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Board 197: An Exploration of How Faculty Advising Influences Doctoral Student Psychological Safety and the Impact on Work-Related Outcomes

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An exploration of how faculty advising influences doctoral student psychological safety and the impact on work-related outcomes

Abstract

Faculty advisors perform a vital role in doctoral students' experiences in their programs, but they often lack training in how to provide essential psychosocial support to their doctoral advisees. This can result in negative graduate experiences, especially for underrepresented groups. While research into psychological safety in the corporate world has highlighted its importance, the importance of psychological safety is less understood in academia, particularly in the context of graduate engineering education. This study seeks to understand how engineering faculty advisors influence the psychological safety of doctoral students they advise and the impact of psychological safety on the student's graduate experience. We use a mixed methods design and in-depth qualitative study to address the research aims. The mixed methods design uses a survey followed by exploratory interviews. Additional narrative interviews will be conducted to gather rich data on student experiences with psychological safety and how they evolve over time.

Background

Faculty advisors play a pivotal role in shaping doctoral students' identities as researchers, including their research skills and overall perspective on the research process [1], [2]. Despite their critical role, faculty often lack training in providing essential psychosocial support to the doctoral students they advise [3]. This gap can result in students, particularly underrepresented groups in engineering (e.g., women, Black, and Latinx students), encountering chilly academic climates [4], [5], [6], [7], leading to increased psychological distress and reduced sense of belonging. Chilly academic climates were caused and exacerbated for underrepresented groups by lack of representation, personal struggles such as with family and health, adjustment to the U.S. culture, and other structural inequalities and norms [4], [5], [7]. Recent studies in the corporate world have highlighted psychological safety as a cornerstone of successful teams [8], [9]. While extensively studied in business contexts, psychological safety remains largely unexplored in academia, particularly within the context of graduate engineering education. This research paper introduces a Research in the Formation of Engineers (RFE) NSF grant project that aims to comprehensively investigate and enhance psychological safety among engineering doctoral students.

Aims & Outcomes

This project seeks to investigate psychological safety in graduate engineering research lab contexts and develop strategies to create more psychologically safe and inclusive research environments. The research aims to understand how faculty advising behaviors influence

doctoral students' psychological safety and the role of psychological safety in influencing various aspects of students' graduate experience, including their research endeavors, mental health and well-being, and other work-related outcomes. The specific aims of the study include:

1. Understand the relationships between faculty advisor mentoring, the psychological safety of doctoral students, and the subsequent positive and negative outcomes.
2. Understand how doctoral engineering students experience mentorship from their advisor and the impact of psychological safety leading to positive and negative outcomes.
3. Understand how doctoral engineering students experience psychological safety over time during their graduate degree programs.
4. Develop educational resources and training for engineering faculty who advise doctoral students.

Conceptual Framework

To achieve these outcomes, we created an integrative conceptual framework for this study that combines several models for psychological safety that describe the contributing factors and experience of psychological safety. The primary guiding framework is the Conservation of Resources (COR) theory, which suggests that individuals strive to obtain, retain, and protect their resources, such as personal characteristics, objects, conditions, or energies, and experience stress when these resources are threatened or lost. [10]. An adapted framework based on COR developed by Newman and colleagues [11] describes how job resources, such as supportive mentorship, can lead to the development of psychological safety and, thus, through either investment or depletion of resources, resulting in positive or negative work outcomes [10], [11]. COR closely aligns with the psychological safety frameworks presented by Edmondson & Lei [12].

The second psychological safety model used in this conceptual framework is the S.A.F.E.T.Y. Model, which was created to identify factors that contribute to the development of psychological safety in the workplace [13], [14], [15]. These factors are security, autonomy, fairness, esteem, trust, and you. Table 1 defines each of the components of the S.A.F.E.T.Y. Model. In relation to the COR model, these factors are classified under the psychological safety component as the foundational components for psychological safety.

Table 1. Components of the S.A.F.E.T.Y. Model

Factor	Definition [13]
Security	"The need for predictability in terms of consistency, commitment, certainty, and change avoidance."

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Autonomy	"The need to feel we have control of our environment and have choices."
Fairness	"The need to engage in and experience fair exchanges"
Esteem	"The need to be regarded highly, derived from how we see ourselves, compare ourselves to others, and think others see us."
Trust	"Our social need to belong to and protect our team, community of practice, etc."
You	The personal attributes brought by an individual such as personality, biases, and personal context.

The third psychological safety model used is the Four Stages of Psychological Safety [16], [17], [18]. The four stages are 1) Inclusion safety, 2) Learner safety, 3) Contributor safety, and 4) Challenger safety. The four stages are defined in Table 2. There are two versions of this model commonly used. The first views the four types of psychological safety as four quadrants, all required to develop psychological safety [18]. The other conceptualization views these stages as different levels that build upon one another, with inclusion safety being the first stage and challenger safety being the last [16], [17]. The latter conceptualization was chosen as it reflects how psychological safety grows as different human needs are met, showing how people can achieve different types of psychological safety as their feeling of respect and permission increase [16]. For this study, we use the second conceptualization and place it in relation to the COR diagram in the resources investment category to show how psychological safety may grow as resources are invested.

Table 2. The Four Stages of Psychological Safety

Stage	Definition [17]
Inclusion Safety	"all members [are] included and welcomed – without discrimination regarding gender, age, social background, sexual orientation, neurodiversity, or anything else"
Learner Safety	"being able to ask questions, give and receive feedback, experiment, and make mistakes. Team members at this stage will provide feedback to each other and ask for feedback themselves."
Contributor Safety	"being able to participate as a member of the team, contribute ideas and suggestions, and raise threats and risks using members' individual talents and abilities to contribute to the team without fear."
Challenger Safety	"being able to challenge the way the team works, come up with new ways of working, behaviors, and challenge the ideas of others – even the ideas of senior

	members."

Following the pathways set by Newman and colleagues [19] our conceptual framework begins with resources. In the context of the PhD advisor-advisee relationship, these can include advisor and team behaviors, and departmental and institutional resources. Depending on the specific behavior or resource, these resources can positively or negatively affect students' psychological safety. The components of psychological safety are conceptualized using the S.A.F.E.T.Y. model [13], [14], [15]. Each individual needs some combination of these six factors to develop psychological safety, though the exact degree each component is needed varies between individuals. Different job resources can lead to the loss or growth of security, autonomy, fairness, esteem, and/or trust. If the behaviors and resources cause the loss of these components, it can lead to resource depletion and negative work outcomes. If the behaviors and resources contribute to the growth of these components to the degree each individual needs, however, the student begins to move through the four stages of psychological safety [16], [17] and experiences positive work outcomes. Positive work outcomes can be experienced at any stage. A visualization of how these three models are combined can be seen in Figure 1.
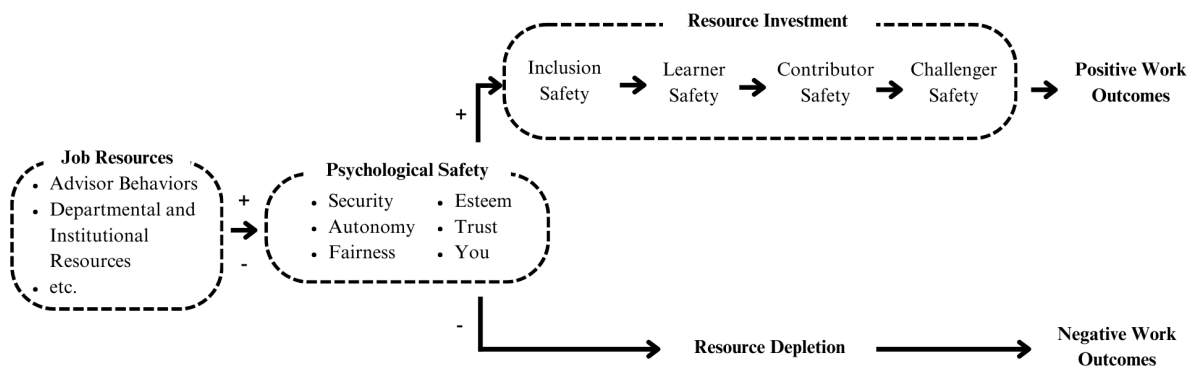

Figure 1. Integrative conceptual framework that combines COR, S.A.F.E.T.Y., and the Four Stages of Psychological Safety frameworks.

Methods

To address research aims 1 and 2, the study will employ an explanatory mixed methods design, combining quantitative surveys with qualitative interviews. This approach will allow us to explore the role of faculty mentorship in influencing psychological safety and its impact on various outcomes such as students' learning, mental health, and well-being. Open-ended survey responses and follow-up explanatory interviews will provide explanations and insights into survey relationships. Participants will be purposefully sampled for the explanatory interviews by

carefully considering demographic and experiential variables to ensure a representative sample. Demographic variables include school, race/ethnicity, neurodivergence and disability, LGBTQ+, gender, and enrollment status (in-state, out-of-state, or international).

We will also conduct in-depth narrative interviews with a subset of 15-20 survey participants to address research aim 3. This approach will enable us to gather rich information on how doctoral students experience psychological safety. These experiences include the temporal evolution of psychological safety over time, how faculty advisors influence psychological safety with their research groups, and how psychological safety impacts various personal and work outcomes. Narrative participants will be selected first by considering short-answer responses from the survey and looking at both response quality and types of experiences. Next, the sample will be evaluated to ensure demographic representation similar to the explanatory interviews, including gender, race and ethnicity, sexuality, disability, neurodivergence, and international status. Figure 2 summarizes the overall research methodology.
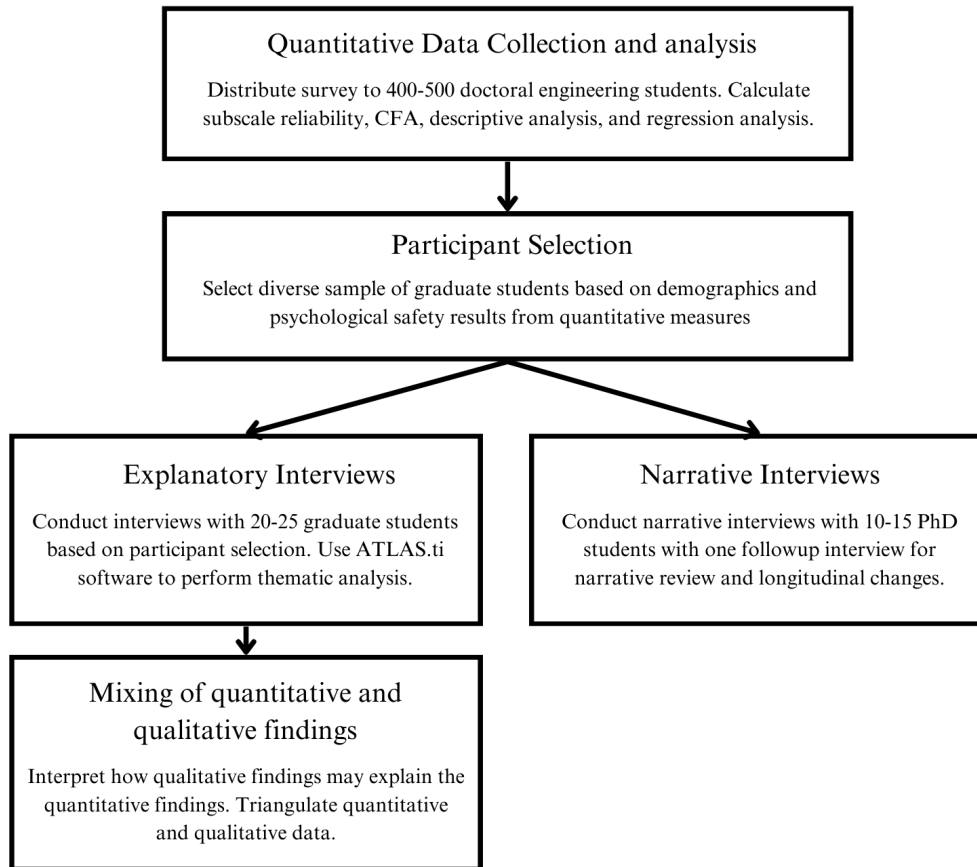
Figure 2. The overview of the research design includes an explanatory sequential mixed methods design and an in-depth narrative qualitative research design.

Preliminary Findings

We are at the early stages of data collection and, therefore, only have some initial findings and observations that will impact our study going forward. Survey responses were collected in Fall 2023, with 433 engineering PhD students responding. Further discussion of analytical methods and data for the qualitative portion of this study can be found in [20].

Beyond the quantitative survey data, we have begun an initial review of the short-answer responses in consideration of interview participant sampling for the narrative interviews. An initial review of participants' short answer questions from the survey shows various advising experiences. Here, we will report and discuss examples from four advising relationship categories - positive, mixed, negative, and very negative. An example of a positive advisor experience can be seen in the following open-ended response:

> I feel so grateful to have an immensely supportive and encouraging advisor! I feel our personal & professional relationship allows us to be our best selves…Early conversations about imposter syndrome made me feel more comfortable asking questions I felt were obvious/I should know the answer to at this point…My advisor regularly asks me for my opinion on research goals, analyses, and general well being. This has helped me feel comfortable with discussing any concerns I may have since I know my thoughts are valued (even if they end up being wrong!).

The participant also could not recall any experiences where their PhD advisor negatively impacted their psychological safety. This example illustrates how a positive relationship with an advisor can help a student overcome difficulties such as imposter syndrome.

Some participants had positive and negative experiences with their advisors, which we classified as mixed. For example:

> My concerns regarding preparing for a career in teaching always fall on deaf ears. My advisor can't ever remember what I want to do after graduation, and actively discourages me from pursuing this career path…Although I lack a lot of the support that I need professionally, my advisor has been unparalleled in teaching me the skills I need to conduct good research. He dedicates a lot of time to my work, and although a bit gruff, is very patient with my learning process. He also doesn't hold a grudge from one minute to the next, so when he gets angry, it's immediately forgotten. It took me a long time to realize these things, though, so the relationship has improved a lot on my end once I understood how he operates.

This example demonstrates a more mixed advisor experience. Though the student is supported in areas related to their research, their advisor does not support them regarding their career goals in

teaching. Furthermore, this example highlights how clear communication relies on understanding and adjustment from the advisor and student.

Some responses illustrated an overall negative relationship with their advisors. When asked about an experience when their PhD advisor had negatively impacted their psychological safety, one student responded:

> When one of my advisors listed every research project except mine as "Important" to someone I admire. When one of my advisors harshly critiqued my work to the point of my crying but didn't stop when I was in distress (critiques are good, but there is a limit to how much someone can take in a day)." Additionally the student could not recall a time their advisor had positively impacted their psychological safety. The student stated that "Grad school has been very disappointing. I am getting no professional mentorship from my advisors. They don't help me problem-solve when I'm lost (ie. I run out of ideas for my project but still have a deadline to meet). This, and negative relationships with my peers made worse by my advisor's behavior (or, lack of modeling good behavior), makes me not want to continue in my field for many years once I complete my Ph.D. I'll get my degree because I am stubborn and get my first job, but given the chance to switch fields, I would take it.

Though not quoted directly here, the student also discusses how their advisor dismisses their concerns over their progress or errors found in previous work done on the project they are working on. This is done both in one-on-one and group settings. This example portrays a co-advising relationship where the student is not getting support from either advisor. Furthermore, this example is an interesting demonstration of how an advisor's behaviors can influence research group dynamics, creating an overall toxic research environment. In this student's case, it has influenced them to no longer wish to work in their current field of study, and their persistence is solely due to their stubbornness.

In an extremely negative scenario, one respondent reported, "My advisor an abusive, sexist, racist old man. He thrives on students being [in] fear…[He has] threaten[ed] me (an international student) with funding…To him students (people's life) are disposable." This student's example illustrates an abusive advising relationship, that is difficult to leave due to additional power dynamics (i.e., being an international student).

Going forward, we hope to capture a wide range of students' advising relationship experiences through purposeful sampling that considers both types of experiences and other demographic information. We will interview approximately 20 students with diverse positive, mixed, and negative advising experiences. Observations from our data indicate that we must consider institutional/departmental context, different advising and research group structures, advisor

behaviors, and personal characteristics, including the impacts of different identities and past experiences, in our participation selection to ensure we capture a diverse range of advising experiences.

Conclusion

This project aims to significantly contribute to understanding psychological safety in engineering doctoral education. By investigating the impact of psychological safety on students and developing resources to enhance faculty-student relationships, we seek to foster inclusive, psychologically safe research environments that support graduate student success and enhanced research innovation.

Acknowledgments

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