these are considerably lower than the rates we observe

[8]Some notable facts in Table B.1 from our background questions: International students are considerably more likely to be the first in their family to graduate from college: 14.4% of international students have a father with a high school degree or less, compared to 4.1% of U.S. students. Overall, almost 60% of students in the participating programs have a father with some kind of graduate degree. International students are also considerably more likely than U.S. students to be working while in the PhD program (80.8% vs. 71.6%), to be living alone (32.2% vs. 24.1%), and to have done something else between their undergraduate degree and the PhD program (81.9% vs. 70.3%).

for minority students (Dunlop et al., 2003). Though limited, mental health studies of LGBTQ adults echo our findings that prevalence rates of mental health disorders in this population are about double those among heterosexual adults (Bostwick et al., 2010).

In contrast to the general population, however, our depression prevalence estimates are lower than those found in other graduate education settings. In a small sample survey of doctoral students at Emory University (301 students or 8% responded to the survey), Garcia-Williams et al. (2014) find 34.5% with PHQ-9 scores greater than or equal to 10. Evans et al. (2018) employ convenience sampling via email and social media of PhD students around the world. Also using the PHQ-9, the authors find 39% of the 2,279 respondents with moderate or severe symptoms of depression. In a 2016 well-being survey of graduate students across all ten campuses, the University of California used the CESD-R measure of depression and recorded 35% of survey respondents self-reporting symptoms that met the clinical cutoff for Major Depressive Disorder. The survey was administered to a stratified random sample of 13,400 students and had a 40% response rate (UCOP, 2017).

Motivated by our study, Harvard University has an ongoing Graduate Student Mental Health Survey Initiative which, as of this writing, has surveyed over 6,800 graduate and professional students across more than 40 departments at Harvard. Preliminary findings show 23.6% of students with PHQ-9 scores greater than or equal to 10 (Dench et al., 2020). The initial report also highlights elevated prevalence rates for LGBTQ, underrepresented minority, first-generation, and low-income students. Overall, the prevalence rate of depressive symptoms that we see among economics PhD students in our study is lower than the rate captured by previous studies of graduate students writ large.

Anxiety

Highly positively correlated with symptoms of depression, anxiety symptoms in our sample are also substantially higher than in the general population and lower than earlier studies have measured among graduate students. Studies of the U.S. population over the last 25 years suggest an adult prevalence rate of 6% or less (e.g., Wittchen et al. (1994), Kessler et al. (2005), Spitzer et al. (2006)) and a worldwide 2017 World Health Organization study put the

highest regional rate of anxiety disorder at 5.8% in the Americas (WHO, 2017).

By contrast, our overall prevalence rate is 17.6%. Our lower-bound prevalence estimate of 8% is higher than the prevalence rate in the general population, as are our gender-weighted and country-weighted estimates (Table 3). Female students (19.2%) are again more likely than male students (15.9%), and U.S. students (17.9%) more likely than international students (16.9%) to be experiencing serious symptoms of anxiety. LGBTQ students (22%) show elevated prevalence rates, while first-generation (12.3%) and minority (13.7%) students fare slightly better than the average student.

Using the GAD-7 in their convenience sample survey of graduate students around the world, Evans et al. (2018) recorded 39% with moderate or severe symptoms of anxiety. Dench et al. (2020) report a prevalence of 23.1% among graduate students across Harvard departments. Underrepresented minority, first-generation, low income, and LGBTQ students were again especially likely to be experiencing serious symptoms. Overall, as with depression, anxiety symptoms appear to be less prevalent among economics PhD students than among graduate students as a whole.

Suicidality

Suicidal ideation is about 3 times more likely among our survey respondents (11.3%) than among adults in the general population (3.9%) and 1.5 times more likely than among the highest risk group, adults aged 18-25 (7.4%) (CDC (2015)). Our lower bound estimate for suicidal ideation (5.1%) falls below that of the highest risk group, though our gender and country-weighted estimates (11.2%) still exceed it (Table 3).

For additional comparison, a 2010-2012 study of almost 300,000 adult outpatients treated for mental health conditions found that, among these patients, 20% reported suicidal ideation through Item 9 on the PHQ-9 (Rossom et al. (2017)). The prevalence of suicidal ideation based on the same measure in our sample, at 11.3%, is thus in between the rates found for this group and for the general population (Table 5).

There is, however, substantial heterogeneity by student characteristics. Though the differences are not statistically significant, men (11.6%) are more likely than women (10.2%) to

have scores of concern on the PHQ-9 Item 9, while international students (13.1%) are more likely than U.S. students (9.3%) to have such scores. Minority (14.3%) and LGBTQ students (22%) exhibit especially high prevalence rates of suicidal ideation (Table 6). The difference in suicidality between heterosexual and LGBTQ students is statistically significant at the 5% level.

Loneliness

We also find higher prevalence rates of other negative feelings in our sample than in the general population. Such feelings, like loneliness, are positively correlated with scores captured by the clinically validated screening tools for depression, anxiety, and suicidality (Table B.3).

Loneliness is common among our survey respondents, with the average student finding himself or herself considerably lonelier than the average retired American. The mean score on the UCLA 3-item loneliness scale was 5.2, with a standard deviation of 1.8. For a sample of over 2,000 retired Americans in 2002, that score was 3.9, with a standard deviation of 1.3 (Hughes et al., 2004).[9]

A 2018 study by the Kaiser Foundation and The Economist found that loneliness and isolation are widely experienced in the U.S. (DiJulio et al., 2018). Although we use different scales, our results suggest that economics PhD students are also more likely to experience loneliness and isolation than a representative sample of Americans. 16.2% of our respondents say they often experience feeling isolated from others, compared to the 11% of Americans who report they experience this feeling often or always. 17.5% of respondents say they often feel that they lack companionship, compared to 13% who report such feelings often or always nationwide.

Diagnoses

Even considering that diagnoses of mental illness are likeliest for those in their 20s, our respondents are obtaining such diagnoses at high rates over the course of their programs. 25% of economics students in our study report being diagnosed by a professional with a mental

[9]The 2002 Health and Retirement Study (HRS) surveyed individuals with a mean age of 66.5 (SD=10.2).

illness, 13.1% prior to starting their PhD program and another 11.9% after starting their program (Table 4). Focusing on students who are near the end of their graduate programs, we see significantly elevated levels of diagnosis. 29.3% of 5th year students have been diagnosed with a mental health issue before (9.8%) or during (19.5%) the program, and 42.1% of students in years 6+ report being diagnosed with a mental health issue before (13.3%) or during (28.8%) the program. While the percentage of students diagnosed prior to graduate school is roughly comparable to the percentage in the general population, the percentage of students with a diagnosis after 5+ years of graduate school is much higher than for comparably-aged adults.

In comparison, the 2017 National Survey on Drug Use and Health administered by the U.S. Department of Health and Human Services found that 18.9% of U.S. adults were living with some form of mental illness (Bose et al., 2018). The highest prevalence, of 25.8%, was found among adults aged 18-25, with adults aged 26-49 following closely behind at 22.2%.[10]

One reason for the increase in diagnoses among college-age adults could be an increase in the availability of mental health services that comes with entering a college environment. If this were the driving force in our setting, we would expect a lot of the diagnoses to show up while students were undergraduates. Additionally, since availability of mental health services should be constant across years in graduate school, availability should not explain differences in diagnosis prevalence between the first few cohorts and the most senior cohorts in our sample.

We believe, in fact, that our numbers are an underestimate of the actual number of students in our sample who have diagnosable mental health issues. As we discuss below, this is likely the case because our students are less likely than working adults or other graduate students to seek professional help when experiencing serious symptoms of mental illness.

Treatment

Although our findings suggest a high prevalence of various serious mental health issues, few students are receiving clinical treatment. 14.9% of students are currently in treatment for some mental health issue, with the percentage rising with each year in the program: from

[10]Note that having a diagnosed mental illness is different from experiencing moderate or severe symptoms of that illness. Diagnosis and proper treatment can reduce symptom severity.

8.1% in year 1 to 18.5% in year 5 and 32.2% in years 6+ (Table 4). Zooming in on those with moderate or severe mental health issues, the share receiving treatment is higher (25.2%), though still low: rising from 14.3% in year 1 to 27.3% in years 6+.

In contrast, a national survey of individuals in the labor market has previously raised concerns that only half of those who experienced serious symptoms of depression were receiving treatment (Kessler et al., 2008). In the study of Harvard departments, 41.4% of students with moderate or severe symptoms of depression or anxiety reported being in treatment (Dench et al., 2020). Economics students in our sample are thus substantially under-treated, even relative to levels in other academic departments.

Certain survey responses point to economics students facing barriers to using mental health services. 87%, for example, say that they would know where to turn for help if experiencing a mental health issue, but only 55% say that they would be moderately likely or very likely to do so (Table 7). The numbers are lower (74% and 52%, respectively) for those reporting suicidal thoughts.[11] Since availability of mental health services should be the same for students across cohorts, other factors, like stigma or the amount of encouragement students receive to seek out services, could be generating this wedge between resource awareness and probability of access. Understanding the relative effects of these factors on whether a student seeks out treatment is an important area for further research. The fact that service usage increases with time in the program could be a valuable clue to investigate further.

3.2 Overall Work Experiences

Before turning to an exploration of how various PhD program experiences could be affecting graduate student mental health, we first want to concretely establish what those experiences are.

We use the 2015 RAND American Working Conditions Survey (Maestas et al., 2015) to get an overview of the work environment and a sense of how it compares to what Americans generally experience in their jobs. The survey is based on a nationally representative sample of Americans and is administered online. We also use the RAND survey questions in our

[11] As Table B.4 shows, only 27% of those who report contemplating suicide within a 2-week period are currently receiving some form of treatment.

survey of faculty at the 8 participating departments, allowing us to compare graduate student experiences with faculty experiences. Our other reference point for graduate student work experiences is a 2017 study by *Nature* of more than 5,700 natural science and engineering PhD students worldwide (Woolston, 2017).

Graduate students in our study, on average, report substantially lower job satisfaction than economics faculty or other workers of a similar age. Across occupations in the U.S., about 60% of men and women with a college degree between the ages of 25 and 35 report experiencing satisfaction of work well done always or most of the time. In contrast, 37% of our economics PhD students report experiencing such satisfaction always or most of the time (Table 8). When economics faculty were posed the same question, 77% said they experienced such satisfaction always or most of the time (Table B.5).

26% of our students report experiencing the feeling of doing useful work always or most of the time, compared to 70% of faculty respondents and 63% of the entire working age population. Only 20% of students feel that they have opportunities to make a positive impact on their community or society compared to 58% of faculty and 53% of the population. Additionally, only 40% of students feel they have opportunities to fully use their talents always or most of the time, compared to 85% of faculty and 53% of the population. The economics PhD program thus appears to be distinct from the average occupation and from the economics professorship in the rarity with which one experiences satisfaction, usefulness, and meaningfulness.

Differences between student and faculty feelings towards work are all the more striking given the experiences that students and faculty share. 73% of students and 72% of faculty report having very good friends in the department, compared to 56% of American workers. 62% of students worry always or most of the time about work when not working, compared to 60% of faculty members. 20.5% of students find themselves too tired for activities in private life always or most of the time, compared to 23% of faculty (Tables 9 and B.6). The intensity of the work and the stresses that come with it thus do not seem to abate with professorship.

When it comes to overall student satisfaction with the PhD experience, our 8 economics programs look very similar to programs in the natural sciences and engineering. As Figure 2

shows, students in our sample are slightly more dissatisfied with their PhD experience, but the differences are negligible.[12] The differences are also negligible when it comes to the number of hours that PhD students report working in a typical week (Figure 3).

However, when we asked students what they would do differently if they were starting their program right now, we got starkly different responses from those found in the *Nature* study (Figure 4). While many in the natural sciences and in engineering would have changed advisers or area of study, those were not sources of major regret for our students. The unstructured nature of the research stage of most economics programs, which allows students to have more control over what they study and who advises them, is consistent with this finding.

36% of students in our sample would have wanted to organize their time more effectively, compared to just 1% of students in the natural sciences and engineering. This also is likely a reflection of the unstructured nature of the research years, but could be a statement on the usefulness of the coursework years as well. The fact that 21% of our students would have engaged more with their studies, compared to just 1% for those in the natural sciences, provides additional evidence that the coursework stage of the economics programs could be improved (through incentives for engaging more with study, through the usefulness of the content covered, etc.).

3.3 Relationships with Peers and Advisers

To learn more about the economics PhD environment, we asked students detailed questions about their interactions with their peers and advisers. While students report positive impressions overall, the majority of students are uncomfortable engaging in seminars and many are not communicating honestly and effectively with their advisers.

Table 10 shows that 66% of students view their peers as not competitive at all or only somewhat competitive and, as mentioned earlier, 73% of students say they have very good friends in the department. Still, a sizable number of students feel isolated and out of place. 3% say that they never turn to someone when faced with a problem or worry and 6% say they have zero people in their personal life with whom they can talk about their most private

[12] A Kolmogorov-Smirnov test does not reject that the two distributions of student satisfaction are the same.

feelings. Another 15% say that there is only one person in their personal life with whom they can be so open. 17.5% of students say they often lack companionship and 16% say they often feel isolated from others.

Though seminars have the potential to allow students and faculty to interact on the same level, many students do not feel comfortable engaging. Only 29% say they are moderately or very comfortable voicing a thought in a seminar setting, and 77% would only raise their hand if they were moderately or very certain about the high quality of their thought (Table B.8). These results are in line with those the AEA found in its recent Professional Climate Survey (Allgood et al. (2018)).

Women feel an especially high barrier to participation in seminars: only 19% of women would be comfortable voicing a thought in a seminar compared to 35% of men. Virtually no gap exists, however, between U.S. students (30.5%) and international students (28.3%). The same percentage, 77%, of men and women would have to feel certain about the high quality of their thoughts before they voice them (Tables B.9-B.10). This suggests that either women have a higher internal bar for thought quality than men or there are other factors disproportionately affecting their comfort levels in seminars. Or both.

Student relationships with their faculty advisers are also nuanced. 96% of students say they met with their main adviser at least once in the last 2 months, with the modal number of meetings being 2 (Table 11). 86% met at least once with their second adviser and 67% met at least once with their third adviser.[13] Asked about the most significant impediments to the frequency with which they meet with faculty, students pointed to fear of the consequences of a bad impression, doubt about the quality of their ideas, questions, and thoughts, and lack of progress on to-dos from the previous meeting. Scheduling difficulties were a significant impediment for 17% of students and meeting unpleasantness was a significant impediment for 8% of students (Table B.11). As with seminars, these numbers suggest that focusing on what happens during the advising meetings, instead of on their sheer frequency, could improve student experiences.

[13]We defined the main adviser as the faculty member with whom the student meets most frequently. The second adviser as the faculty member with whom the student meets second-most frequently, and so on.

While most students have good, helpful relationships with their advisers, many do not receive adequate support and engagement. 27% of women and 34.5% of men say that their advisers do not care about them as a person. A gap also exists between U.S. students (29%) and international students (34%). 19% think that their advisers do not care at all or care only somewhat about the success of their research (Table 12).

18% do not have a professional role model among the faculty in the department. 40% of men say they have 3 or more such role models, compared to 33.5% of women (Table B.12). 36% of students report that no faculty member had initiated an informal conversation with them about how they were doing academically or personally in a 2 month period.[14] 40% of international students report not having such faculty interactions, compared to 32% of U.S. students.

We measure substantial gaps in how honest students *would like to be* with their advisers about a range of difficulties and how honest they currently *can be* with their advisers about those difficulties (Table B.13). The difficulties were, by gap between desired levels of openness and actual levels of openness[15]: (1) non-academic career options, (2) preparing for the job market, (3) research progress, (4) issues with other advisers, (5) issues arising from co-authorship with the faculty member, (6) presentations, (7) refereeing, (8) co-authoring with other students, (9) teaching, (10) decision to get a PhD, (11) mental health, (12) decisions related to starting a family, (13) other personal life issues.[16]

Although fewer than 10% of students say they can be very honest with their advisers about mental health, starting a family, or other personal life issues, few students actually want to discuss these issues openly with their advisers. This is true for both men and women, international and U.S. students.[17] Additionally, virtually the same percentage of students

[14]The initial survey was administered in November, so the 2 month period would have been September and October. We also asked this question in the follow-up survey in May where 39% of students reported not having any informal conversations initiated by faculty about how they were doing in a 2 month period.

[15]We calculate this gap by taking the percent of students saying they *would like* to be very honest with their advisers about the topic and subtracting the percent of students saying they *can* be very honest with their advisers about it.

[16]Table B.7 shows faculty perceptions of how honest their students can be with them about these difficulties. The gaps between faculty perceptions and student perceptions are similar to the ones we report here.

[17]Women and international students are slightly more likely to want to discuss mental health very honestly with their advisers than men and U.S. students, respectively.

cannot be honest with advisers at all about research progress (38.7%) as say that they cannot be honest with advisers at all about mental health problems (41.5%) (Table B.13). A similar 49.7% of students say it's not easy at all for them to talk to advisers about non-academic career options. In contrast, only 8.2% of faculty think their students find it so hard to talk about non-academic careers with them (Table B.7). Adviser-advisee communication issues thus go beyond a student's personal life difficulties and impede the core professional objectives of the advising relationship.

Finally, there appears to be a lack of options for students when they experience issues with advising. 42% of students say that they would know where to turn for help with advising and only 36% say they would be moderately likely or very likely to seek out help if an issue arose (Table 13). Given the role of evaluator that faculty are playing, it may be difficult for students to see a way to address advising issues constructively and without negative consequences. For a majority of graduate students in our sample, existing channels for addressing advising issues, whether within the department or at the university more broadly, appear to be inadequate.

3.4 Sexual Harassment

In order to obtain a more complete picture about the departmental environment, we asked questions about sexual harassment. Specifically, we wanted to know what share of students have experienced some form of sexual harassment in their department, what form that harassment took, and who perpetrated it. Although the prevalence of sexual harassment appears to be lower in our sample than in graduate and professional programs nationwide, the problem is still substantial. Contrary to common perception, we find that fellow students, rather than faculty members, are the most common perpetrators of such harassment.

For comparability purposes, we used the same phrasing for our questions that was employed by the Association of American Universities (AAU) Climate Survey on Sexual Assault and Sexual Misconduct in 2015 (see Cantor et al. (2017)). A preamble to the questions emphasized that students should be thinking about situations that interfered with their work, limited their ability to participate in their program, or created a hostile work environment.

16% of students experienced some form of sexual harassment in their department since

starting the PhD program (Table 14). 21.5% of women experienced harassment compared to 13% of men; 22.2% of U.S. students, compared to 8.9% of international students. 62.5% of the instances of harassment were perpetrated by another graduate student, while 19% came from a professor and about 10% from someone the student did not know. Advisers, undergraduates, and others affiliated with the department make up the remaining 9% of sexual harassment experiences.[18] For context, the AAU survey revealed that about 44% of women in graduate or professional programs had experienced some form of sexual harassment, compared to 30% of men.

In order from most common to least common, the following were the forms of harassment experienced by economics PhD students in our sample: (1) sexual remarks, jokes, or stories that were insulting or offensive to you, (2) inappropriate or offensive comments about your or someone else's body, appearance, or sexual activities, (3) crude or gross sexual comments or tried to get you to talk about sexual matters when you did not want to, (4) requests to go out for dinner, have drinks, or have sex even though you said, "No", and (5) Email(s), text(s), phone call(s), or instant message(s) with offensive sexual remarks, jokes, stories, pictures, or videos that you did not want to receive.

4 Discussion

Mental Health and Graduate School: Suggestive Evidence of a Connection

Is there a connection between student mental health and the work experiences we describe above? In line with other studies of the effects of workplace conditions on mental health (Woo and Postolache, 2008), our work provides suggestive evidence of a connection.

One such piece of evidence is that of those who are currently experiencing moderate or severe symptoms of depression, 19% were diagnosed with a mental health issue before starting their program and 26% were diagnosed more recently, during their program. Of those students who were diagnosed in graduate school, 19% have contemplated suicide in a 2-week period; of those who were diagnosed before the PhD, 10% contemplated suicide in the same 2-week period

[18] It is possible that students say they have experienced sexual harassment from professors but not from advisers because those professors are no longer their advisers.

(Table B.14). In other words, those diagnosed with mental health issues as PhD students are more likely to have worse mental health today than those diagnosed before the PhD program.

Although graduate school could be causing these more severe symptoms for the recently diagnosed, it could also be the case that these students are simply in a different part of the treatment cycle than those diagnosed before the program. Shorter treatment duration, as opposed to graduate school itself, could be the cause of worse symptoms among those who are diagnosed while in the program. The exact mechanisms at play here warrant further study.

Another piece of evidence is that the most senior students have the worst mental health. 21.2% of first-year students experienced moderate or severe symptoms of depression or anxiety (in November of their first year), while 29.6% of 5th year students and 36.7% of students in years 6+ experienced such symptoms (Table 4). When it comes to suicidal ideation, 8.1% of the first-years report contemplating suicide in a 2-week period, compared to 23.3% of those in years 6+ (Figure 1).

It is possible that repeated shocks and failures in the research process, coupled with a lack of adequate support for working through those failures, can accumulate over time into the symptoms of anxiety or depression that we see at the end of the program. In addition to the accumulation of stress over many years and the peak stress of the job market, the latter years of the PhD can also be characterized by a lack of structure and increased isolation. Existing work on these forces suggests that they are all likely contributing to the pattern of increasing symptom prevalence that we observe (e.g., Cacioppo and Patrick (2009), Layard and Clark (2015), Murthy (2020)). Unlike increases in diagnoses and treatment in later years, which Section 3.1 notes could be caused by factors like decreased stigma or increased encouragement from administrators to seek out care, large increases in symptom prevalence are harder to explain with alternative hypotheses. Even if our findings can be explained by differential attrition across cohorts, with healthier students disproportionately graduating before year 5, our work nonetheless raises serious concerns about the mental health of the majority of economics PhD students – those who spend 5 or more years in their program.

We find further evidence of a connection between mental health and graduate school when

looking at the relationship between students' mental health and their regrets. Of those who say they regret their area of study, 28% contemplated suicide in a 2-week period. 27% of those who said they would not pursue a PhD at all, 24% of those who said they would study at another institution, and 20% of those who would change their advisers have also contemplated suicide.[19] Among students who regret not engaging more with study and organizing time more effectively, however, a substantially lower percentage (11%) have contemplated suicide. Those who say they would change nothing about their graduate school experience have the lowest rate of suicidal ideation, at 7%. Though this suggests that the graduate environment is negatively affecting student mental health, it could also be the case that poor mental health is distorting students' perceptions of their program. Regardless of the direction of causality, we see here that one's mental health and one's graduate school experience are closely linked.

Correlations and Mitigating Factors

Correlating students' program experiences with their mental health provides us with additional evidence of a link between the two. The social environment, for example, appears closely linked to student mental health. Mental health is worse for students who say their peers are competitive. Having more very good friends in one's program, on the other hand, is correlated with better mental health, as is having more people in general with whom a student can openly discuss their private feelings without having to hold back (Table 10). Supportive and collaborative classmates, people who can empathize with the PhD experience, and others who can be trusted to have the student's best interests in mind appear to be valuable tools for mitigating shocks to mental health. In turn, better mental health might make it easier for students to connect with others and build supportive relationships in the first place.

In addition to strong social support, having sources of meaning, purpose, and usefulness appears to be important for mental health. Those who have goals to aspire to, feelings of doing useful work, and opportunities to make a positive impact on their surroundings have better mental health than those who do not (Table 8). At the same time, when work fatigue and worries negatively affect activities in private life, mental health is worse (Table 9). In line

[19] Students could select more than one option for what they would do differently.

with existing literature (e.g., Layard and Clark (2015)), students who have difficulties making ends meet financially are also more likely to have mental health problems.

Those with worse mental health also have worse engagement with their programs along a few dimensions. They are less likely to voice a thought in a seminar and substantially more likely to seriously contemplate leaving the program (Table B.8). They are also more pessimistic about how well they have done and will do in their courses, teaching, presentations, and (especially) research (Table B.16). Of course, the anhedonia, pessimism, and hopelessness that often come with depression can also lead to such disengagement and can prevent someone from deriving joy from their work (e.g., Sapolsky (2004), Quidt and Haushofer (2016)).

Mental health issues do not, however, appear to be affecting students with different values in life differently. In particular, students who believe that tenure at an academic institution is very important for their success in life are not more or less likely to have mental health issues than students who believe that income or recognition or a family are very important for success in life (Table B.15). We see this as an important finding, suggesting that it is not possible to use a student's aspirations and values to infer mental health.

Advising relationships seem to be tightly related to student mental health, likely through both the social support channel and the usefulness of work channel (Hyun et al., 2006). Students who talk to faculty that care about their success and care about them as a person have better mental health than students who do not (Table 12). While the number of meetings that students have with their main adviser or with faculty more broadly is not correlated with mental health (Table 11), the nature of those meetings is. Students who say they avoid meetings with faculty because those meetings are unpleasant, or because they fear the consequences of a bad impression, have worse mental health than students who do not feel this way. In contrast, students whose biggest issues with meetings are that they are too short or too difficult to schedule do not have worse mental health than students for whom those factors are not problems (Table B.11).

How honest a student can be with their adviser about difficulties in the program is also correlated with that student's mental health. We dove deeply into those difficulties, asking

students to tell us how honest they can be with their advisers about problems that ranged from research progress and presentations to mental health and starting a family. While students who cannot honestly discuss mental health with their advisers have worse mental health, it is also true that students who cannot honestly discuss problems with research progress also have worse mental health. Openness on teaching, preparing for the job market, and considering non-academic jobs is also correlated with student mental health (Table B.13). In other words, what matters is whether the relationship between student and adviser is trusting and honest, not whether the problems are professional or personal.

These findings are in line with existing evidence that the repeated failure of coping mechanisms in the face of stressors can lead to depression (Sapolsky, 2003). Since the research process is full of shocks and failure, the absence of adequate mechanisms for bouncing back from such failure could, over time, lead to the kind of learned hopelessness that characterizes depression. While peers, family, friends, and university resources are a crucial source of support, the nature of the research process ultimately puts advisers on the front lines of this battle.

Whether mental health problems are causing a lack of honesty and openness in advising relationships or vice versa, it is clear that many students could be having better relationships with their advisers. We think it would be beneficial for departments to experiment with various advising schemes and feedback mechanisms to improve student-adviser relationships. Creating a channel for faculty to receive constructive feedback on their advising, perhaps by allowing anonymous student evaluations of each faculty member's advising strengths and weakness over a several year period, could help each faculty member understand what he or she can do better.

If our results are any indication, a substantial part of that improvement will be in figuring out ways to better balance the role of adviser and evaluator so as to facilitate honest and open conversations with students. Social or even financial incentives for such advising could also be explored. One approach could be to assign incoming students to faculty members who have actively volunteered to advise more on how to navigate the program and less on specific research questions. Such an advising relationship, without any evaluative constraints, could

be a valuable source of support for students even into the later research years and could help students navigate future relationships with dissertation committee members.

Certainly, a change in culture to the point where students and advisers can openly and harmlessly agree on an advising relationship that works best for everyone could go a long way. If the arrow of causality points the other way, then making a concerted effort to improve student mental health should improve advising relationships and student productivity.

5 Summary and Recommendations

Our study of 8 graduate economics PhD programs establishes several important features of student mental health and their connection to student experiences. Moderate or severe symptoms of depression or anxiety are prevalent among graduate students in our sample, with rates that are more than double those of the general population (Kessler et al. (2005) and WHO (2017)). Over a tenth of students report suicidal ideation on at least several days over a 2-week period. Though sample selection concerns exist, robustness checks nonetheless suggest higher prevalence rates of such symptoms than in the general population and lower rates than found in previous studies of graduate student mental health.

We find that our survey respondents are considerably less likely to be in treatment than other graduate students. Only 25.2% of students in our sample with moderate or severe symptoms of depression or anxiety are currently receiving professional treatment. In contrast, prior work has shown that over 40% of graduate students with such symptoms across disciplines are receiving treatment.

Students often feel limited meaning in their work and in their ability to make a positive impact on their community. 20% feel that they have opportunities to make a positive impact on their community or society, whereas 58% of faculty and 53% of the population report feeling that they have these opportunities (Maestas et al., 2015).

We measure notable correlates between mental health and student experiences. Students in years 5+ of their program are especially likely to have high levels of depressive or anxious symptoms. Students who express regrets about their PhD experience have higher rates of mental health distress as well. Having friends and advisers with whom students can openly

and honestly discuss their difficulties is correlated with better mental health, while the sheer frequency of advising meetings is uncorrelated with mental health. Overall, our work points to the importance of having effective advising relationships, improving collegiality, encouraging collaboration, helping students find meaning and purpose in their work, and lowering barriers to high quality mental health care. We see these as the keys to improving graduate student mental health.

Below, we include six specific recommendations for students, faculty, department leadership, and university administrators on ways to improve graduate school experiences and student mental health. These recommendations echo those proposed in prior work on the subject (e.g., Mousavi et al. (2018)). For free-form recommendations that economics faculty submitted through the supplemental faculty survey, please see Appendix A.

First, we recommend that department leaders raise awareness of mental health issues among graduate students, raise awareness of available mental health resources, and encourage students to take their mental health and the health of their peers seriously. Doing so early in the program, as early as math camp, should make it easier to tackle issues when they arise later on. Encouragement can involve asking students to arrange for a consultation with campus mental health services, to use online screening tools often provided by campus mental health services to identify depression and anxiety symptoms, or simply to feel comfortable seeking support. See (Mowbray et al., 2006) for more details on ways to improve mental health care utilization.

Second, department leaders could use their platform to encourage students to invest in building friendships with their peers and to actively avoid prolonged isolation. In the same vein, we recommend discouraging competitive attitudes, while encouraging collaboration, peer advising, and co-authorship among students across years in the program. Confirming prior work, we find that students who have more people in their lives that they can really open up to and who do so more frequently are less likely to suffer from mental health issues. See (Cacioppo and Patrick, 2009), (Murthy, 2017), and (Choi et al., 2020) for more on the value of strong social support for mental health.

Messaging these points to students is important, but departments could also think more from a design perspective about how the requirements throughout the program, the physical spaces, and the financial and advising resources made available to students can encourage collaboration. Students themselves could work on organizing more informal activities and resources for each other, modeling the mutual helpfulness that such activities should strive to foster. Prior research suggests that these steps should reduce feelings of isolation and loneliness, increase empathetic connections, and help students build strong social networks that will serve them well into their professional lives (see Whitlock et al. (2012) and Small (2017)).

Third, improving student-faculty advising relationships can help students identify promising directions for research and bounce back better from setbacks. One element of the strain could be that advisers play a dual role – one of support and one of evaluation. Some departments have started connecting students early on with faculty who volunteer to advise students in the pre-research years. Such advising relationships, established outside of the dissertation committee structure, may provide students with faculty support that does not come bundled with consequential evaluation. These advisers could also help students navigate their relationships with other faculty members and help address other issues with advising. We believe that helping students build a strong support structure and develop growth and strategic mindsets early on in the program will help them navigate shocks that arise later on, especially at the end of the program. See (Posselt, 2018) for more on how faculty can best help their students persist and Chen et al. (2020) for more on building growth and strategic mindsets.

Fourth, relatedly, we recommend instituting policies that help advisers ensure that students are not falling through the cracks and are progressing with their projects. In programs where the advising structures are more diffuse, field-specific meetings among faculty to discuss student progress could be a good way to do this. If, for example, none of the faculty have interacted with the student in a while, the most relevant faculty member could be tasked with checking in with that student. If a student is stuck, such faculty meetings could also allow faculty to brainstorm and triage solutions. Another approach could involve students and faculty

establishing a regular check-in schedule, with a mutual understanding that such meetings are not just meant for showcasing progress but are also for working through problems. Helping students climb out of research ruts and bounce back from shocks more easily could lower the probability that these students develop debilitating anxious and depressive symptoms over time (Sapolsky, 2003).

Fifth, with so few students finding meaning in their work, we think it would be useful to actively encourage students to pursue research questions they find meaningful and socially valuable. Additionally, though many students ultimately find meaning and purpose outside of academia, many cannot talk to advisers about non-academic career trajectories. In fact, we find that talking to advisers about non-academic careers is just as hard for students to do as discussing mental health issues. Efforts to normalize private and public sector opportunities, by celebrating alumni who work in those sectors and perhaps even inviting them to talk to current students, might help alleviate the mental distress that students feel when transitioning out of graduate school (Gardner, 2010).

Sixth, departments could partner with campus mental health services to experiment with different approaches to mental health treatment. Some departments have experimented with peer support groups and "Let's Talk" programs that make campus mental health professionals available for drop-in hours close to the department. Other low-cost interventions that reduce barriers to care-seeking deserve further research.

Additionally, interventions like Cognitive Behavioral Therapy (CBT), for example, deserve more attention. We know CBT works in other settings and initial results from an intervention with Harvard graduate students are promising (e.g., Cuijpers et al. (2013), Guille et al. (2015), Ross et al. (2019), and Bernstein et al. (Forthcoming)). More research and experimentation with such tools holds substantial promise for addressing the problems we document in this study.

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Tables

Table 1: Enrolled students and study participants, by program

Programs	Total enrolled	Total responded	% responded	% of all responses
UC Berkeley	131	71	54.2%	13.8%
Columbia	149	71	47.7%	13.8%
Harvard	190	73	38.4%	14.2%
MIT	130	76	58.5%	14.8%
Princeton	131	55	42.0%	10.7%
UC San Diego	127	50	39.4%	9.7%
U of Michigan	163	66	40.5%	12.9%
Yale	117	51	43.6%	9.9%
Total	1,138	513	45.1%	100.0%

Note: Table shows, for each participating economics PhD program, the total number of students receiving the Fall 2017 survey; the total number of students who took the survey; the percent of invited students who took the survey; and the percent of the entire sample represented by students from each program.

Table 2: Enrolled students and study participants, by year in program

	Year in Graduate Program						
	G1	G2	G3	G4	G5	G6+	Total
Panel A: All Enrolled Students							
Number	223	190	175	206	172	172	1,138
Percent Female	28.7%	31.1%	26.3%	30.1%	27.9%	26.2%	28.4%
Percent U.S. Undergrad	52.0%	49.5%	52.0%	47.6%	46.0%	57.6%	50.8%
Percent Responded to Survey	44.4%	54.7%	44.0%	43.2%	47.7%	36.0%	45.1%
Panel B: Study Participants							
Number	99	104	77	89	82	60	511
Percent Female	38.4%	32.7%	33.8%	36.4%	37.0%	30.5%	34.7%
Diff w/non-respondents p-val	*0.007*	*0.704*	*0.069*	*0.148*	*0.024*	*0.470*	*0.000*
Percent U.S. Undergrad	57.6%	50.5%	54.5%	51.1%	48.8%	58.6%	53.5%
Diff w/non-respondents p-val	*0.177*	*0.822*	*0.656*	*0.543*	*0.574*	*0.998*	*0.123*

Note: Panel A shows, for each year in the graduate program, the total number of students enrolled in the 8 participating departments and thus receiving the Fall 2017 survey; the percentage of enrolled students who are female; the percentage of enrolled students who were undergraduates in the U.S.; and the percent of enrolled students who took the Fall 2017 survey. Panel B shows, for each year in the graduate program, the total number of students who took the Fall 2017 survey; the percentage of respondents who are female; p-values of chi-squared tests of differences in female percentage between respondents and non-respondents; the percentage of respondents who were undergraduates in the U.S.; and p-values of chi-squared tests of differences in U.S. undergraduate percentages between respondents and non-respondents.

Table 3: Prevalence of mental health issues, alternative estimates

	Total	Gender Wgt	Country Wgt	Lower Est	Upper Est
Panel A: Mental Health Issues					
Depression	17.7%	16.9%	17.4%	8.0%	62.9%
Anxiety	17.6%	16.8%	17.4%	8.0%	62.9%
Depression or Anxiety	24.8%	24.0%	24.7%	11.2%	66.1%
Suicidality 2-weeks	11.3%	11.2%	11.2%	5.1%	60.0%
Suicidality 1-year	12.0%	11.6%	11.7%	5.4%	60.3%
Panel B: Diagnoses and Treatment					
Diagnosed, pre-program	13.1%	13.1%	13.0%	5.9%	60.8%
Diagnosed, during program	11.9%	11.4%	12.1%	5.4%	60.3%
In treatment for any mental illness	14.9%	14.9%	14.9%	6.7%	61.6%
Of those w/moderate-severe depression or anxiety, % in treatment	25.2%	25.3%	25.3%	11.4%	66.3%

Note: Panel A shows the percentage of students who score about critical thresholds on mental health survey instruments. Depression and Anxiety show those scoring 10 or higher on the PHQ-9 and GAD-7, respectively. Suicidality 2-weeks are those reporting contemplating suicide or self-harm on at least several days in the last two weeks, as captured by Item 9 on the PHQ-9. Suicidality 1-year are those scoring 7 or higher on the SBQR suicidality screening tool, which contains 1-year look-back questions. The Total column reports the percentage recorded in our surveys. The Gender Wgt column weights each prevalence rate based on the gender breakdown of students enrolled in the programs we survey. The Country Wgt column weights each prevalence rate based on the U.S. and international student breakdown of students enrolled in the programs we survey. The Lower Est column provides lower bound estimates (assuming that all who do not participate in the study score below critical thresholds) and the Upper Est column provides upper bound estimates (assuming that all who do not participate in the study score above critical thresholds). Panel B shows the percentage of students who report being diagnosed by a mental health professional with some form of mental illness, either before or during the PhD program. Also shown are percentages of students who are in treatment for any mental illness and the percentage of those with moderate or severe symptoms of depression or anxiety (PHQ-9>=10 and/or GAD-7>=10) who are in treatment.

Table 4: Mental health issues, diagnoses, and treatment, by year in program

	Year in Graduate Program						
	G1	G2	G3	G4	G5	G6+	Total
Panel A: Mental Health Issue Prevalence							
Depression	14.6%	15.4%	15.8%	12.8%	24.7%	25.4%	17.7%
Anxiety	12.2%	12.5%	19.5%	18.2%	21.0%	28.3%	17.6%
Depression or Anxiety	21.2%	19.2%	24.7%	22.5%	29.6%	36.7%	24.8%
Suicidality 2-weeks	8.1%	5.8%	13.0%	15.9%	6.1%	23.3%	11.3%
Suicidality 1-year	5.1%	11.7%	10.4%	22.6%	8.5%	16.7%	12.0%
Panel B: Diagnoses and Treatment							
Diagnosed, pre-program	13.3%	11.5%	10.4%	20.2%	9.8%	13.3%	13.1%
Diagnosed, during program	0.0%	6.8%	9.1%	15.7%	19.5%	28.8%	11.9%
In treatment for any mental illness	8.1%	9.6%	11.7%	16.9%	18.5%	32.2%	14.9%
Of those w/moderate-severe depression or anxiety, % in treatment	14.3%	15.0%	26.3%	35.0%	33.3%	27.3%	25.2%

Note: Panel A shows the percentage of students in each year of the graduate program who score about critical thresholds on mental health survey instruments. Depression and Anxiety show those scoring 10 or higher on the PHQ-9 and GAD-7, respectively. Suicidality 2-weeks are those reporting contemplating suicide or self-harm on at least several days in the last two weeks, as captured by Item 9 on the PHQ-9. Suicidality 1-year are those scoring 7 or higher on the SBQR suicidality screening tool, which contains 1-year look-back questions. Panel B shows the percentage of students in each year who report being diagnosed by a mental health professional with some form of mental illness, either before or during the PhD program. Also shown are percentages of students who are in treatment for any mental illness and the percentage of those with moderate or severe symptoms of depression or anxiety (PHQ-9>=10 and/or GAD-7>=10) who are in treatment.

Table 5: Percent of students scoring above critical thresholds

Category	Depression	Anxiety	Suicidality 2-weeks	Suicidality 1-year
All	17.7%	17.6%	11.3%	12.0%
Male	16.4%	15.9%	11.6%	12.0%
Female	18.3%	19.2%	10.2%	10.9%
Diff male & female p-val	*0.684*	*0.413*	*0.746*	*0.824*
U.S. Undergrad	19.2%	17.9%	9.3%	9.8%
Non-U.S. Undergrad	15.5%	16.9%	13.1%	13.6%
Diff U.S. & non-U.S. p-val	*0.340*	*0.868*	*0.213*	*0.230*

Note: Table shows percent of students scoring above thresholds for mental health concern. Depression and Anxiety show those scoring 10 or higher on the PHQ-9 and GAD-7, respectively. Suicidality 2-weeks are those reporting contemplating suicide or self-harm on at least several days in the last two weeks, as captured by Item 9 on the PHQ-9. Suicidality 1-year are those scoring 7 or higher on the SBQR suicidality screening tool, which contains 1-year look-back questions. P-values for chi-squared tests of differences are also reported, showing no statistical significance in the relationship between mental health and gender and mental health and undergraduate location.

Table 6: Percent of minority race, minority sexuality, and first-generation students scoring above critical thresholds

Category	Depression	Anxiety	Suicidality 2-weeks	Suicidality 1-year
All	17.7%	17.6%	11.3%	12.0%
Minority Race	15.7%	13.7%	14.3%	14.5%
Diff w/White p-val	*0.286*	*0.022*	*0.178*	*0.301*
Minority Sexuality	28.0%	22.0%	22.0%	28.0%
Diff w/Heterosexual p-val	*0.050*	*0.440*	*0.013*	*0.000*
First-Generation	16.2%	12.3%	8.1%	11.0%
Diff w/Non-First Gen p-val	*0.838*	*0.274*	*0.448*	*0.902*

Note: Table shows percent of various groups of students scoring above thresholds for mental health concern. Students classified as minority race are those who select at least one non-White race (Black or African American, Hispanic or Latino, Asian or Asian American, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native). Students classified as minority sexuality are those who select Bisexual or Gay or Lesbian as their sexual orientation. Students with a father or mother with high school or less as the highest level of educational attainment are included in the First-Generation category. Depression and Anxiety show those scoring 10 or higher on the PHQ-9 and GAD-7, respectively. Suicidality 2-weeks are those reporting contemplating suicide or self-harm on at least several days in the last two weeks, as captured by Item 9 on the PHQ-9. Suicidality 1-year are those scoring 7 or higher on the SBQR suicidality screening tool, which contains 1-year look-back questions. P-values for chi-squared tests of differences are also reported, showing levels of statistical significance for relationships between mental health and race, sexual orientation, and parent education level.

Table 7: Help with mental health: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
If issue with mental health, would you know where to turn for help?		**-0.103****	**-0.070**	**-0.141*****
Yes	87.1%			
No	12.9%			
If issue with mental health, how likely would you be to turn to someone for help?		**-0.191*****	**-0.092****	**-0.132*****
Not likely	12.9%			
Somewhat likely	32.0%			
Moderately likely	25.0%			
Very likely	30.2%			

Note: A higher response value indicates knowing where to turn for help and a greater likelihood of turning to someone for help. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = $p<0.1$, ** = $p<0.05$, *** = $p<0.01$. For exact question wording, please see survey instrument in Appendix C1.

Table 8: RAND meaningfulness of work: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Opportunities to fully use your talents		**-0.364*** **	**-0.240*** **	**-0.187*** **
Always	8.7%			
Most of the time	32.5%			
Sometimes	45.2%			
Rarely	12.1%			
Never	1.6%			
Opportunities to make positive impact on community/society		**-0.231*** **	**-0.113** **	**-0.120*** **
Always	3.7%			
Most of the time	16.4%			
Sometimes	31.9%			
Rarely	35.6%			
Never	12.5%			
Sense of personal accomplishment		**-0.366*** **	**-0.304*** **	**-0.123*** **
Always	7.7%			
Most of the time	25.8%			
Sometimes	47.5%			
Rarely	16.6%			
Never	2.4%			
Goals to aspire to		**-0.272*** **	**-0.238*** **	**-0.166*** **
Always	15.6%			
Most of the time	37.3%			
Sometimes	34.3%			
Rarely	10.5%			
Never	2.4%			
Satisfaction of work well done		**-0.364*** **	**-0.325*** **	**-0.128*** **
Always	7.5%			
Most of the time	26.5%			
Sometimes	43.2%			
Rarely	19.8%			
Never	2.9%			
Feeling of doing useful work		**-0.313*** **	**-0.226*** **	**-0.137*** **
Always	6.1%			
Most of the time	20.3%			
Sometimes	45.9%			
Rarely	22.2%			
Never	5.5%			

Note: These questions were borrowed from the RAND American Working Conditions Survey (Maestas et al. (2015)). A higher response value indicates a respondent's work provides more of each question item. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table 9: RAND work issues: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Worried about work when not working		**0.354*** **	**0.437*** **	**0.140*** **
Always	20.1%			
Most of the time	41.8%			
Sometimes	31.2%			
Rarely	6.2%			
Never	0.6%			
Were too tired for activities in private life		**0.354*** **	**0.407*** **	**0.221*** **
Always	4.9%			
Most of the time	15.6%			
Sometimes	49.0%			
Rarely	25.0%			
Never	5.5%			
Were too tired to do household jobs		**0.331*** **	**0.364*** **	**0.132*** **
Always	6.2%			
Most of the time	18.3%			
Sometimes	42.3%			
Rarely	26.7%			
Never	6.4%			
Had difficulty making ends meet financially		**0.215*** **	**0.227*** **	**0.082***
Always	2.5%			
Most of the time	5.7%			
Sometimes	11.3%			
Rarely	26.7%			
Never	53.8%			
Had work prevent time with family or significant others		**0.234*** **	**0.350*** **	**0.109** **
Always	6.7%			
Most of the time	17.6%			
Sometimes	39.1%			
Rarely	22.9%			
Never	13.7%			

Note: These questions were borrowed from the RAND American Working Conditions Survey (Maestas et al. (2015)). A higher response value indicates a respondent experienced more of each type of situation. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table 10: Social sources of support: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Number of people you can really open up to		**-0.203*** **	**-0.123*** **	**-0.232*** **
0	5.8%			
1	14.6%			
2 - 5	61.2%			
6 - 10	15.2%			
11 - 15	1.6%			
16 - 20	0.8%			
More than 20	0.8%			
How often share problem or worry?		**-0.182*** **	**-0.067**	**-0.162*** **
Never	3.3%			
Sometimes	48.4%			
Most of the Time	36.5%			
Always	11.7%			
I have very good friends at my Economics Department.		**-0.233*** **	**-0.144*** **	**-0.182*** **
Strongly agree	38.4%			
Agree	34.3%			
Neither agree nor disagree	14.8%			
Disagree	8.4%			
Strongly disagree	4.1%			
How competitive are your peers?		**0.222*** **	**0.272*** **	**0.143*** **
Not competitive at all	24.2%			
Somewhat competitive	41.6%			
Moderately competitive	23.0%			
Very competitive	11.1%			

Note: A higher response value indicates more people to open up to, more often letting someone know about a problem, more friends in the Economics Department, and more perceived competition among peers. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table 11: Number of meetings with advisers: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
In the last 2 months, # of times met with main adviser		**-0.005**	**0.077**	**0.002**
0	4.4%			
1	12.6%			
2	19.8%			
3	16.2%			
4	15.9%			
5	8.2%			
6-10	19.0%			
11-15	1.8%			
15+	2.1%			
In the last 2 months, total # of times met with one of three advisers		**-0.074**	**0.079**	**-0.035**
0	0.0%			
1	0.0%			
2	0.0%			
3	3.6%			
4	3.6%			
5	7.6%			
6-10	46.7%			
11-15	28.3%			
15+	10.1%			

Note: For the first question, a higher response value indicates greater number of times met with main adviser. For the second question, a higher response value indicates greater number of times met with one of three advisers (summed across the three advisers). Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table 12: Perceptions of faculty care: Experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
How much do advisers care about the success of your research project(s)?		**-0.184*** **	**-0.164*** **	**-0.161*** **
Do not care at all	2.3%			
Care somewhat	16.6%			
Care moderately	34.3%			
Care very much	46.9%			
How much do advisers care about you as a person?		**-0.236*** **	**-0.245*** **	**-0.160*** **
Do not care at all	7.8%			
Care somewhat	28.0%			
Care moderately	38.6%			
Care very much	25.6%			

Note: A higher response value indicates greater perceived care. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table 13: Help with advising: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
If issue with advising, would you know where to turn for help?		**-0.188*** **	**-0.170*** **	**-0.118*** **
Yes	41.9%			
No	58.1%			
If issue with advising, how likely would you be to turn to someone for help?		**-0.250*** **	**-0.235*** **	**-0.215*** **
Not likely	23.4%			
Somewhat likely	40.7%			
Moderately likely	23.2%			
Very likely	12.6%			

Note: A higher response value indicates knowing where to turn for help and a greater likelihood of turning to someone for help. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

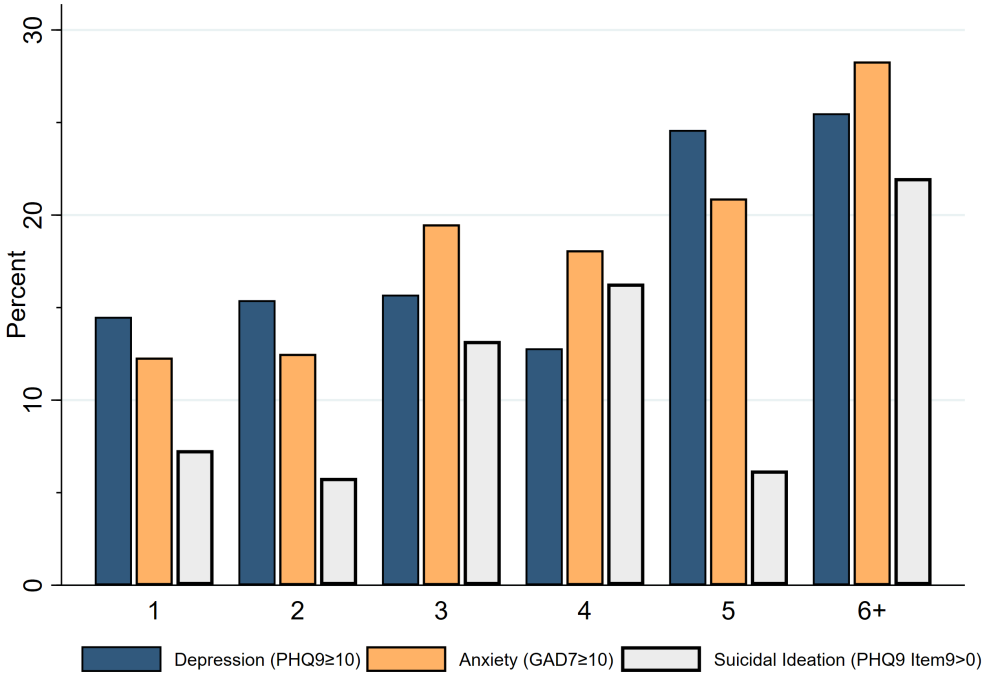
Table 14: Have you experienced sexual harassment in your department?

	All	Male	Female	U.S. Undergrad	Non-U.S. Undergrad
Yes	16.2%	13.0%	21.5%	22.2%	8.9%

Note: Table shows percentage of each group of students that report having experienced one or more forms of sexual harassment from someone in their department. A chi-squared joint test revealed no statistically significant difference in the percentage of students who reported sexual harassment and had PHQ-9>=10 and the percentage of students who reported sexual harassment and had PHQ-9<10 (p-value = 0.112). This was also the case for critical values of GAD-7 (p-value = 0.521), and PHQ-9 Item 9 (p-value = 0.971). For exact question wording, please see survey instrument in Appendix C1.

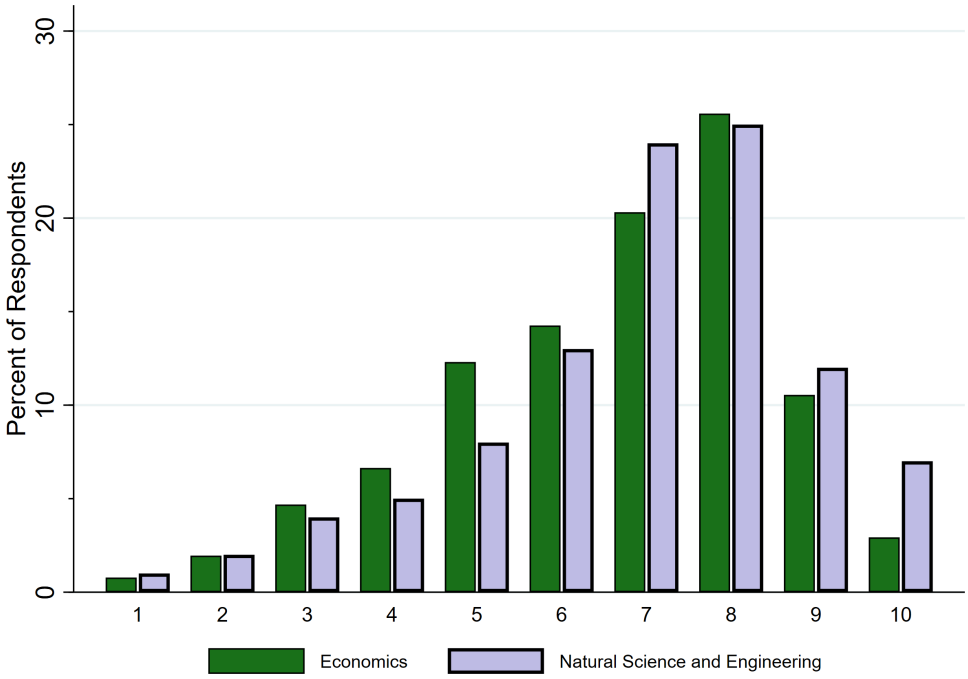
Figures

Figure 1: Prevalence of mental illness by year in graduate program



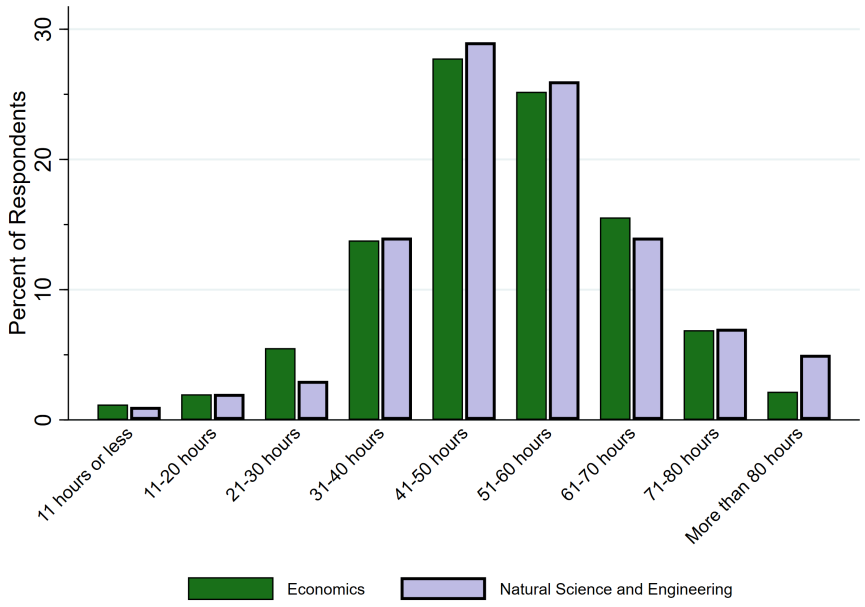
Note: PHQ-9 measures symptoms of depression. GAD-7 measures symptoms of anxiety. Symptom intensity increases as PHQ-9 and GAD-7 scores increase. Mental health professionals use a score of 10 on the PHQ-9 and the GAD-7 as a cutoff when diagnosing individuals with depression or anxiety disorder, respectively. The PHQ-9 Item 9 measures suicidality by asking on how many days over the past two weeks a student was bothered by thoughts of wanting to be dead or wanting to hurt themselves. We show here the percent of students scoring 10 or higher on the PHQ-9 and GAD-7, and the percent of students bothered by suicidal thoughts in a two week period.

Figure 2: On a scale of 1 to 10, where 1 = Extremely dissatisfied and 10 = Extremely satisfied, how satisfied are you with your PhD experience?



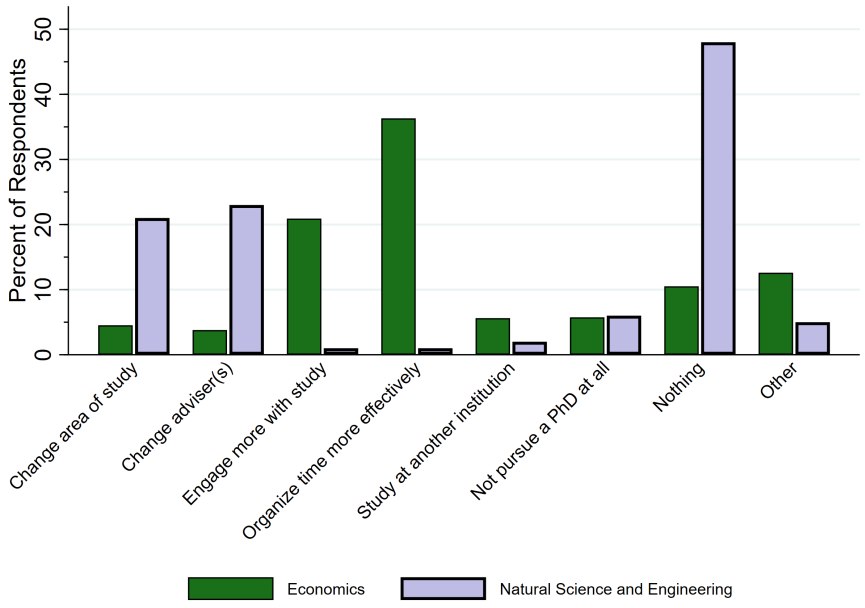
Note: Results for Natural Science and Engineering PhD students come from Woolston (2017).

Figure 3: On average, how many hours a week do you typically work?



Note: Results for Natural Science and Engineering PhD students come from Woolston (2017).

Figure 4: What would you do differently right now if you were starting your program?



Note: Results for Natural Science and Engineering PhD students come from Woolston (2017).

Appendix A: Faculty Recommendations on Working with Students Who Are Experiencing Mental Health Issues

1. "Listen, be kind, advise them to go to counselling, say that getting treated is no more shameful than wearing glasses, listen some more"

2. "Be empathetic, patient, and understanding - and refer them to mental health professionals."

3. "Engage with the student. Show empathy. Relate own experiences."

4. "Try not to equate a difficulty getting things done with laziness."

5. "Be supportive but also encourage the student to access the resources available on campus, including trained mental health professionals."

6. "Direct them to school mental health services, many have no idea it exists, or would not consider this an option for cultural reasons etc. Telling them this is completely normal and a widely used resource has been helpful in the past in my experience. Students have taken it up and have found it helpful."

7. "Be patient with them, give them time to sort out issues, and help give them a long run perspective on things so that they're not so worried about short term achievements / immediate research progress"

8. "Listen carefully, be supportive, and remember that with appropriate support the student's mental health issue does not need to be a barrier to success in PhD and beyond."

9. "The key in all cases is followup...absolutely essential. Do not wait. A same-day follow up call shows that you care. There is a real risk that without that the student will continue a downhill spiral and do nothing, until it gets much worse."

10. "Address it right away, don't wait for it to become extreme. Don't try to talk to the student as a therapist, but do (strongly) encourage him/her to go to therapy ---

most likely the campus offers some decent free service. Tell them that it is absolutely normal, that even successful and bright people go through dark times."

11. "Become familiar with resources available on campus for support and direct students to those resources."

12. "Try to open lines of communication so that the student can talk with you without feeling that this will impact their academic standing or progress; urge the student to reach out to mental health professionals; try to help the student find a support network, whether making contact with family, talking with friends, or contacting a religious leader; reassure the student by explaining that many students face -- and overcome -- mental health issues"

13. "I think it's difficult from a faculty perspective to see the difference between lack of progress because of (a) lack of effort and (b) a mental health issue that prevents focus/etc. I think discussion and training on this distinction is crucial."

14. "I don't have great advice, but I think this is a seriously under appreciated problem. All departments should have clear procedures for what professors should do if they think a student could use help in this domain (which I believe many do), so that students can get help without being stigmatized"

Appendix B: Additional Tables

Table B.1: Student Background Characteristics

	All	Male	Female	US Undergrad	Non-US Undergrad
Gender Identity					
Man	64.7%	100.0%	0.0%	63.9%	65.4%
Woman	34.7%	0.0%	100.0%	34.9%	34.6%
Other	0.6%	0.0%	0.0%	1.1%	0.0%
Age					
Younger than 20	0%	0%	0%	0%	0%
20-24	18.8%	18.8%	19.2%	23.0%	14.3%
25-29	66.9%	63.5%	72.3%	64.3%	69.6%
30-34	13.3%	16.7%	7.3%	11.2%	15.6%
35 or older	1.0%	0.9%	1.1%	1.5%	0.4%
Race					
American Indian or Alaska Native	0.5%	0.8%	0%	0.4%	0.8%
Asian or Asian American	26.0%	21.8%	34.2%	25.4%	26.5%
Hispanic or Latino	11.7%	12.1%	11.1%	5.3%	18.8%
Black or African American	0.5%	0.3%	1.1%	0.4%	0.8%
Native Hawaiian or Other Pacific Islander	0.2%	0%	0.5%	0.4%	0%
White	61.1%	65.0%	53.2%	68.2%	53.1%
US Citizenship					
US Citizen	46.3%	47.4%	43.2%	82.9%	5.1%
Non-US Citizen	53.7%	52.6%	56.8%	17.1%	94.9%
English Language					
English is first language	50.9%	53.5%	45.5%	83.3%	14.0%
English is not first language	49.1%	46.5%	54.5%	16.7%	86.0%
Disability					
Disability	1.6%	1.8%	0.6%	2.6%	0.4%
No disability	98.4%	98.2%	99.4%	97.4%	99.6%
Sexual Orientation					
Heterosexual	90.1%	89.7%	92.5%	89.6%	91.5%
Bisexual	4.9%	4.0%	6.9%	6.3%	3.0%
Gay or lesbian	4.3%	6.4%	0.6%	3.0%	5.6%
Relationship Status					
Single	31.3%	31.3%	30.9%	32.1%	30.1%
Casual	3.7%	4.3%	2.9%	4.1%	3.4%
Dating	9.3%	10.3%	7.4%	6.3%	12.3%
Long-term/Committed	36.4%	34.3%	40.6%	39.2%	33.5%
Married	18.7%	19.5%	17.1%	17.2%	20.8%
Divorced	0%	0%	0%	0%	0%
Other	0.6%	0.3%	1.1%	1.1%	0%
Living Alone					
Living alone	28.4%	28.0%	28.2%	24.1%	32.2%
Not living alone	71.6%	72.0%	71.8%	75.9%	67.8%
Children					
One or more	3.9%	4.3%	3.4%	3.7%	4.2%
None	96.1%	95.7%	96.6%	96.3%	95.8%
Undergraduate Institution					
Small liberal arts college (US)	11.0%	8.8%	14.7%	20.7%	0%
Public university (US)	12.7%	14.0%	10.2%	24.1%	0%
Private university (US)	29.2%	29.5%	28.2%	55.2%	0%
Non-U.S. university	46.5%	47.1%	46.3%	0%	100.0%
Other	0.6%	0.6%	0.6%	0%	0%

Table B.1: (Cont.) Student Background Statistics

	All	Male	Female	US Undergrad	Non-US Undergrad
Parental Relationship Status					
Never married	2.1%	1.5%	3.4%	0.4%	4.2%
Married	76.0%	75.8%	76.3%	79.3%	72.6%
Divorced or separated	18.8%	19.4%	17.5%	18.1%	19.0%
Other	3.1%	3.3%	2.8%	2.2%	4.2%
Father - Highest Degree Earned					
High school or below	9.2%	10.0%	8.0%	4.1%	14.4%
Associate	2.7%	3.0%	2.3%	1.5%	4.2%
Bachelor's	29.2%	30.9%	25.0%	24.4%	34.3%
Graduate degree	58.9%	56.1%	64.8%	70.0%	47.0%
Father w/Grad Degree - Degree Type					
MBA	13.3%	12.9%	14.2%	17.5%	5.9%
Other Master's	31.7%	32.7%	29.1%	26.9%	39.8%
MD	10.9%	12.4%	8.7%	9.4%	13.6%
JD	6.3%	7.9%	3.9%	7.1%	5.1%
Economics PhD	6.9%	5.9%	8.7%	6.6%	7.6%
Other PhD	27.8%	26.2%	30.7%	31.1%	22.0%
Other	3.0%	2.0%	4.7%	1.4%	5.9%
Mother - Highest Degree Earned					
High school or below	10.7%	12.1%	8.5%	5.2%	16.5%
Associate	6.6%	6.1%	7.9%	4.8%	8.4%
Bachelor's	33.8%	35.8%	30.5%	30.7%	37.1%
Graduate degree	48.8%	46.1%	53.1%	59.3%	38.0%
Mother w/Grad Degree - Degree Type					
MBA	10.4%	10.3%	10.0%	10.9%	9.5%
Other Master's	46.5%	48.5%	42.0%	47.7%	44.2%
MD	13.0%	13.9%	12.0%	12.6%	13.7%
JD	4.8%	4.8%	5.0%	4.6%	5.3%
Economics PhD	2.2%	1.8%	3.0%	2.9%	1.1%
Other PhD	20.1%	17.0%	26.0%	18.4%	23.2%
Other	3.0%	3.6%	2.0%	2.9%	3.2%
Math courses btw. start of undergrad & PhD					
0	2.9%	2.1%	4.5%	2.6%	3.4%
1 or 2	6.5%	6.4%	6.2%	4.5%	8.5%
3 or 4	18.6%	17.9%	20.5%	19.7%	17.4%
5 or 6	19.4%	17.3%	23.3%	17.5%	21.6%
7+	52.5%	56.2%	45.5%	55.8%	49.2%
Straight from undergraduate to PhD?					
Yes	24.3%	23.5%	26.0%	29.7%	18.1%
No	75.7%	76.5%	74.0%	70.3%	81.9%
Positions for compensation in the last two months					
Teaching Assistant	34.3%	33.9%	34.8%	28.7%	40.1%
Research Assistant	22.1%	23.3%	20.4%	22.2%	22.4%
Grader	6.1%	6.1%	6.3%	5.1%	7.4%
Resident Assistant	0.9%	1.2%	0.5%	0.9%	1.0%
Private tutor	6.3%	6.4%	6.3%	7.5%	5.1%
Non-academic data scientist	0.9%	0.9%	0.9%	1.2%	0.6%
Other	5.2%	5.4%	4.5%	6.0%	4.2%
Did not work for compensation	24.1%	22.8%	26.2%	28.4%	19.2%

Table B.2: Study participant comparison, by response behavior

Panel A: Took Only Fall 2017 Survey					
	All	Depression	Anxiety	Suicidality 2-weeks	Suicidality 1-year
Number	263	46	47	31	33
Percent Female	33.5%	32.6%	36.2%	25.8%	27.3%
Percent U.S. Undergrad	46.0%	52.2%	44.7%	32.3%	39.4%
Panel B: Took Both Fall 2017 & Spring 2018 Surveys					
Number	250	43	43	27	28
Percent Female	35.6%	39.5%	39.5%	37.0%	35.7%
Diff w/only fall resp. p-val	*0.720*	*0.633*	*0.898*	*0.512*	*0.580*
Percent U.S. Undergrad	59.6%	62.8%	62.8%	55.6%	46.4%
Diff w/only fall resp. p-val	*0.003*	*0.413*	*0.124*	*0.119*	*0.654*

Note: Panel A focuses on those who only took the main Fall 2017 survey and reports the number of such respondents and the number of such respondents who score above critical mental health thresholds. Percent female reports the percent of respondents scoring above critical mental health thresholds who are female; percent U.S. Undergrad reports the percent of respondents scoring above critical mental health thresholds who were U.S. undergraduates. Panel B reports the same figures, but for those who took both the main Fall 2017 survey and the Spring 2018 follow-up survey. Depression and Anxiety show those scoring 10 or higher on the PHQ-9 and GAD-7, respectively. Suicidality 2-weeks are those reporting contemplating suicide or self-harm on at least several days in the last two weeks, as captured by Item 9 on the PHQ-9. Suicidality 1-year are those scoring 7 or higher on the SBQR suicidality screening tool, which contains 1-year look-back questions. Panel B also shows p-values of chi-squared tests of differences in female percentage and U.S. undergraduate percentage between the sample in Panel A and the sample in Panel B.

Table B.3: Pearson correlations of Depression (PHQ-9) score and other mental health measures

Measure	Depression (PHQ-9)
Anxiety (GAD-7)	0.655 ***
Suicidality 2-weeks (PHQ-9 Item 9)	0.511 ***
Suicidality 1-year (SBQR)	0.304 ***
Loneliness (UCLA-3)	0.482 ***
Self-Esteem (Rosenberg)	-0.585 ***
Impostor Syndrome (Clance)	0.379 ***
Eating Disorder (ESP)	0.264 ***
ADHD	0.280 ***
Alcohol Use (AUDIT-C)	0.012
Physical Exercise, Moderate	-0.015
Sleep (Good Days)	-0.418 ***
Sleepiness	0.379 ***

Note: Higher scores mean worse outcomes, except for Self-Esteem (higher score=higher self-esteem), Physical Exercise (higher score=more exercise), and Sleep (higher score=more good days of sleep). For exact question wording, please see survey instrument in Appendix C1. * = p<0.1, ** = p<0.05, *** = p<0.01.

Table B.4: Students receiving treatment for depression, anxiety, or any mental health issue, by symptom severity

Panel A: Depression			
PHQ-9 Score	Category	Num. Students	Percent in Treatment
0 to 4	none-minimal	225	2.2%
5 to 9	mild	190	8.4%
10 to 14	moderate	60	18.3%
15 to 19	moderately-severe	22	18.2%
>=20	severe	7	28.6%
Panel B: Anxiety			
GAD-7 Score	Category	Num. Students	Percent in Treatment
0 to 4	none-minimal	261	4.2%
5 to 9	mild	159	11.9%
10 to 14	moderate	68	22.1%
>=15	severe	22	18.2%
Panel C: Suicidality			
PHQ-9 Item 9 Score	Category	Num. Students	Percent in Treatment
0	not at all	448	13.6%
>= 1	more than zero days	56	26.8%

Note: PHQ-9 measures symptoms of depression. GAD-7 measures symptoms of anxiety. Symptom severity increases as PHQ-9 and GAD-7 scores increase. Mental health professionals use a score of 10 on the PHQ-9 and the GAD-7 as a cutoff when diagnosing individuals with depression or anxiety disorder, respectively. The PHQ-9 Item 9 measures suicidality by asking on how many days over the past two weeks a student was bothered by thoughts of wanting to be dead or wanting to hurt themselves. Treatment in Panel A refers to treatment for depression; in Panel B, treatment for anxiety; in Panel C, treatment for any mental health issue.

Table B.5: Faculty responses: meaningfulness of work

Question and Answer	Percent
Opportunities to fully use your talents	
Always	28.8%
Most of the time	57.1%
Sometimes	13.6%
Rarely	0.5%
Never	0.0%
Opportunities to make positive impact on community/society	
Always	17.8%
Most of the time	40.5%
Sometimes	35.1%
Rarely	5.9%
Never	0.5%
Sense of personal accomplishment	
Always	25.4%
Most of the time	50.3%
Sometimes	21.1%
Rarely	3.2%
Never	0.0%
Goals to aspire to	
Always	43.2%
Most of the time	41.6%
Sometimes	12.4%
Rarely	2.7%
Never	0.0%
Satisfaction of work well done	
Always	24.2%
Most of the time	52.7%
Sometimes	19.9%
Rarely	3.2%
Never	0.0%
Feeling of doing useful work	
Always	19.5%
Most of the time	51.4%
Sometimes	24.9%
Rarely	3.8%
Never	0.5%

Note: These questions were borrowed from the RAND American Working Conditions Survey (Maestas et al. (2015)). Similar questions were asked of the students. For comparison with student responses, please see Table 8. For exact question wording, please see survey instrument in Appendix C2.

Table B.6: Faculty responses: work issues

Question and Answer	Percent
Worried about work when not working	
Always	19.5%
Most of the time	40.5%
Sometimes	34.1%
Rarely	4.9%
Never	1.1%
Were too tired for activities in private life	
Always	2.7%
Most of the time	20.1%
Sometimes	46.2%
Rarely	27.2%
Never	3.8%
Were too tired to do household jobs	
Always	0.5%
Most of the time	13.6%
Sometimes	47.3%
Rarely	31.5%
Never	7.1%
Had difficulty making ends meet financially	
Always	0.0%
Most of the time	0.5%
Sometimes	3.8%
Rarely	17.4%
Never	78.3%
Had work prevent time with family or significant others	
Always	1.6%
Most of the time	21.1%
Sometimes	52.4%
Rarely	18.4%
Never	6.5%

Note: These questions were borrowed from the RAND American Working Conditions Survey (Maestas et al. (2015)). Similar questions were asked of the students. For comparison with student responses, please see Table 9. For exact question wording, please see survey instrument in Appendix C2.

Table B.7: Faculty responses: perceptions of relationships with students

Question and Answer	Percent
How easy do you think it would be for them to talk to you about non-academic career options?	
Not easy at all	8.2%
Somewhat easy	23.5%
Moderately easy	41.5%
Very easy	26.8%
How honest do you think they would be with you if they faced difficulties with research progress?	
Not honest at all	0.5%
Somewhat honest	13.2%
Moderately honest	48.4%
Very honest	37.9%
Presentations	
Not honest at all	0.6%
Somewhat honest	8.9%
Moderately honest	45.6%
Very honest	45.0%
Teaching	
Not honest at all	2.4%
Somewhat honest	20.0%
Moderately honest	44.7%
Very honest	32.9%
Refereeing	
Not honest at all	0.8%
Somewhat honest	13.2%
Moderately honest	31.4%
Very honest	54.5%
Co-authoring with other students	
Not honest at all	0.0%
Somewhat honest	25.3%
Moderately honest	42.0%
Very honest	32.7%
Co-authoring with you	
Not honest at all	9.5%
Somewhat honest	43.5%
Moderately honest	32.7%
Very honest	14.3%
Their other advisers	
Not honest at all	8.4%
Somewhat honest	41.9%
Moderately honest	34.1%
Very honest	15.6%
Preparing for the job market	
Not honest at all	0.0%
Somewhat honest	14.6%
Moderately honest	40.4%
Very honest	44.9%
Their decision to get a PhD in economics	
Not honest at all	4.7%
Somewhat honest	32.7%
Moderately honest	41.5%
Very honest	21.1%
Decisions related to starting a family	
Not honest at all	11.3%
Somewhat honest	45.3%
Moderately honest	34.0%
Very honest	9.3%
Their mental health	
Not honest at all	19.4%
Somewhat honest	53.5%
Moderately honest	22.4%
Very honest	4.7%
Other personal life issues	
Not honest at all	12.9%
Somewhat honest	54.7%
Moderately honest	26.5%
Very honest	5.9%

Note: Similar questions were asked of the students. For comparison with student responses, please see Table B.13. For exact question wording, see survey instrument in Appendix C2.

Table B.8: Seminar environment: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Comfortable voice a thought in a seminar setting?		**-0.162*** **	**-0.115*** **	**-0.057**
Not comfortable at all	35.5%			
Somewhat comfortable	35.2%			
Moderately comfortable	19.3%			
Very comfortable	10.0%			
How certain about high quality of thought before sharing it in seminar setting?		**0.056**	**0.044**	**-0.065**
Not certain at all	9.0%			
Somewhat certain	13.6%			
Moderately certain	26.1%			
Very certain	51.3%			

Note: A higher response value indicates greater comfort and certainty. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table B.9: As of right now, how comfortable would you be voicing a thought in a seminar setting?

	All	Male	Female	US Undergrad	Non-US Undergrad
Moderately/Very Comfortable	29.3%	34.8%	19.3%	30.5%	28.3%

Table B.10: As of right now, how certain would you have to be about the high quality of a thought before you voiced it in a seminar setting?

	All	Male	Female	US Undergrad	Non-US Undergrad
Moderately/Very Certain	77.4%	77.0%	77.4%	81.1%	73.8%

Table B.11: Impediments to meeting with faculty: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Meetings are difficult to schedule		**0.105****	**0.062**	**0.042**
Not significant at all	56.6%			
Somewhat significant	26.7%			
Moderately significant	11.0%			
Very significant	5.7%			
Meetings are too short		**0.041**	**0.074**	**-0.021**
Not significant at all	70.9%			
Somewhat significant	20.7%			
Moderately significant	6.8%			
Very significant	1.5%			
Meetings are not useful		**0.178*****	**0.148*****	**0.131*****
Not significant at all	70.4%			
Somewhat significant	21.7%			
Moderately significant	6.2%			
Very significant	1.8%			
Meetings are unpleasant		**0.314*****	**0.322*****	**0.258*****
Not significant at all	79.9%			
Somewhat significant	12.2%			
Moderately significant	5.8%			
Very significant	2.2%			
Fear of the consequences of a bad impression		**0.285*****	**0.339*****	**0.151*****
Not significant at all	32.3%			
Somewhat significant	30.8%			
Moderately significant	18.2%			
Very significant	18.7%			
Doubt about the quality of your ideas, questions, thoughts		**0.215*****	**0.238*****	**0.088***
Not significant at all	24.8%			
Somewhat significant	26.6%			
Moderately significant	25.1%			
Very significant	23.5%			
Lack of progress on to-dos from previous meeting		**0.180*****	**0.195*****	**0.100****
Not significant at all	30.1%			
Somewhat significant	24.6%			
Moderately significant	23.1%			
Very significant	22.2%			

Note: A higher response value indicates greater significance for each impediment. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table B.12: Faculty attention and role modeling: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Over last 2 months, # of faculty initiating informal conversation		**-0.109****	**-0.087***	**-0.085***
0	36.3%			
1	31.9%			
2	24.0%			
3 or more	7.8%			
# of faculty members in department you consider to be professional role models		**-0.174*****	**-0.182*****	**-0.162*****
0	18.0%			
1	18.8%			
2	25.6%			
3 or more	37.6%			

Note: A higher response value indicates more faculty informal conversations and more faculty professional role models. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = $p<0.1$, ** = $p<0.05$, *** = $p<0.01$. For exact question wording, please see survey instrument in Appendix C1.

Table B.13: Discussing difficulties with advisers: Experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
How easy is it for you to talk to advisers about non-academic career options?		**-0.193*** **	**-0.272*** **	**-0.184*** **
Not easy at all	49.7%			
Somewhat easy	22.6%			
Moderately easy	17.1%			
Very easy	10.6%			
How honest can you be with advisers about difficulties with research progress?		**-0.261*** **	**-0.313*** **	**-0.198*** **
Not honest at all	38.7%			
Somewhat honest	32.7%			
Moderately honest	19.8%			
Very honest	8.9%			
Presentations		**-0.257*** **	**-0.310*** **	**-0.223*** **
Not honest at all	3.0%			
Somewhat honest	18.8%			
Moderately honest	31.6%			
Very honest	46.5%			
Teaching		**-0.215*** **	**-0.326*** **	**-0.183*** **
Not honest at all	4.0%			
Somewhat honest	15.9%			
Moderately honest	31.8%			
Very honest	48.4%			
Refereeing		**-0.290*** **	**-0.344*** **	**-0.252*** **
Not honest at all	3.6%			
Somewhat honest	12.4%			
Moderately honest	31.4%			
Very honest	52.7%			
Co-authoring with other students		**-0.146** **	**-0.191*** **	**-0.235*** **
Not honest at all	6.0%			
Somewhat honest	19.2%			
Moderately honest	31.6%			
Very honest	43.2%			
Your mental health		**-0.284*** **	**-0.308*** **	**-0.296*** **
Not honest at all	41.5%			
Somewhat honest	32.7%			
Moderately honest	14.6%			
Very honest	11.1%			
Your other advisers		**-0.159*** **	**-0.191*** **	**-0.176*** **
Not honest at all	15.8%			
Somewhat honest	32.9%			
Moderately honest	25.8%			
Very honest	25.5%			
Preparing for the job market		**-0.340*** **	**-0.312*** **	**-0.244*** **
Not honest at all	4.1%			
Somewhat honest	20.1%			
Moderately honest	30.1%			
Very honest	45.7%			
Your decision to get a PhD in economics		**-0.293*** **	**-0.271*** **	**-0.195*** **
Not honest at all	22.6%			
Somewhat honest	22.6%			
Moderately honest	19.3%			
Very honest	35.4%			
Decisions related to starting a family		**-0.234*** **	**-0.239*** **	**-0.133** **
Not honest at all	31.0%			
Somewhat honest	30.2%			
Moderately honest	19.6%			
Very honest	19.2%			
Co-authoring with these faculty		**-0.248*** **	**-0.244*** **	**-0.217*** **
Not honest at all	11.7%			
Somewhat honest	27.3%			
Moderately honest	27.3%			
Very honest	33.7%			
Other personal life issues		**-0.261*** **	**-0.313*** **	**-0.198*** **
Not honest at all	38.7%			
Somewhat honest	32.7%			
Moderately honest	19.8%			
Very honest	8.9%			

Note: A higher response value indicates greater ease of discussing non-academic career options and greater honesty with difficulties in each question category. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table B.14: Symptom severity and mental health diagnoses

Panel A: Depression			
PHQ-9 Score	Category	Diagnosed Before	Diagnosed After
0 to 4	none-minimal	34.8%	27.9%
5 to 9	mild	39.4%	34.4%
10 to 14	moderate	16.7%	24.6%
15 to 19	moderately-severe	7.6%	9.8%
>=20	severe	1.5%	3.3%
Panel B: Anxiety			
GAD-7 Score	Category	Diagnosed Before	Diagnosed After
0 to 4	none-minimal	43.3%	36.1%
5 to 9	mild	34.3%	34.4%
10 to 14	moderate	17.9%	19.7%
>=15	severe	4.5%	9.8%
Panel C: Suicidality			
PHQ-9 Item 9 Score	Category	Diagnosed Before	Diagnosed After
0	not at all	89.4%	80.3%
>= 1	more than zero days	10.6%	19.7%

Note: Table shows the percentage of students diagnosed with a mental health issue before starting the PhD program and percentage of students diagnosed after starting the PhD program who are scoring in each PHQ-9, GAD-7, and PHQ-9 Item 9 category. Those who score 10 or higher on the PHQ-9 or the GAD-7 would, with a 90% probability, be diagnosed with depression or anxiety disorder, respectively, upon seeing a mental health professional. PHQ-9 Item 9 measures suicidality by asking on how many days over the past two weeks a student was bothered by thoughts of wanting to be dead or wanting to hurt themselves.

Table B.15: How important are the following to your sense of success in life?

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
Tenure at an academic institution		**-0.094****	**-0.064**	**-0.005**
Not important at all	14.1%			
Somewhat important	28.0%			
Moderately important	32.9%			
Very important	25.0%			
Tenure at a top-ranked academic institution		**-0.046**	**-0.098****	**0.009**
Not important at all	25.3%			
Somewhat important	36.8%			
Moderately important	25.3%			
Very important	12.5%			
High income		**0.069**	**0.012**	**0.048**
Not important at all	9.6%			
Somewhat important	37.3%			
Moderately important	37.9%			
Very important	15.2%			
Having your own family		**-0.084***	**0.001**	**-0.047**
Not important at all	5.9%			
Somewhat important	13.1%			
Moderately important	21.7%			
Very important	59.3%			
Knowing that you have made a useful contribution to the world		**-0.036**	**-0.032**	**-0.113****
Not important at all	3.9%			
Somewhat important	10.1%			
Moderately important	28.5%			
Very important	57.5%			
Recognition of your work by the general public		**-0.022**	**-0.009**	**-0.029**
Not important at all	16.2%			
Somewhat important	35.1%			
Moderately important	34.1%			
Very important	14.6%			

Note: A higher response value indicates greater importance to a respondent's sense of success in life. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table B.16: In this academic year, how successful do you think you will be...: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
in your courses		**-0.285*** **	**-0.315*** **	**-0.197*** **
Not successful at all	8.2%			
Somewhat successful	21.3%			
Moderately successful	51.1%			
Very successful	19.5%			
in your research process		**-0.361*** **	**-0.290*** **	**-0.172*** **
Not successful at all	8.3%			
Somewhat successful	39.2%			
Moderately successful	41.8%			
Very successful	10.7%			
in your presentations		**-0.325*** **	**-0.259*** **	**-0.158*** **
Not successful at all	10.3%			
Somewhat successful	30.5%			
Moderately successful	47.5%			
Very successful	11.6%			
in your teaching		**-0.201*** **	**-0.193*** **	**-0.128** **
Not successful at all	3.9%			
Somewhat successful	20.4%			
Moderately successful	47.4%			
Very successful	28.4%			

Note: A higher response value indicates greater belief in success in each endeavor. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Table B.17: Working with others: experiences and correlations with mental health

Question and Answer	Percent	PHQ-9 ρ	GAD-7 ρ	PHQ-9 Item 9 ρ
In 1st year, number of people worked with on problem sets		**-0.016**	**0.013**	**-0.030**
Worked alone	29.0%			
2 people	15.3%			
3 people	32.8%			
4+ people	22.9%			
Co-authoring with other PhD student?		**-0.078***	**0.020**	**-0.026**
Yes	36.7%			
No	63.3%			
Co-authoring with faculty member?		**-0.074**	**0.012**	**-0.043**
Yes	39.1%			
No	60.9%			
Over the last 7 days, how many days did you work in the Economics Department?		**-0.095****	**-0.021**	**-0.077***
0 days	11.4%			
1 day	5.3%			
2 days	7.6%			
3 days	9.6%			
4 days	15.1%			
5 days	28.0%			
6 days	13.5%			
7 days	9.6%			

Note: A higher response value indicates a larger group, one or more projects co-authored, and more days worked in the Economics Department. Higher PHQ-9, GAD-7, and PHQ-9 Item 9 scores reflect worse mental health. PHQ-9 captures depressive symptoms, GAD-7 captures anxious symptoms, and PHQ-9 Item 9 captures thoughts of suicide and self-harm. Last three columns report Pearson correlation (ρ) between response to the question and each mental health measure. Statistical significance is denoted using * = p<0.1, ** = p<0.05, *** = p<0.01. For exact question wording, please see survey instrument in Appendix C1.

Appendix C1: 2017 Fall Student Survey

Note that you cannot return to the previous page.
Please do not use your browser navigation button to go back.

Overview & ID

Graduate Student Mental Health: A Study of American Economics Departments
Researchers: Paul Barreira, MD; Matthew Basilico; Valentin Bolotnyy

Consent Form

Participation is voluntary

It is your choice whether or not to participate in this research. If you choose to participate, you may change your mind and leave the study at any time. Refusal to participate or stopping your participation will involve no penalty or loss of benefits to which you are otherwise entitled.

What is the purpose of this research?

The purpose of this research is to understand the prevalence and severity of common mental health problems among graduate students in economics departments across the United States. In addition, the study will help identify environmental factors that may mitigate or contribute to mental health issues. A faculty survey portion of the study will help supplement the graduate student study by shedding additional light on faculty-student relationships.

What can I expect if I take part in this research?

The study is intended for economics graduate students in all years of the PhD program.

The initial survey will take 20 to 25 minutes to complete. A follow-up survey will be sent to you in the Spring of 2018 and will take about 10 minutes to complete. At the end of each survey, you will receive scores on the clinically validated mental health screens and explanations for what those scores mean about your mental health.

Once you begin a survey you will not be able to leave it and return to it at another time, so please complete it in one sitting. There is also no "Back" button, so you cannot change responses once you proceed to the next page.

The researchers will produce an aggregated report across all participating economics programs, as well as an aggregated report specifically for your department. Data from your department will only be studied in an aggregated way and the researchers will share department-specific results only with your

department Chair. The report aggregated across all participating programs will not identify department-specific results.

What are the risks and possible discomforts?

If you choose to participate, answering questions that require reflection on issues related to your mental health and potentially distressing past experiences has some psychological risk. If you become upset or feel any distress when you are responding to these questions, please call your university's mental health services. The National Suicide Prevention Lifeline is another resource that is available 24 hours a day at 1-800-273-8255.

Benefits

We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include an improved understanding of your own mental health and its connection to your life experiences; structural department-level and profession-level reforms that improve student and faculty quality of life; improved departmental culture around mental health; initiatives across graduate programs worldwide to improve mental health among students and faculty.

If I take part in this research, how will my privacy be protected? What happens to the information you collect?

The data we collect will be stored on a secure server and analyzed in an anonymous way. No raw, individual response-level data will ever be made public. Such data will also not be handled or accessed by anyone other than a third-party data scientist hired by the researchers. The data scientist has no affiliation with any economics department and has signed a confidentiality agreement. No attempt will ever be made to identify whether or how specific individuals answered the questions in this study.

The ID provided to you for access to each survey is intended to ensure that you only complete each survey once and to allow the researchers to see how graduate student mental health changes over time across all participating programs and in your department. Data matching the ID to you will be stored on a separate secure server from the data set with your survey responses and will only be used for the purpose of this study, as described above.

If I have any questions, concerns, or complaints about this research study, who can I talk to?

The lead researcher for this study is *Paul Barreira, MD* who can be reached at 671-495-2010; 75 Mt. Auburn Street, Cambridge, MA 02138; gradsurvey@huhs.harvard.edu .

Please contact him if you have questions, concerns, complaints, or:

- If you would like to talk to the research team,

- If you think the research has harmed you, or
- If you wish to withdraw from the study.

This research has been reviewed by the Committee on the Use of Human Subjects in Research at Harvard University. The Committee can be reached at 617-496-2847, 1350 Massachusetts Avenue, 9th Floor, Suite 935, Cambridge, MA 02138, or cuhs@harvard.edu for any of the following:

- If your questions, concerns, or complaints are not being answered by the research team,
- If you cannot reach the research team,
- If you want to talk to someone besides the research team, or
- If you have questions about your rights as a research participant.

Statement of Consent

I have read the information in this consent form. All my questions about the research have been answered to my satisfaction.

Click here to download consent form PDF

Signature

By selecting this box, I consent to taking part in this research.

Please note that refreshing the survey or using your browser navigation button to go back will invalidate the survey.

Please enter the survey ID number provided in the e-mail:

PHQ-9

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	O	O	O	O
Feeling down, depressed, or hopeless	O	O	O	O
Trouble falling or staying asleep, or sleeping too much	O	O	O	O
Feeling tired or having little energy	O	O	O	O

	Not at all	Several days	More than half the days	Nearly every day
Poor appetite or overeating	O	O	O	O
Feeling bad about yourself - or that you are a failure or have let yourself or your family down	O	O	O	O
Trouble concentrating on things, such as reading the newspaper or watching television	O	O	O	O
Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	O	O	O	O
Thoughts that you would be better off dead or of hurting yourself in some way	O	O	O	O

How difficult have these problems made it for your to do your work, take care of things at home, or get along with other people?

Not difficult at all | Somewhat difficult | Very difficult | Extremely difficult

GAD-7

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly everyday
Feeling nervous, anxious or on edge	O	O	O	O
Not being able to stop or control worrying	O	O	O	O
Worrying too much about different things	O	O	O	O
Trouble relaxing	O	O	O	O
Being so restless that it is hard to sit still	O	O	O	O
Becoming easily annoyed or irritable	O	O	O	O
Feeling afraid as if something awful might happen	O	O	O	O

How difficult have these problems made it for your to do your work, take care of things at home, or get along with other people?

Not difficult at all | Somewhat difficult | Very difficult | Extremely difficult

SBQ-R Suicide Behaviors Questionnaire-Revised

Have you ever thought about or attempted to kill yourself?

Never

It was just a brief passing thought

I have had a plan at least once to kill myself but did not try to do it

I have had a plan at least once to kill myself and really wanted to die

I have attempted to kill myself, but did not want to die

I have attempted to kill myself, and really hoped to die

How often have you thought about killing yourself in the past year?

Never

Rarely (1 time)

Sometimes (2 times)

Often (3-4 times)

Very Often (5 or more times)

Have you ever told someone that you were going to commit suicide, or that you might do it?

No

Yes, at one time, but did not really want to die

Yes, at one time, and really wanted to die

Yes, more than once, but did not want to do it

Yes, more than once, and really wanted to do it

How likely is it that you will attempt suicide someday?

Never

No chance at all

Rather unlikely

Unlikely

Likely

Rather likely

Very likely

Self Esteem, Rosenberg Self-Esteem Scale

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree
On the whole, I am satisfied with myself.	O	O	O	O
At times I think I am no good at all.	O	O	O	O
I feel that I have a number of good qualities.	O	O	O	O
I am able to do things as well as most other people.	O	O	O	O
I feel I do not have much to be proud of.	O	O	O	O
I certainly feel useless at times.	O	O	O	O
I feel that I am a person of worth, at least on an equal plane with others.	O	O	O	O
I wish I could have more respect for myself.	O	O	O	O
All in all, I am inclined to feel that I am a failure.	O	O	O	O
I take a positive attitude toward myself.	O	O	O	O

Imposter Phenomenon (IP)

For each question, please check the box that best indicates how true the statement is of you. It is best to give the first response that enters your mind rather than dwelling on each statement and thinking about it over and over.

	Not at all true	Rarely true	Sometimes true	Often true	Very true
I can give the impression that I'm more competent than I really am.	O	O	O	O	O
I'm afraid people important to me may find out that I'm not as capable as they think I am.	O	O	O	O	O
I often compare my ability to those around me and think they may be more intelligent than I am.	O	O	O	O	O
Sometimes I'm afraid others will discover how much knowledge or ability I really lack.	O	O	O	O	O

	Not at all true	Rarely true	Sometimes true	Often true	Very true
I feel bad and discouraged if I'm not "the best" or at least "very special" in situations that involve achievement.	O	O	O	O	O
I feel confident in my abilities as a researcher.	O	O	O	O	O
I feel confident in my abilities in math.	O	O	O	O	O
I feel that I am at the same level of technical ability as my peers.	O	O	O	O	O

EPS (Eating Disorder Screening Tool for Primary Care)

Please answer the following questions:

	Yes	No
Are you satisfied with your eating patterns?	O	O
Do you ever eat in secret?	O	O
Does your weight affect the way you feel about yourself?	O	O
Have any members of your family suffered with an eating disorder?	O	O
Do you currently suffer with or have you ever suffered in the past with an eating disorder?	O	O

Adult Self-Report Scale -VI.I (ASRS-VI.I) Screener (ADHD)

Check the box that best describes how you have felt and conducted yourself over the past 6 months.

	Never	Rarely	Sometimes	Often	Very Often
How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?	O	O	O	O	O
How often do you have difficulty getting things in order when you have to do a task that requires organization?	O	O	O	O	O
How often do you have problems remembering appointments or obligations?	O	O	O	O	O
When you have a task that requires a lot of thought, how often do you avoid or delay getting started?	O	O	O	O	O

	Never	Rarely	Sometimes	Often	Very Often
How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?	O	O	O	O	O
How often do you feel overly active and compelled to do things, like you were driven by a motor?	O	O	O	O	O

Question on feeling overwhelmed

Over the last 7 days, on how many days did you feel overwhelmed by the work you had to do?

0-1 days 2-3 days 4-5 days 6-7 days

Exercise

On how many of the past 7 days did you:

	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days
Do moderate-intensity cardio or aerobic exercise (caused a noticeable increase in heart rate, such as a brisk walk) for at least 30 minutes?	O	O	O	O	O	O	O	O
Do vigorous-intensity cardio or aerobic exercise (caused large increase in breathing or heart rate, such as jogging) for at least 20 minutes?	O	O	O	O	O	O	O	O
Do 8-10 strength training exercises (such as resistance weight machines) for 8-12 repetitions each?	O	O	O	O	O	O	O	O

AUDIT-C

How often do you have a drink containing alcohol?

Never Monthly or less 2-4 times per month 2-3 times per week 4+ times per week

How many units of alcohol do you drink on a typical day when you are drinking?

1-2 3-4 5-6 7-9 10+

If female: how often have you had 6 or more units on a single occasion in the last year?
If male: how often have you had 8 or more units on a single occasion in the last year?

Never Less than monthly Monthly Weekly Daily or almost daily

Sleep

On how many of the past 7 days did you get enough sleep so that you felt rested when you woke up in the morning?

0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days

People sometimes feel sleepy during the daytime. In the past 7 days, how much of a problem have you had with sleepiness (feeling sleepy, struggling to stay awake) during your daytime activities?

No problem at all

A little problem

More than a little problem

A big problem

A very big problem

Mental Health Diagnosis & Treatment

How would you rate your mental health overall?

Poor

Fair

Good

Excellent

Do you think your mental health is better or worse than the mental health of the average PhD student in your department?

Better

Worse

If you ever feel that you are experiencing a mental health issue, would you know where to turn for help?

Yes

No

If you ever feel that you are experiencing a mental health issue, how likely would you be to turn to someone for help?

Not likely

Somewhat likely

Moderately likely

Very likely

If you had an issue with mental health in the last 2 months, to whom did you turn for help? (Select all that apply)

Mental health professional(s) at your university

Mental health professional(s) outside of your university

Department staff member(s)

Department faculty member(s)

Family member(s)

Friend(s) in the department

Friend(s) outside of the department

Did not turn to anyone for help

How helpful were the mental health professional(s) at your university with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

How helpful were the mental health professional(s) outside of your university with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

How helpful were the department staff member(s) with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

How helpful were the department faculty member(s) with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

How helpful were the family member(s) with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

How helpful were the friend(s) in the department with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

How helpful were the friend(s) outside of the department with addressing your mental health issue?

Not helpful

Somewhat helpful

Moderately helpful

Very helpful

Were you diagnosed by a mental health professional with any mental health issue(s) prior to starting this PhD program?

Yes

No

Have you been diagnosed by a mental health professional with any mental health issue(s) after you started this PhD program?

Yes

No

Are you currently receiving treatment for:

	Yes	No
Depression	○	○
Anxiety	○	○
Any other mental health issue	○	○

Personal

About how many people do you have in your personal life that you can really open up to about your most private feelings without having to hold back?

0

1

2 - 5

6 - 10

11 - 15

16 - 20

More than 20

When you have a problem or worry, how often do you let someone in your personal life know about it?

Never Sometimes Most of the Time Always

I have very good friends at my Economics Department.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

The following questions address how you feel about different aspects of your life. For each question, please tell us how often you feel that way.

	Hardly Ever	Some of the Time	Often
How often do you feel you lack companionship?	○	○	○
How often do you feel left out?	○	○	○
How often do you feel isolated from others?	○	○	○

Over the last 7 days, how many hours per day did you typically spend on a leisure activity unrelated to the PhD program?

0

1

2

3 or more

Over the last 7 days, how many times per day did you typically check Facebook?

0

1

2

3 or more

Don't have a Facebook account

Over the last 2 weeks:

	Yes	No
Has a significant other, friend, or family member experienced a significant negative life event?	O	O
Have you experienced a significant negative life event?	O	O

How important are the following to your sense of success in life?

	Not important at all	Somewhat important	Moderately important	Very important
Tenure at an academic institution	O	O	O	O
Tenure at a top-ranked academic institution	O	O	O	O
High income	O	O	O	O
Having your own family	O	O	O	O
Knowing that you have made a useful contribution to the world	O	O	O	O
Recognition of your work by the general public	O	O	O	O

Academic Performance

In this academic year, how successful do you think you will be ... ?

	Not successful at all	Somewhat successful	Moderately successful	Very successful	Not applicable
in your courses	O	O	O	O	O
in your research process	O	O	O	O	O
in your presentations	O	O	O	O	O
in your teaching	O	O	O	O	O

As of right now, how comfortable would you be voicing a thought in a seminar setting?

Not comfortable at all

Somewhat comfortable

Moderately comfortable

Very comfortable

As of right now, how certain would you have to be about the high quality of a thought before you voiced it in a seminar setting?

Not certain at all

Somewhat certain

Moderately certain

Very certain

As of right now, how competitive do you think your peers are with each other?

Not competitive at all

Somewhat competitive

Moderately competitive

Very competitive

If you are a 2nd year student or above, please answer the following: What was the average of your grades in the first-year Microeconomic Theory and Macroeconomic Theory courses?

A

A/A-

A-

A-/B+

B+

B+/B

B

B/B-

B-

Lower than B-

During your 1st year in the PhD program, how large was the group (including yourself) in which you typically found yourself working on problem sets? Please respond even if you are currently a 1st year student.

Worked alone

2 people

3 people

4+ people

As of right now, do you have one or more projects that you are co-authoring with another PhD student?

Yes

No

As of right now, do you have one or more projects that you are co-authoring with a faculty member?

Yes

No

In general, how often does your work provide you with the following:

	Always	Most of the time	Sometimes	Rarely	Never	Don't Know
Opportunities to fully use your talents	O	O	O	O	O	O
Opportunities to make positive impact on community/society	O	O	O	O	O	O
Sense of personal accomplishment	O	O	O	O	O	O
Goals to aspire to	O	O	O	O	O	O
Satisfaction of work well done	O	O	O	O	O	O
Feeling of doing useful work	O	O	O	O	O	O

Thinking about both your commitments at work and outside of work, please select the response which best describes your situation. How often, in the last 3 months, has it happened that you:

	Always	Most of the time	Sometimes	Rarely	Never
Worried about work when not working	O	O	O	O	O
Were too tired for activities in private life	O	O	O	O	O
Were too tired to do household jobs	O	O	O	O	O
Had difficulty making ends meet financially	O	O	O	O	O
Had work prevent time with family or significant others	O	O	O	O	O

Over the last 2 weeks, on how many days did you seriously contemplate quitting the PhD program?

0 days

1 day

2 days

3 days or more

Academic Field

What year are you in your program?

1st 2nd 3rd 4th 5th 6th 7th+

What do you consider to be your primary field?

What do you consider to be your secondary field, if you have one?

On a scale of 1 to 10, where 1 = Extremely dissatisfied and 10 = Extremely satisfied, how satisfied are you with your PhD experience?

1 2 3 4 5 6 7 8 9 10

What would you do differently right now if you were starting your program? Please select as many as apply.

Change area of study
Change adviser(s)
Not pursue a PhD at all
Study at another institution
Engage more with study
Organize time more effectively
Nothing
Other

On average, how many hours a week do you typically work?

Less than 11 hours | 11-20 hours | 21-30 hours | 31-40 hours | 41-50 hours | 51-60 hours | 61-70 hours | 71-80 hours | More than 80 hours

Over the last 7 days, how many days did you work in the Economics Department?

0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days

Over the last 2 months, have you been physically away from your department for 1 month or longer?

Yes

No

Advising

Think of your Economics Department faculty members with whom you've met in the last 2 months:

From your impressions, how much do they care about the success of your research project(s)?

Do not care at all

Care somewhat

Care moderately

Care very much

Not applicable/have not met with faculty in the last 2 months

From your impressions, how much do they care about you as a person?

Do not care at all

Care somewhat

Care moderately

Care very much

Not applicable/have not met with faculty in the last 2 months

How easy is it for you to talk to them about non-academic career options?

Not easy at all

Somewhat easy

Moderately easy

Very easy

Not applicable/have not met with faculty in the last 2 months

Think of your Economics Department faculty members with whom you've met in the last 2 months:

How honest can you be with them about the difficulties you face with:

	Not honest at all	Somewhat honest	Moderately honest	Very honest	Not applicable/have not met with faculty in the last 2 months
Research progress	○	○	○	○	○
Presentations	○	○	○	○	○
Teaching	○	○	○	○	○
Refereeing	○	○	○	○	○
Co-authoring with other students	○	○	○	○	○
Co-authoring with these faculty	○	○	○	○	○
Your other advisers	○	○	○	○	○
Preparing for the job market	○	○	○	○	○
Your decision to get a PhD in economics	○	○	○	○	○
Decisions related to starting a family	○	○	○	○	○
Your mental health	○	○	○	○	○
Other personal life issues	○	○	○	○	○

Think of your Economics Department faculty members with whom you've met in the last 2 months:

How honest would you like to be with them about the difficulties you face with:

	Not honest at all	Somewhat honest	Moderately honest	Very honest	Not applicable/have not met with faculty in the last 2 months
Research progress	○	○	○	○	○
Presentations	○	○	○	○	○
Teaching	○	○	○	○	○
Refereeing	○	○	○	○	○
Co-authoring with other students	○	○	○	○	○
Co-authoring with these faculty	○	○	○	○	○
Your other advisers	○	○	○	○	○
Preparing for the job market	○	○	○	○	○
Your decision to get a PhD in economics	○	○	○	○	○
Decisions related to starting a family	○	○	○	○	○

	Not honest at all	Somewhat honest	Moderately honest	Very honest	Not applicable/have not met with faculty in the last 2 months
Your mental health	O	O	O	O	O
Other personal life issues	O	O	O	O	O

How easy would you like it to be for you to talk to them about non-academic career options?

Not easy at all

Somewhat easy

Moderately easy

Very easy

Not applicable/have not met with faculty in the last 2 months

In the last 2 months, how many times have you met with your:

Main adviser (the faculty member with whom you meet most frequently)	▼
Second adviser (the faculty member with whom you meet second-most frequently)	▼
Third adviser (the faculty member with whom you meet third-most frequently)	▼

As of right now, how significant are the following impediments for the frequency with which you meet with faculty?

	Not significant at all	Somewhat significant	Moderately significant	Very significant
Meetings are difficult to schedule	O	O	O	O
Meetings are too short	O	O	O	O
Meetings are not useful	O	O	O	O
Meetings are unpleasant	O	O	O	O
Fear of the consequences of a bad impression	O	O	O	O
Doubt about the quality of your ideas, questions, thoughts	O	O	O	O
Lack of progress on to-dos from previous meeting	O	O	O	O

Over the last 2 months, how many faculty members in your department initiated an informal conversation with you about how you were doing academically or personally?

0

1

2

3 or more

As of right now, how many faculty members in your department do you consider to be your professional role models?

0

1

2

3 or more

If you are a 2nd year student or above, please select the number of advisers you had last academic year who are:

No longer at the department

On leave this term only

On leave this academic year

Was one of the advisers who is no longer at the department or currently on leave your main adviser?

Yes

No

If you ever feel that you are experiencing an issue with advising, would you know where to turn for help?

Yes

No

If you ever feel that you are experiencing an issue with advising, how likely would you be to turn to someone for help?

Not likely

Somewhat likely

Moderately likely

Very likely

Background Questions

How old are you?

Younger than 20

20-24

25-29

30-34

35 or older

Which of the following races best describe(s) you: (Select all that apply)

American Indian or Alaska Native

Asian or Asian American

Hispanic or Latino

Black or African American

Native Hawaiian or Other Pacific Islander

White

Are you a U.S. citizen or permanent resident?

Yes

No

Is English your first language?

Yes

No

Which best describes your gender identity?

Man

Woman

Transgender

Other

Do you consider yourself to be:

Heterosexual

Bisexual

Gay or lesbian

Other

Do you have a disability?

Yes

No

How would you best describe your current relationship status?

Single

Casual

Dating

Long-term/Committed

Married

Divorced

Other

Do you live alone?

Yes

No

Do you have 1 or more children?

Yes

No

Are your parents:

Never married

Married

Divorced or separated

Other

Please indicate the highest degree earned by your father (biological or step). If you have multiple fathers, select the highest degree earned.

High school or below

Associate

Bachelor's

Graduate degree

Please indicate the graduate degree(s) earned by your father. (Select all that apply)

MBA
Other Master's
MD
JD
Economics PhD
Other PhD
Other

Please indicate the highest degree earned by your mother (biological or step). If you have multiple mothers, select the highest degree earned.

High school or below
Associate
Bachelor's
Graduate degree

Please indicate the graduate degree(s) earned by your mother. (Select all that apply)

MBA
Other Master's
MD
JD
Economics PhD
Other PhD
Other

Which of the following best describes your undergraduate institution?

Small liberal arts college (US)
Public university (US)
Private university (US)
Non-U.S. university
Other

How many math courses did you take between the start of your undergraduate study and the start of this PhD program?

0

1 or 2

3 or 4

5 or 6

7+

Did you go straight into this Economics PhD program after completing your undergraduate degree?

Yes

No

Over the last 2 months, what position(s) have you held for compensation? (Select all that apply)

Teaching Assistant

Grader

Research Assistant

Resident Assistant

Private tutor

Non-academic data scientist

Other

Did not work for compensation

Sexual Harassment

These next questions ask about situations in which a student, faculty member, staff member, or someone else associated with your Economics Department said or did something that:

- Interfered with your academic or professional performance,
- Limited your ability to participate in your academic program, or
- Created an intimidating, hostile or offensive social, academic or work environment

Check all that you have experienced since becoming a PhD student from a student, faculty member, staff member, or someone else associated with your Economics Department:

Sexual remarks, jokes, or stories that were insulting or offensive to you

Inappropriate or offensive comments about your or someone else's body, appearance, or sexual activities

Crude or gross sexual comments or tried to get you to talk about sexual matters when you did not want to

Email(s), text(s), phone call(s), or instant message(s) with offensive sexual remarks, jokes, stories, pictures, or videos that you did not want to receive

Requests to go out for dinner, have drinks, or have sex even though you said, "No"

At the time of this event/these events, what was the person's/were the persons' relationship(s) to you? (Select all that apply)

At the time, it was someone I was involved or intimate with

Someone I had been involved or was intimate with

Professor

Adviser

Staff member

Graduate student friend or acquaintance

Undergraduate student friend or acquaintance

Stranger

Other

Don't know

Appendix C2: 2017 Fall Faculty Survey

Note that you cannot return to the previous page.
Please do not use your browser navigation button to go back.

Overview & ID

Graduate Student Mental Health: A Study of American Economics Departments
Researchers: Paul Barreira, MD; Matthew Basilico; Valentin Bolotnyy

Consent Form

Participation is voluntary

It is your choice whether or not to participate in this research. If you choose to participate, you may change your mind and leave the study at any time. Refusal to participate or stopping your participation will involve no penalty or loss of benefits to which you are otherwise entitled.

What is the purpose of this research?

The purpose of this research is to understand the prevalence, severity, and correlates of common mental health problems among graduate students in economics departments across the United States. The faculty survey portion of the study will help supplement the graduate student study by shedding additional light on faculty-student relationships.

What can I expect if I take part in this research?

This survey should take about 5 minutes to complete. It is intended for all tenured or tenure-track faculty in Economics.

Once you begin the survey you will not be able to leave it and return to it at another time, so please complete it in one sitting. There is also no "Back" button, so you cannot change responses once you proceed to the next page.

The researchers will produce an aggregated report across all participating economics programs, as well as an aggregated report specifically for your department. Data from your department will only be studied in an aggregated way and the researchers will share department-specific results only with your department Chair. The report aggregated across all participating programs will not identify department-specific results.

What are the risks and possible discomforts?

Answering questions that require reflection on interactions with students and colleagues, as well as on the environment in the department, may cause discomfort. Your thoughtful and honest responses are important to us, but if you are uncomfortable answering a certain question, please feel free to skip that question.

Benefits

We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include students' improved understanding of their own mental health and its connection to their life experiences; structural department-level and profession-level reforms that improve student and faculty quality of life; improved departmental culture around mental health; initiatives across graduate programs worldwide to improve mental health among students and faculty.

If I take part in this research, how will my privacy be protected? What happens to the information you collect?

The data we collect will be stored on a secure server and analyzed in an anonymous way. No raw, individual response-level data will ever be made public. Such data will also not be handled or accessed by anyone other than a third-party data scientist hired by the researchers. The data scientist has no affiliation with any economics department and has signed a confidentiality agreement. No attempt will ever be made to identify whether or how specific individuals answered the questions in this study.

If I have any questions, concerns, or complaints about this research study, who can I talk to?

The lead researcher for this study is *Paul Barreira, MD* who can be reached at 671-495-2010; 75 Mt. Auburn Street, Cambridge, MA 02138; gradsurvey@huhs.harvard.edu .

Please contact him if you have questions, concerns, complaints, or:

- If you would like to talk to the research team,
- If you think the research has harmed you, or
- If you wish to withdraw from the study.

This research has been reviewed by the Committee on the Use of Human Subjects in Research at Harvard University. The Committee can be reached at 617-496-2847, 1350 Massachusetts Avenue, 9th Floor, Suite 935, Cambridge, MA 02138, or cuhs@harvard.edu for any of the following:

- If your questions, concerns, or complaints are not being answered by the research team,
- If you cannot reach the research team,
- If you want to talk to someone besides the research team, or

- If you have questions about your rights as a research participant.

Statement of Consent

I have read the information in this consent form. All my questions about the research have been answered to my satisfaction.

Consent Form PDF Download

Signature

By selecting this box, I consent to taking part in this research.

Please note that refreshing the survey or using your browser navigation button to go back will invalidate the survey.

Faculty

Think of the PhD students with whom you've met in the last 2 months:

How honest do you think they would be with you if they faced difficulties with:

	Not honest at all	Somewhat honest	Moderately honest	Very honest	Not applicable/did not meet with students
Research progress	O	O	O	O	O
Presentations	O	O	O	O	O
Teaching	O	O	O	O	O
Refereeing	O	O	O	O	O
Co-authoring with other students	O	O	O	O	O
Co-authoring with you	O	O	O	O	O
Their other advisers	O	O	O	O	O
Preparing for the job market	O	O	O	O	O
Their decision to get a PhD in economics	O	O	O	O	O
Their decisions related to starting a family	O	O	O	O	O
Their mental health	O	O	O	O	O
Their other personal life issues	O	O	O	O	O

How easy do you think it would be for them to talk to you about non-academic career options?

Not easy at all

Somewhat easy

Moderately easy

Very easy

Not applicable or did not meet with students

In what year of the Economics PhD program do you think the average student experiences the highest level of strain on his or her mental health?

1st 2nd 3rd 4th 5th 6th 7th+

Have you ever received training on a mental health-related topic?

Yes

No

Don't know

Have you ever advised PhD student(s) who were experiencing an issue with mental health at the time?

Yes

No

Don't know

If yes, approximately how many of such students have you advised?

What advice would you give to other faculty members who might be advising a PhD student with a mental health issue?

RAND American Working Conditions Survey

The following are standard questions based on the RAND American Working Conditions Survey:

In general, how often does your work provide you with the following:

	Always	Most of the time	Sometimes	Rarely	Never	Don't know
Opportunities to fully use your talents	O	O	O	O	O	O
Opportunities to make positive impact on community/society	O	O	O	O	O	O
Sense of personal accomplishment	O	O	O	O	O	O
Goals to aspire to	O	O	O	O	O	O
Satisfaction of work well done	O	O	O	O	O	O
Feeling of doing useful work	O	O	O	O	O	O

The following are standard questions based on the RAND American Working Conditions Survey:

Thinking about both your commitments at work and outside of work, please select the response which best describes your situation. How often, in the last 3 months, has it happened that you:

	Always	Most of the time	Sometimes	Rarely	Never
Worried about work when not working	O	O	O	O	O
Were too tired for activities in private life	O	O	O	O	O
Were too tired to do household jobs	O	O	O	O	O
Had difficulty making ends meet financially	O	O	O	O	O
Had work prevent time with family or significant others	O	O	O	O	O

I have very good friends at my Economics Department.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

What is your level of seniority in the department?

On tenure track

Tenured

Since receiving your PhD, for how many years have you held an academic position?