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Developing a survey instrument to measure graduate students' mental health experiences: instrument generation and initial qualitative validation

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Abstract

Topic/Background: With mental health concerns on the rise, there is a need to develop tools and interventions to support students' wellbeing. At the same time, survey instruments specific to engineering graduate students' mental health experiences are limited. Many survey instruments exist for student populations; however, these tend to focus on broader undergraduate experiences, with graduate students being an add-on. This results in a lack of depth and breadth on the experiences specific to graduate school (e.g., research focus, advanced courses, etc.). At the same time, graduate students are not a monolith. Graduate students within engineering programs often have varied experiences that may not translate to graduate students in other disciplines, such as humanities or professional programs (e.g., law programs). Of the surveys that exist, many struggle to capture (1) graduate student specific experiences, (2) discipline-specific experiences, or (3) both. While this may be a result of valid concerns with survey length, respective survey fatigue, or scope in the initial instrument development, the reality is that many of the surveys developed often omit aspects core to engineering graduate students' mental health experiences.

Purpose: This study seeks to address the call to support the mental health and overall well-being of graduate students by designing and validating a survey instrument to assess mental health experiences of engineering graduate students. Specifically, we seek to answer the question, *what factors are needed to assess the range of engineering graduate students' mental health experiences?*

Methods: To answer this question, we developed a survey instrument to assess engineering graduate students' mental health experiences. Survey instrument development followed a defined model with six iterative stages: (1) item generation and construct development, (2) validity testing, (3) implementation, (4) exploratory factor analysis, (5) confirmatory factor analysis, and (6) instrument modification and replication.

Findings/Conclusions: Findings from this work will focus on the first two stages of instrument design. Specifically, we will detail our approach to item generation and construct development before discussing the two stages of validity testing (cognitive interviews and expert feedback). We then detail the findings from the cognitive interviews before providing a finalized draft version of the survey instrument ready for implementation (or further validation).

Implications: The findings from this work will first provide a validated survey instrument that was piloted at an institution as part of the Healthy Minds Network, Healthy Minds Study's Spring 2025 administration. This instrument will be used to assess engineering graduate students' mental health experiences, including a list of risk and protective factors core to examining these experiences. Detailing these factors will provide not only direction for future interventions, but a tool to assess the impact of ongoing and future interventions. This can aid to increase the retention of engineering graduate students and their successful degree completion by providing key areas of focus to support positive mental health experiences.

Introduction

Institutions of higher education have been struggling for over a decade to meet students' mental health needs admits a growing national mental health crisis [1]. Mental health problems are consistently among the top cited reasons for students' leaving their degree program. Graduate students specifically are known to be more likely to have or develop a mental health problem compared to same age, highly-educated peers [2-3]. In addition, engineering students have been found to be the least likely to seek help for mental health concerns; this is concerning given that delayed help-seeking can severely increase the impact and severity of mental health concerns [2].

Work by Jensen and Cross found a stress culture that exists within undergraduate engineering populations [4-5]. This may also be the case for engineering graduate students. As detailed by Bork and Mondisa, much of the existing work has focused on demographic groupings within engineering (e.g., international students, women, etc.), leaving a lack of knowledge on many students' lived experiences [6]. Recent qualitative work has sought to address this gap. Shanachilubwa et al. sought to uncover engineering graduate students' schemas surrounding their academic experiences, with findings detailing five themes (i.e., unmet expectations, unreconciled tension, lack of advocacy, lack of agency, and apathetic disdain) that lead to a model of disenchantment for engineering graduate students [7]. Along these same lines, research has detailed how relationships are critical for retention of engineering graduate students, including their research advisor and peers [6, 8, 9]. Furthermore, work by Parker et al. has examined doctoral graduate students' perceptions of stress and its possible impact on their mental health and academics [10]. They found that students noticed the impact of stress through changes in their behavioral and physical health, with behavioral changes indicative of early chronic stress and physical health changes as signs of sustained chronic stress. Across these studies it is clear that there are many factors impacting engineering graduate students' mental health. Population level tools are needed to assess not only these experiences more broadly, but to serve as a tool to assess interventions intended to address these concerns.

Therefore, there is a need to develop a survey instrument to assess engineering graduate students' mental health experiences. Existing survey instruments fail to capture the necessary breadth of engineering graduate students' experiences. Most population level mental health studies (i.e., using survey instruments) tend to examine graduate students experiences alongside undergraduate populations. Furthermore, they often overlook the significant differences between graduate and undergraduate student populations, whether that be socially (e.g., hobbies, interests, social engagements) or academically (e.g., research focus versus courses, career aspirations, etc.) [11-15]. Those surveys that do focus on graduate students often fail to capture the full range of graduate students' experiences. For one, most studies focus on negative mental health experiences (e.g., depression, anxiety, stress, etc.) or tend to focus on specific contexts (e.g., experiences as teaching assistant) rather than the range of roles graduate students may be in. Furthermore, most of these surveys are not scoped to account for the different norms, assumptions, and behaviors that are specific to engineering (i.e., the culture of engineering [16]). This both omits a large breadth of experiences and severely limits stakeholders' ability to (re)produce positive experiences for students that may increase retention within engineering.

Therefore, this study seeks to answer the question, *what factors are needed to assess the range of engineering graduate students' mental health experiences?*

The following sections will first detail the two theoretical frameworks guiding this work. Following this, the methodology guiding the survey instrument design is detailed alongside the preliminary findings (i.e., the first two stages of the instrument development process and resulting survey instrument). The limitations of the study are discussed before detailing future work.

Guiding Frameworks

There were two theoretical frameworks used to guide the survey development. Bronfenbrenner's Bioecological Systems Model (BSM) was used to attune the different systems engineering graduate students may operate in. This helped us consider the range and depth of relevant experiences that should be considered [17-20]. Godfrey and Parker's Culture of Engineering Education Framework (CEEF) was used to pull focus on the environment these experiences occur within (the culture of engineering) [16].

Bronfenbrenner's Bioecological Systems Model (BSM)

Bronfenbrenner's BSM places an individual in the center of the model. From there, there are five concentric systems levels that radiate outwards [16, 21]. This core individual level is defined by a person's experiences, knowledge, and beliefs, and how these may impact their interactions and view of the world. Moving outward, the system levels explore differing aspects of this individual's environment, starting with the microsystem. The microsystem is scoped to an individual's direct environment; this includes the various activities, roles, and interpersonal relationships the individual may have. For a graduate student, this could include their roles in courses or research, or perhaps a prior experience with a course instructor. Following this is the mesosystem, which includes connections across microsystems. For example, someone taking a class related to a research project they are on with members of their research group. The exosystem follows, encapsulating indirect environments (e.g., experiences of roommate in graduate school but in a different degree program and conversations with the individual about these experiences). The macrosystem level includes social and cultural values, whereas the final chronosystem level pertains to transitions in environment(s) over time, respectively [21]. It is important to note that there is a bidirectional relationship between a person and their environment; that is, they both can impact one another (discussed via the process-person-context-time [PPCT] language) [5].

Godfrey & Parker's Culture of Engineering Education Framework (CEEF)

CEEF was used to provide context to the environment and systems engineering graduate students' experiences take place in. That is, the culture of these engineering environments (i.e., culture of engineering) [20]. CEEF has six dimensions with a total of 27 sub-themes. The dimensions include an engineering way of thinking, an engineering way of doing, being an engineer, acceptance of difference, relationships, and relationship to the environment [20]. This framework was used when examining the behaviors, beliefs, norms, and expectations that may exist for engineering graduate students, and the possible impact these may have on students' mental health experiences.

Methodology and Preliminary Findings

The development of the survey will follow a defined, iterative instrument development protocol, detailed in Figure 1 [22-23]. Unique for this instrument development was that this survey was

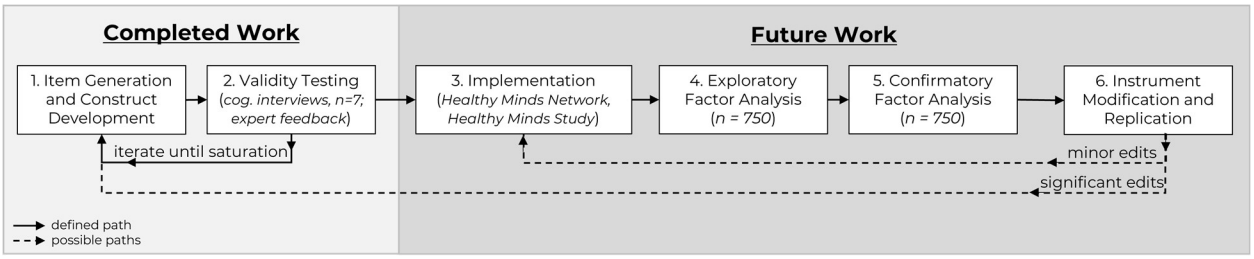

Figure 1. Outlining the instrument design protocol; solid lines indicate a defined path; dotted lines detailing possible paths based on feedback and analysis (adapted from [22]).

designed to be a part of a larger survey as an optional add-on module; said another way, it was not being created to be a stand-alone survey instrument. Specifically, it is being developed and piloted in Spring 2025 to become an optional, add-on module as part of the Healthy Minds Network, Healthy Minds Study [24]. As such, this partnership provided both design constraints and affordances. The main constraint was the survey instrument length; given the scale of the survey administration and other modules participants would have, the length of the survey instrument was restricted to 35 items. On the other hand, knowing students would be answering questions on the other modules provided affordances the content already available. We knew that all participants would have already answered questions regarding their demographics (e.g., degree program, citizenship, etc.), mental health status (e.g., sense of belonging, depression, anxiety, positive mental health, etc.), and mental health service utilization and help-seeking. This allowed us to de-prioritize these items and focus solely on aspects related to graduate students. With this in mind, we began Stage 1.

Stage 1: Item Generation and Construct Development

The goal of this stage was to generate a pool of possible survey items and groupings. This was done using prior work by Bork, relevant literature, and existing survey instruments. Table 2 details prior work by Bork that directly contributed to the pool of possible survey items and constructs. Table 3 details existing instruments related to engineering graduate students' mental health that were considered during the instrument design. Although these survey instruments may not have been specifically designed for engineering graduate students, they could have constructs and/or items that could be adapted to this group. Table 3 also details the scope or coverage of the items, who the survey was designed for, and what these surveys were missing in terms of. As detailed, most existing instruments were misaligned in their scope and/or implementation [24-31]. Specifically, several lack response options specific to graduate students' experiences (e.g., demographic questions on candidacy or not, response options based on research settings and/or interactions [research group, courses, clubs, etc.], questions on research advising relationship, etc.). Also, most instruments did not include positive mental health and related experiences, and therefore, are only focusing on negative experiences. It is equally important to focus on positive experiences as these may serve as protective factors for students' mental health. Finally, not all scope to all graduate students, focusing on doctoral students and excluding master's degree students.

Once the pool of items was generated (e.g., academic milestones, demographic backgrounds, relationship with peers), Bork reviewed the items for relevance and clarity. These were then grouped into respective constructs while leveraging the guiding theoretical frameworks. CEEF was used to help attune to specific experiences students may have within the culture of

Table 2. Example constructs and item topic(s) from Bork's prior work and existing literature.

Possible Construct	How we define it	Example Item Topic(s)
Academics	focus on academic or collegial outcomes, differentiating outcomes by a degree program or discipline	- publication rate - perceived barriers to persist - post-graduation career intentions - weekly workload - positive interactions
Culture	normative behaviors, interactions, expectations, and dynamics that exist for a specific social group; aspects of climate; measures used to assess culture and/or climate	- culture of stress - perception of program climate - perception of school climate - stereotypes / stereotype threat - work-life balance / perceptions
Demographics & Background	background information on participants, analysis or findings grouped by these backgrounds and/or identities	- age - financial support - living situation - time in the U.S.
Mental Health	anything relating to a person's emotional or psychological wellbeing; instruments used to measure and/or assess this	- anxiety - depression - flourishing (positive mental health) - stress
Relationships	any meaningful connection that is discussed and/or discussion of skills used in social interactions to facilitate relationships	- advising relationship - friends / family - peers (research group and/or program) - social supports

engineering. BSM helped Bork consider the items and categories under the different environments an engineering graduate student may exist in.

With this draft survey generated, feedback was solicited from three groups, separately: the Cultivate Lab (PI: Bork), the Thrive Lab (PI: Jensen), and a group of engineering faculty (subset of faculty within the Engineering Education Transformations Institute at the University of Georgia). Each group was provided with the scope and aim of the instrument before being asked to provide feedback on the items. At the end, each group was asked to rank the top three items they would include if those were the only items that could be included. This feedback was then reviewed by the authors to aid in item clarity and prioritization. Table 4 details the constructs that resulted after these revisions. There were 35 questions in this draft with a total of 85 individual items, well above the 35-item limit. Therefore, the next stage in the design process was to seek validation on these items while simultaneously iterating on the length and scope of the instrument.

Stage 2: Validity Testing

Validity testing was done to ensure the instrument aligned with its intended uses [32]. This validation was used to assess the instrument for content validity (does it fully measure what we want it to), face validity (does the content of the survey appear suitable for the goals), item relevance, item clarity, and timing. There were two groups included in the validity testing: engineering graduate students and experts of student mental health.

Table 3. Existing surveys referenced to generate pool of possible items and constructs. Details their scope and gaps pertaining to engineering graduate students' mental health.

Survey Instrument	What does it cover?	Intended for?	What is missing?
Graduate Student Mental Health Initiative at Harvard University [25]	Screening instruments, questions on environment, mental health service usage, and impact of learning environment	Harvard University grad students	- items specific to engineering culture and norms - positive experiences and/or mental health
Discrimination in Engineering Graduate Education (DEGrE) Scale [26]	Discrimination in engineering graduate education.	engineering graduate students	- related academic experiences (scope)
Graduate Student Experiences in the Research University [27]	Broad post-baccalaureate experiences (e.g., admission, finances, research and teaching experiences, career plans, wellbeing, etc.).	post-baccalaureate students	- items specific to engineering culture and norms - positive experiences and/or mental health - differentiation of student interactions with peers
The University of California Graduate Student Well-Being Survey [28]	Life satisfaction, depression, mentoring and advising, financial confidence, food security, career prospects, LGBTQ.	University of California graduate students.	- items specific to engineering culture and norms - positive experiences / possible protective factors
The Healthy Minds Network – Healthy Minds Study [24]	3 core modules and 14 elective modules regarding student mental health and related experiences	higher education students (undergrad & grad school)	- graduate student specific questions, responses options, and experiences
The Michigan Doctoral Experience Study [29]	the socialization process of doctoral students going from student to scholar	University of Michigan doctoral students.	- items specific to engineering culture and norms - master's students and their experiences - positive experiences and/or mental health
The Stressors for Doctoral Students Questionnaire - Engineering [30]	engineering student stressors (teaching, research)	engineering doctoral students	- items specific to engineering culture and norms - master's students and their experiences - positive experiences and/or mental health
The Undergraduate Engineering Mental Health Help-Seeking Instrument [31]	help-seeking instrument	undergraduate engineering students	- graduate student specific questions, responses options, and experiences

Table 4. Initial instrument constructs

Draft construct	Scope of items within construct
Demographic add-ons	Background information on participants, analysis or findings grouped by these backgrounds and/or identities; add-ons to the existing demographic items
Background	Feelings on their program; motivations to complete their degree
Academic / Degree Milestones	Thoughts on overall and specific core aspects of graduate degree programs (e.g., coursework, research, etc.)
Research	Asking if research is a part of their degree program, and if so, questions about their advising format and perceptions on research related activities
Time Management	Aspects of work and time distribution of tasks
Support Systems	Ranking possible support systems and, if relevant, support they may get from their research environment
Advisor Relationship	Items related to a graduate student – advisor relationship
Mental Health	Reflecting on possible experiences and norms as a graduate student that are related to their mental health experiences
Post-Graduation	Post-graduation degree intentions

First, Bork conducted seven individual, one-hour cognitive interviews with engineering graduate students [23, 25, 33]. Participants were recruited using direct, purposeful sampling via the research team's networks, aiming for participants across different degree programs, engineering disciplines, program year, ethnicity/race, gender, and citizenship status. Individuals were recruited from one of two institutions, both considered very high research activity under the Carnegie Classification [34].

Participants

Table 5 details the demographics of each participant. The average age of participants was 27.9, with participants ranging from 24 to 33 years old. Three participants identified as male, and four as female. The participants identified as Black or African American, three identified as Asian or Asian American, and one identified as White (non-Hispanic). Two participants were domestic students with five participants being international students. One participant had at least one child or other dependent they were responsible for in their household. Five participants were in doctoral only degree programs with the other two participants being in a joint master's and doctoral degree program. Participants ranged from being less than one to four years in their program. Students came from one discipline. To protect participant identities, the exact discipline is not provided.

Cognitive interviews were conducted, following the best practices outlined by [35]. These interviews included the suggested probes for the interviews and best practices (i.e., feedback being reviewed and incorporated into the survey instrument after each cognitive interview, with items being modified, added, and/or removed). Table 6 details examples of common modifications that occurred, pulling examples from Stephanie's interview. This allowed for an up-to-date conversation with each participant and provided a means to validate the adjustments being made.

Table 5. Demographic and background information of participants from the cognitive interviews.

Pseudonym	Age	Gender	Race / ethnicity	Domestic student?	Dependents?	Degree Program	Years in Program
Alexander	33	male	Black / African American	No	Yes	Doctoral only	2
Casi	24	female	Black / African American	Yes	No	Doctoral only	1
Jade	27	female	Asian / Asian American	No	No	Masters / doctoral	4
Joey	27	male	Asian / Asian American	No	No	Doctoral only	2
Lydia	25	female	Black / African American	No	No	Doctoral only	2
Marius	33	male	Asian / Asian American	No	No	Doctoral only	< 1
Stephanie	26	female	White/Non-Hispanic	Yes	No	Masters / doctoral	2

Experts in student mental health then provided feedback. Specifically, Joseph Mirabelli within the Thrive Lab and members of the Healthy Minds Network. Mirabelli leveraged his expertise in survey development and engineering graduate student stressors [30] to aid in prioritizing items (e.g., face validity), reducing redundancy across items, and providing input on the proposed constructs (i.e., item groupings). His feedback followed an iterative reduction process (e.g., grouping similar items together, removing redundant items) which resulted in items and/or constructs being modified, removed, and/or added. Mirabelli's prior experience in instrument development was essential in distinguishing nuanced factors for items. Members of the Healthy Minds Network have collective and individual expertise in student mental health and national survey administration [36]. This was vital in the feedback and iteration of the instrument, where they provided insight into items that, although from a research or theoretical perspective may be important, may be too detailed, unnecessary, or unactionable. This input was critical in reducing the instrument to the final 35-item limit, detailed in Appendix A. Table 7 details the final constructs across these items.

Limitations

One significant limitation of this instrument design was the 35-item limit. This bound the breadth and depth of items able to be included. Additionally, the demographic make-up of participants within the cognitive interviews, while diverse, was not representative of the demographic make-up of graduate students at each respective institution. This included a low representation of White males and students in master's degree programs. Furthermore, only one engineering discipline was represented. Bork was the only individual on the research team present during the cognitive interviews. Although recorded, this often led to increased cognitive note-taking burdens and a split focus on Bork between conducting the interview and capturing their feedback [35].

Table 6. Examples from Stephanie's interview detailing common types of feedback across the cognitive interviews.

Item Discussing	Stephanie's Feedback	Type of Feedback
<if selected doctoral degree> Have you advanced to candidacy in your program? <yes, no unsure>	[I don't know if] every degree has a candidacy, I know everyone looks different. I just don't really know much about grad school in general to know if that's like a common term that's used.	Item clarity and content validity; removal suggested
Is there a significant research component to your degree program (for example, a major research project, thesis, study, etc. required in your program)? <yes, no unsure>	I'm wondering if the like the things in the quotes are kind of more confusing. Like to me, major research project thesis stud[ies] are required for your program. When you say that, I'm wondering if you're asking if I have all of those and all of those make them significant, or if I need one of those to make it significant. Like, if I need a major research project versus, like multiple major research projects to make that significant like, where would your line for significant, be.	Item clarity and content validity; suggest modify language
	If they're Phd students, then ... don't we all have to do a thesis at some point?	Item relevance; redundant question, suggest remove
Was asked a the end of the demographic-add on section, "Is anything missing / would you add any question?"	International student that was here for, like your undergrad, as well might be different than like an international student that's like new to the States … in terms of their mental health, like they might be better ... [graduate school might be] harder on the like brand-new international students than those that had been here for a while, and might have ... networks of people that they know to. They can talk to that are here.	Missing context; add an item
I strive for completion, not perfection.	[I] feel like that mostly makes sense. I feel like there's definitely a grad student that looks for perfection and one that looks for completion.	Content validity confirmed; suggest keep item
I feel that you need to be fully committed to grad school, all in or all	I immediately said, no, because I don't think that humans have one should ever commit themselves to one identity ever … people that are working and going to grad school are super valuable, and that is like absolutely fine … if this is just grad school and you're doing master's students absolutely. You do not need to be fully committed to [research to] do [a] masters [degree] … maybe [separate] like research and like your side responsibilities that comes with a Phd. ... you do need to be pretty fully committed because or else ... it's not getting done.	Content validity; context matters, add specificity
I cannot change the culture of my grad program, and therefore need to conform or endure it	I don't know if I would say … It seems like 2 different questions, like, I cannot change the culture of my grad program. I would say no. I think that people can change the culture of their grad program. But I do think yes, everyone has to like, conform, or endure or endure their grad program. To a certain extent those be like 2 different [questions].	Item clarity and content validity; double-barreled; sparse out

Table 7. Survey instrument constructs post-cognitive interviews

Draft construct (# of items)	Scope of items within construct
Existing questions / modification (not included in item count; 2)	List of items that were already a part of the other modules participants would have prior to this module and/or optional items that could be added to those prior modules; these items didn't count towards the 35-item count
Demographic add-ons (4)	background information on participants, analysis or findings grouped by these backgrounds and/or identities; add-ons to the existing demographic items
Mental Health & Culture of Graduate School (17)	Reflecting on possible experiences and norms as a graduate student that are related to their mental health experiences
Academic Stressors (7)	Ranking type (positive, negative, or mixed) and frequency of emotional experiences related to core aspects of graduate degree programs (e.g., coursework, research, etc.)
Research Co-Variates (7)	Confidence in research related activities and questions on their primary research advisor and related research group

Conclusions and Future Work

The main finding from this work in progress is the draft survey instrument ready for implementation. This instrument, detailed in Appendix A, focuses on engineering graduate students' mental health experiences as they related to: mental health and the culture of graduate school; academic stressors; and research co-variates.

Future work will continue progressing through the iterative stages of the instrument development protocol, as detailed in Figure 1. The next step is stage three, implementation. Bork and Jensen have provided the survey instrument to be piloted with the Healthy Minds Network during Spring 2025. This pilot implementation will gather data for further quantitative analysis. First, descriptive statistics (e.g., means, standard deviations, ranges, skewness, kurtosis, etc.) and bivariate statistics (e.g., correlations) will be used to analyze the survey responses.

Psychometric analyses will follow. These analyses will follow established practices within engineering education [26, 37]. R will be used to perform the analysis (psych package) [38]. Exploratory factor analysis will be conducted to assess the factor structure of the survey instrument using data from the first administration. Following this, a second survey administration will occur; confirmatory factor analysis will then be conducted to test the resulting factor structure. The research team will run at least two models for analysis: (1) the proposed factor solution from the EFA and (2) a single factor structure model. These models will be assessed quantitatively (i.e., goodness of fit, etc.) to determine if the proposed factor solution is a better fit than a single factor model [39]. Following this, the instrument will be assessed for convergent, concurrent, and divergent validity [26].

Following these analyses, instrument modification and replication will occur (stage 6). The extent of the modifications being made will drive the path (i.e., significant edits will lead back to stage 1 with item generation and construct development whereas minor edits will take place and lead to further administration via stage 3). This will also be driven by findings from our quantitative analyses.

Implications

The findings from this work will first provide a validated survey instrument to assess engineering graduate students' mental health experiences. From this work, we will be able to analyze the findings and examine possible risk and protective factors core to these experiences that include aspects core to their backgrounds and experiences, the culture of graduate school, academic stressors, and co-variates related to research. Given this survey instrument is a module in a larger survey [24], the survey participants will also be given other items on demographics (e.g., degree program, citizenship, etc.), mental health status (e.g., sense of belonging, depression, anxiety, positive mental health, etc.), and mental health service utilization and help-seeking. There are also 16 additional modules institutions can self-select from to customize and focus on at an institutional level, including: substance use; eating and body image; assault and abuse; overall health; knowledge and attitudes about mental health and mental health services; upstander / bystander behaviors; mental health climate; climate for diversity and inclusion; academic persistence, retention, and competition; resilience and coping; financial stress; student athletes; peer support; public safety and policing; Black college student mental health; and knowledge and attitudes about artificial intelligence [24]. Although not every participant will be provided the same set of add-on modules, some may. Therefore, this data can also be used for exploratory analysis to identify additional potential protective/risk factors. Furthermore, engineering graduate students are not the only individuals taking the survey. The survey will be administered to a sample of graduate students at one very active research institution (R1) in the Midwest [34]. This allows for analysis to examine differences between a variety of factors, such as disciplines, degree programs, demographics, and institutions. Future iterations of the survey can therefore be used to analyze differing risk and protective factors based on the student population stakeholders are interested in. In addition, analysis can be done to account for institutional differences to help determine what trends may be more localized to a specific school versus more widespread across institutions. This can be used to provide both general recommendations as well as recommendations for each specific institution and/or related discipline.

Unearthing salient risk and protective factors for engineering graduate students' mental health will provide not only direction for future interventions, but a tool to assess the impact of ongoing and future interventions. This can aid to increase the retention of engineering graduate students and their successful degree completion by providing key areas of focus to support positive mental health experiences.

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Appendix A

This appendix details the finalized survey instrument draft intended for piloting at one institution through the Healthy Minds Network, Spring 2025 Healthy Minds Study.

EXISTING ITEMS (emitted in item count)

- (family characteristics) What is the current number of children or other dependents for whom you are responsible? (dropdown, 0, 1, 2, 3, 4, 5 or more)
- (pregnancy) Are you currently pregnant, or have you been pregnant, given birth, or taken parental leave within the last 12 months? (1=Yes, 2=No, 3=Prefer not to say, 4=I don't know)

DEMOGRAPHIC ADD ONS (4 items)

1. <*if selected doctoral degree*> Have you advanced to candidacy in your doctoral program (i.e., completed your core course requirements and are moving to an emphasis on research (e.g., qualifying exam, candidacy, or equivalent))? Yes / No / Unsure

2. Have you done (or are you doing) research as part of your graduate degree program? Yes / No / Unsure

3. <*if yes to international student*> Have you earned any degree in the U.S. prior to joining the program you are enrolled in now? Yes / No

4. Consider how you are funding your degree program and associated living expenses **this past year**. What sources are / have / will you use? Check all that apply.
   - External fellowship(s) / scholarship(s) (e.g., National Science Foundation, company sponsor, country sponsor, etc.)
   - Internal fellowship(s) / scholarship(s) (e.g., fellowship from your institution)
   - Family support and/or personal savings
   - Loan(s) and/or credit card(s)
   - Part-time job(s)
   - Research appointment(s)
   - Teaching appointment(s)
   - Other (please specify):

MENTAL HEALTH & CULTURE OF GRAD SCHOOL (17 items)

5. (13 items) Within the **past year**, rate how much you agree with the following statements. Reflect on **your experiences**, on average, as a graduate (grad) student [1 = strongly disagree to 8 = strongly agree, NA]
   - I feel pressure to sacrifice my sleep to complete tasks as a grad student.
   - I have a life outside of grad school (for example, maintaining friendships and relationships, participating in hobbies, cooking, exercising, etc.)
   - I think grad school is unnecessarily difficult
   - Being the best is very important to me
   - If you think grad school is too hard, you aren't cut out for it
   - I would help a peer in my program even if there was no immediate or direct benefit for me
   - I feel like I am being made to compete with and/or being compared to my peers
   - I feel like I don't belong in my graduate school program

- I conform to values, norms, and/or behaviors I don't believe in to "fit in" my program
- I am more likely to try and stay connected with peers I feel are as smart or smarter than myself

- Knowing what I know now, I would choose to pursue grad school again
- I feel behind in life compared to peers my age (e.g., financially, lifestyle, etc.) because I chose to pursue a graduate degree
- I worry about how I will pay for my degree and/or related living expenses while in grad school.

6. (4 items) Within the **past year,** rate how much you agree with the following statements about **graduate (grad) students you know**, on average. [1 = strongly disagree to 8 = strongly agree, NA]
   - Grad students are relaxed
   - Most grad students I know are making good progress in their degree program
   - Most of my peers are high achievers
   - The successful grad students I know have a healthy work-life balance

ACADEMIC STRESSORS (7 items)

7. (7 items) The following question will ask you about possible **academic stressors**, or sources of stress, in your graduate (grad) program. Consider the stressors **you have experienced so far** during your graduate degree program.

   Then, rate 1) type of emotional experience and 2) the frequency of the experience.

   Scales: 1= significant negative experience ---- mixed ------- significant positive experience=8

   Frequency: 1 = never

   2 = once a semester

   3 = once a month

   4 = once every other week

   5 = once a week

   6 = once every other day

   7 = daily

   8 = multiple times a day

   - Degree coursework
   - Securing a job post-graduation

   <if international student>

   - Maintaining my visa status as an international student

   <if research is selected>

   - Conducting my research study(ies) (e.g., planning, collecting data, analysis, etc.)
   - Writing on my research (e.g., report, conference paper, journal manuscript, etc.)
   - Presenting on my research (e.g., research group meetings, conference, talk, etc.)

- Receiving feedback on my research (e.g., advisor, peers, during a presentation, etc.)

RESEARCH CO-VARIATES <if research = yes> (7 items)

8. (7 items) The next question will ask you about your research advisor(s) and their respective research group(s).

If you have more than one main research advisor, are a part of more than one research group, and/or are between research groups now, select one recent research group advisor to be your main advisor. Focus your responses on that individual and their respective group.

Within the past year, how much do you agree with the following statements, on average, regarding your primary research advisor? [1 = strongly disagree to 8 = strongly agree, NA]

- Knowing what I know now, I would choose to work with my advisor again
- I share core identities and/or values with my advisor
- My advisor is available and accessible to me most of the time
- My advisor is receptive and responsive to my feedback
- My advisor prioritizes their students' needs, health, and well-being over their research interests

- Knowing what I know now, I would choose to work with my research group again
- I feel supported by my research group