Investigating Stress and Academic Performance Among University of Toronto Engineering Students

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This qualitative study explores how stress is experienced by engineering students at the University of Toronto. Ten in-depth interviews was conducted in the winter semester of 2024. Although students have some self-awareness of their stress levels and awareness of existing stress coping methods, they still face a significant amount of pressure from their own expectations in addition to influences from the engineering culture. These factors contribute to high stress levels that come with both physiological and psychological symptoms. Despite this; however, resilience is a common trait among these students that allow them to manage their academic obligactions. Finally, the study concludes with recommendations for the university to improve its current support systems to better suit the needs of engineering students.

Table of Contents

1.0 Introduction and Background

This research project aims to explore the unique challenges of undergraduate engineering students at the University of Toronto (UofT). The researcher aims for this study to benefit fellow researchers, course instructors and course administrators within the engineering community. The goal is to shed light on how students experience stress, to cultivate a sense of community through shared experiences and how the university could better provide mental health support.

1.1 Purpose Statement

From a review of the literature, there is an alarming trend of elevated stress levels among engineering students that can significantly impact their academic performance and overall well-being. These studies highlight the significant amount of stress that engineering undergraduate students undergo throughout their academic career. However, understanding how stress is normalized and ingrained within the engineering culture at UofT, and how it ultimately impacts student well-being and academic performance has not been thoroughly studied.

This study aims to explore this gap, exploring how stress may impact academic performance and conversely, how academic performance might induce stress. The cultural normalization of stress will be explored as the general engineering community perceives and justifies stress as a standard part of the academic experience.

1.2 Significance of the Study

The final results of the study will be shared with the UofT engineering community. The findings are anticipated to provide valuable insights into the life of an engineering student, providing information on how they experience and perceive stress, how stress may affect their academic performance and how stress may be ingrained in the culture. The goal is for faculty to take into consideration the findings when developing mitigation strategies to help students develop coping skills to deal with stress. However, the findings may be limited as the study takes place during the winter semester of the academic 2023-2024 year. It's important to note that different findings may emerge if the study were conducted in a different semester such as fall, spring and/or summer.

1.3 Positionality Statement

It's important to acknowledge that the researcher is an alumna of the undergraduate engineering program at UofT. She is currently a graduate student at the institution, also working as a Teaching Assistant for various undergraduate courses in human factors and user experience design. Although her knowledge of the program and interaction with current undergraduate students offers a unique perspective of the culture, she acknowledges that her positionality may have influenced the study. Thus, she made a conscious effort to bracket existing biases and any assumptions during the data collection and data analysis process.

1.4 Research Questions and Objectives

The following are the three main research questions of this study:

1) How do UofT engineering students perceive and experience stress and what impact does this have on their academic performance?
2) What cultural factors within the UofT engineering community contribute to the normalization of stress?
3) Does the strong work ethic in the engineering culture lead to better academic performance?

1.5 Theoretical Stance

The researcher will adopt both the constructivist and interpretivist stance when interpreting the data. Constructivism will allow the researcher to gather insights from participants based on how the participants interpret their own realities, while interpretivism will allow the researcher to facilitate a deeper understanding of the phenomena within the existing UofT engineering culture [1].

2.0 Material and Methods

An ethnographic study was chosen as the qualitative approach. This approach allows the researcher to understand how students interpret and navigate their own undergraduate experiences from their own perspectives. An ethnography seeks to gain an emic perspective, where members of a specific culture provide meaning to their world from their own lens [2]. This approach will offer a nuanced view on how stress is experienced, perceived and becomes influential within the engineering community. In addition, an ethnographic study enables the researcher to look at specific social interactions and any cultural norms that are unique to engineering students at UofT [2]. By engaging with students during the academic semester, the ethnographic approach leverages the immediate experiences of engineering students. Thus, helping the researcher uncover emergent themes that will offer insights and address the research questions.

2.1 Participants and Recruitment

Approximately 10 current, full-time undergraduate engineering students will be selected for this study. Participants will be recruited through social media and engineering student clubs. A criterion sampling strategy will be used to ensure that participants can offer detailed insights and diverse perspectives, and to ensure the data collected is reliable and representative of the current academic landscape.

2.1.1 Inclusion Criteria:

- Must be enrolled as a full-time undergraduate student in the engineering program at UofT for the 2023-2024 academic year.

- Open to students from all years of the engineering program, including those currently on an internship.
- Must be willing to discuss personal experiences of stress and academic performance.

2.1.2 Exclusion Criteria:

- Part-time students are not eligible in the study due to differences in academic pressure and time commitment.
- Students not currently enrolled in the engineering program at UofT, recent graduates and students taking a year off, will be excluded. Including students that are not currently engaged in the program might introduce variables that do not accurately represent the current academic climate.
- Students who are not willing or comfortable to discuss personal experiences of stress and academic performance.

All participants will be assigned pseudonyms in the research paper to protect their identity. Participants have the right to withdraw at any time without any consequences. They will be offered a chance to review their contributions in the paper before publication. In addition, participants will be thanked and awarded a $20 gift card upon completion of their participation in the study.

2.2 Participant Coordination

Potential candidates for the study will fill out a Google Form to ensure they meet the specified criteria above. The researcher will then reach out to the eligible participants via email, arranging interview times that are subject to the participant's availability. The participant will be sent a consent form along with a link to the scheduled one-on-one interview. Participants will have the opportunity to reach out to the researcher should they have any questions, but will be required to forward a signed-copy of the consent form prior to the scheduled interview.

2.3 Data Collection

The scheduled interview will be recorded and hosted through a video-call using Google Meets. The interview will be transcribed and will be stored in a computer that is owned by the researcher and can only be accessed by a password. The participant will be informed of the data collection process at the start of the scheduled interview. The participant will have the opportunity to review and provide feedback of the transcribed recording following the interview. This is to ensure that the transcript accurately reflects the participant's feedback and to allow the participant to remove any information they wish to withdraw before the data analysis phase of the study.

The interview will follow an open-ended and unstructured approach, allowing the participants to freely express themselves and to provide narrative responses (see Appendix A for interview

script). This approach will allow the participant to control the pacing and to describe their academic journey in their own words. An open-ended approach will foster a conversational environment, where the participant can take the lead and set their own story. Should the researcher require clarification, the researcher will use close-ended questions to ensure both parties accurately understand the provided information.

3.0 Literature Review

The following section reviews the dynamics of stress and its effects on the well-being and academic performance of engineering students.

3.1 Stress and Academic Stress

Stress emerges when an individual perceives an event as overly demanding, exceeding their capacity to manage effectively [3, 4]. Also known as "stressors," these demands can be defined as the event or situation that causes stress [4, 5]. Universities are widely recognized as a high-stress environment due to the rigorous academic demands and high expectations placed on students. University students report lack of sleep, the pressure to earn high grades and a heavy-workload as sources of stressors [6].

Building on this, a 2022 study provides further insight into academic stress. It identifies workload, academic performance and the students' academic self-perceptions and expectations as key factors contributing to academic stress, which in turn can impact their psychological well-being [7]. The study found a significant correlation between diminishing mental well-being and increased academic stress across the students [7]. Furthermore, a 2021 study highlighted self-inflicted stress (SIS) as a significant factor affecting the well-being of university students. This type of stress is characterized by the demands and expectations students place upon themselves regarding their academic performance. [8]. SIS was found to be a strong predictor of the probability that students experience "languishing mental health" [8].

The implications of these findings are significant. If stress is prolonged, it may not only disrupt mental well-being, but also lead to or worsen serious mental and physical health issues, such as post-traumatic stress disorder (PTSD), depression, anxiety, sleep disorders, migraine, neck and shoulder pain [4]. The health consequences of academic stress highlights the need to investigate its effects on the student population.

3.2 Stress Among University of Toronto Students

A 2016 survey of students at UofT found that 43% identified stress, 33% identified anxiety and 26% identified sleep difficulties as the primary factors impeding their academic performance [9]. Furthermore, only 1% of UofT students reported experiencing no forms of stress, while 46% of students reported experiencing an above-average amount of stress.

Another recent study at UofT among engineering students reveals that admitted students had a significantly lower cumulative grade point average (cGPA) than expected given their previous academic performance [10]. The UofT engineering admissions process is described as “highly selective and rigorous,” typically admitting high-school students with above average grades [10]. This discrepancy and high-stress levels among the UofT population suggests that there could be existing factors beyond academic ability that could potentially influence the academic performance of students. This premise aligns with insights from ethnographic studies conducted on the engineering culture and undergraduate engineering students in North America.

3.3 Engineering Culture of Hard-Work and Success

Several studies conducted with undergraduate engineering students reveal a culture suggesting that success is equated with hard-work. A 1998 ethnographic study reveals engineering students held the belief that anything worthwhile was difficult, and that managing a heavy workload is just one of the many features of pursuing engineering education [10]. The culture associates the difficulty of a subject area synonymous with its worth and status, devaluing subject areas that were seen as “easy” [11]. Similarly, a 2007 four-year longitudinal study reveals that engineering students see “difficulty” as a defining criterion of one’s worthiness. It’s the belief that students are only worthy of engineering if they are willing to work hard and willing to make the necessary sacrifices [12]. In addition, a recent study shows that engineering students characterize traits: "hardworking" and "innovative,” as traits that describe a “successful engineer” [13]. This further emphasizes the ingrained notion that a strong work ethic is required to successfully complete the program. The shared experience of a heavy workload and the ability to tackle challenging subjects; however, leads to a strong sense of camaraderie among the engineering community [11].

The studies imply that there is a certain student profile that fits within the engineering community. Within these studies, there was a repeating theme of students sacrificing sleep and viewing all-nighters as a passage rite in order to meet academic obligations [12, 13]. Nearly every engineering student in a 2018 study reported feeling stressed throughout their studies [13]. Furthermore, engineering students held a belief that the stress they are experiencing is worse than stress experienced by non-engineering students, often dismissing the work in other disciplines as “easy” [12, 13].” This continuous stress and perceived superiority in workload and difficulty, highlight the unique pressures faced by engineering students.

Despite the emphasis on a strong work ethic and ability to tackle challenging subjects; however, the cGPA of engineering students are a lot lower than would be predicted given their previous academic performance [10].This raises the question if there is a correlation between the intense effort and the sacrifices of an engineering student, in comparison to their academic success.

3.4 Mental Health Among Engineering Students

A 2020 study, engineering students studying at public universities in the United States filled out the DASS-21 questionnaire to assess their levels of depression, anxiety, and stress [14]. The DASS-21 is a self-reporting questionnaire that is widely used for assessing mental health symptoms among researchers and scientist-professional clinicians [15]. The survey reveals that engineering students experience significantly higher levels of stress, anxiety and depression, in comparison to two different groups: undergraduates across all disciplines at a Midwestern college in the United States and a non-clinical sample of adults [14, 16, 17].

Similarly, a 2018 study reveals that engineering students experience mental health issues at a much higher rate than the average university student. It was found that these students are roughly two times more likely to suffer mental health issues such as depression, anxiety and PTSD [18].

Although the engineering culture emphasizes a strong work ethic to meet rigorous academic standards, these studies highlight a concerning aspect: engineering students experience a significant amount of stress and mental distress, surpassing the levels found in other young adults and other student groups.

These studies highlight the significant amount of stress that engineering undergraduate students undergo throughout their academic career. However, understanding how stress is normalized and ingrained within the engineering culture and how it ultimately impacts student well-being and academic performance has not been thoroughly studied.

This study aims to explore this gap, exploring how stress may impact academic performance and conversely, how academic performance might induce stress. At this stage in the research, the cultural normalization of stress will be explored, as the general engineering community perceives and justifies stress as a standard part of the academic experience.

4.0 Results

The researcher interviewed 10 engineering students within the UofT community among different disciplines and years of study. Among the 10 students, 5 were from the electrical and computer (ECE) engineering discipline, 4 were from the industrial engineering discipline and 1 was from material science (MSE) engineering discipline. There are a total of 7 engineering disciplines at UofT [19]. Among the 10 students, 2 were in first year, 2 in their second year, 3 in their third year, and 3 in their fourth year of the engineering program. (See Appendix B for a breakdown).

A total of 14 open-ended questions were asked during the video interviews during the winter term of 2024 (Appendix A). The interview was transcribed and stored in a computer that is owned by the researcher and could only be accessed by a password. The questions aimed to address the research questions with the intention of allowing the participants to describe in detail

their engineering undergraduate experience at UofT. The questions covered the students' personal experiences, their perceptions of stress and the impact of stress on their academic performance.

4.1 Data Analysis Strategy

For the data analysis approach, the researcher incorporated a mix of inductive reasoning and thematic analysis to uncover themes and meanings related to participants' experiences. The initial stage involved inductive coding, enabling the researcher to derive codes from the dataset, while ensuring that the themes developed are driven by the data and come from the participants' perspectives [20]. Coding was performed without any preconceived categories. NVivo was utilized as a software tool to assist the researcher in summarizing passages into single phrases (codes) from the transcripts. With these codes, a qualitative codebook was generated with three columns: code, description and examples.

Table 1: Qualitative Codebook

Code	**Description**	**Examples**

A thematic analysis followed for the second round of coding. The goal was to reduce the initial number of codes, categorizing these codes into themes. Codes identified from the first round of coding were organized into meaningful themes, leading to new insights that addressed the research questions [20].

Throughout this phase, the codebook was revised either by re-coding, merging codes or re-naming codes. A new column was added to Table 1, called "themes," that merged multiple codes that share underlying ideas that capture the students' lived experiences. A sample of the coded data can be seen in Appendix C.

5.0 Validation

For this study, the researcher used "member checks" as a validation method [21]. As mentioned earlier, participants were able to review and provide feedback after receiving a copy of their transcripts. This process gave participants an opportunity to correct errors and/or provide additional information in their transcripts.

Three participants were also sent a preliminary draft of the themes uncovered, giving them the opportunity to challenge the researcher's findings. This review allowed the researcher to refine the preliminary themes and to confirm the accuracy of the findings.

6.0 Discussion

This section delves into the themes identified during the second round of coding, expanding on the literature and addressing the research questions. The following will be explored: the self-awareness, the self-imposed expectations, the resilience and the experience of high-level stress among engineering students at UofT.

6.1 Themes

There were four themes that emerged from the study that expand on the literature review and answer the research questions:

1) Engineering students are **self-aware** of their performance, stress levels, academic obligations and coping methods.
2) One significant contributor to stress is the pressure from **self-imposed expectations**.
3) Engineering students experience **high levels of stress** and **burnout** marked by both psychological and physiological symptoms.
4) **Resilience** emerges as a common trait among engineering students, allowing them to manage their workload and stress levels.

6.1.1 Self Awareness

During the interview phase, the researcher noted how participants behaved and responded to questions. When asked about their perceptions of stress, their grade expectations, their commitments, their stress-coping methods and their ability to differentiate positive and negative stress, the participants were able to articulate their own opinions with conviction.

The participants were also aware of the services provided at UofT; however, only 2 out of 10 sought out mental health services offered at the UofT Health and Wellness Centre. Almost half mentioned that there were "long wait-times" for these services with a "huge backlog of students." One participant described the experience as "impersonal":

> I tried to go visit but it felt impersonal. I walked in and they gave me a clipboard. I looked at the clipboard with all these questions and I immediately left.

In addition, 6 out of the 10 were able to predict their exam performance based on the amount of effort they invested in preparation. Participants in their upper years shared their lessons-learned, expressing awareness of what coping methods and study habits work best for their needs. Furthermore, almost all of the participants expressed the importance of a good sleep schedule, getting regular exercise and a healthy diet. When asked about their most stressful experience, all participants were able to pinpoint the root of their stress. Some of these include: overcommitment, procrastination and poor time management skills.

Another notable observation is how engineering students are able to differentiate between positive and negative stress. Positive stress was described as the stress that provides the participants with motivation. 8 out of 10 stated that positive stress was stress that "forces you to do things" and "keeps you going." Participant 9 described it as:

> There's a type of stress that makes you want to work, that's positive stress.

Other participants shared a similar sentiment. Negative stress on the other hand, was generally described by all participants as "stress that becomes too much to the point where you shut down." Participant 7 noted "questioning their self worth," with Participant 3 and Participant 5 reporting how the stress negatively impacted their exam performance, leading them to "blank out" during the exam.

With all of these factors in mind, it's evident that engineering students have self-awareness when it comes to their academic obligations and stress levels. They are also aware of coping methods that would help alleviate stress; however, some students might choose to look over their mental and physical well-being to meet their academic obligations. This addresses our first research question: "How do UofT engineering students perceive and experience stress and what impact does this have on their academic performance?" The study demonstrates that although students have some self-awareness of coping strategies and their stress-levels, the intensity of this stress can significantly impair their academic performance and overall well-being. Symptoms of negative stress will be further explored in 7.1.3.

6.1.2 Self-Imposed Expectations

From the literature review, it was mentioned that students' self-perception and self-inflicted stress were a significant factor in their psychological well-being [6, 7]. In the study conducted, half of the participants explicitly mentioned that most of their stress came from within themselves and their own expectations to do well. Thus, the finding from the literature resonates with the participants. Participant 5 stated:

> Most of my stress came from own internal expectations. I always strive for the best no matter what and put my best foot forward. Because I came from a very academic heavy background even before high school. I always had 90s in elementary and in high school. That set up the expectation to always put your best foot forward.

Similarly, 5 other participants noted their performance in high school, sharing how they always had the top grades and felt the need to live up to their past performance. 3 out of 10 noted that their freshman year was an "eye-opening experience." These participants noted feelings of

disappointment after receiving much lower grades during their freshman year. They admitted to attaching their self-worth to their grades. Participant 8 stated:

> I use to get validation from my teachers because they told me I'm amazing. So I had to figure out how to get validation from myself.

Participant 7 also mentioned:

> Once I started adjusting in first-year, I stopped letting my grades define me.

In addition, when asked to recall their high school experience, all of the participants described having the top grades and having the time to participate in extra-curriculars. The participants described themselves as driven and well-rounded individuals. This is in line with a study found during the literature review, where it was found that the students admitted to the program had "above average grades" and that these students had a lower cGPA than what would be predicted given their performance [9].

To summarize, it was found that students put a lot of pressure on themselves to perform well, which can lead to feelings of stress or even doubts about their own self-worth should they fail to meet their own standards. It would be interesting for further research whether or not these factors contribute to their academic confidence. This finding addresses our first research question and our second research question: "What cultural factors within the UofT engineering community contribute to the normalization of stress?" Self-imposed expectations are a significant contributor to the stress that engineering students face. Within the community, students often impose high expectations on themselves, striving for excellence given their past performance in high school. The extent to which students will go to fulfill these high expectations will be further explored in the next section.

6.1.3 High-Levels of Stress and Burnout

From the study, most participants reported feeling stress negatively throughout the academic semester. 5 out of 10 felt they experienced a burnout at some point in their academic career. Participant 2 described it as:

> When you're burnt out, you're just not as motivated to pursue what once motivated you. You kind of want to take a really long break and you kind of lack motivation and energy to work on the things you would normally want to work on. I felt a lot of anxiety during exam season.

Participant 5 also noted:

> I didn't take enough breaks for myself. The burn out got so bad that I was having trouble remembering basic things. The brain fog was so bad that I had no motivation. I even went to a doctor and I was advised that I may have anxiety and depression. That's what made me start therapy and antidepressants.

The findings of the study align with the literature, stating that engineering students experience a significant amount of stress in comparison to other groups or the average university student [13, 15, 16, 17]. Furthermore, the participants noted the following physiological symptoms: hair loss, weight loss, weight gain, fatigue and nausea. The psychological symptoms noted were: feelings of anxiety, depression, brain fog, and insomnia. Out of all the participants, 3 out of 10 admitted to being diagnosed with either anxiety and/or depression. To cope with the stress, 3 participants reported using non-mental health services at UofT such as: meeting with their academic advisor, a learning strategist or utilizing the tutoring centre.

However, for majority of the participants, one common method of coping with stress is by confinding in their friends. Participant 3 noted:

> My friends and I don't really discuss how we handle stress, we just talk about what we're stressed about. Being able to confide in someone and express how you're stressed and having them validate your feelings is a great way to relieve stress.

It's also interesting to note the culture that exists within the UofT engineering community. Most participants describe it as "tight-knit," "caring," and "welcoming." It's described as "people banding together to tackle assignments and exams." Participant 7 noted:

> We're all on this boat, we might all be sinking but we're still paddling together. Nobody gets left behind.

Participant 9 also noted:

> Everyone knows everything is going terribly and it feels like the world is on fire. You're drowning in a tsunami. Everyone is willing to help each other out.

However, although there exists a supportive culture, it's important to highlight another side of the culture that normalizes stress. Some students may downplay their stress levels, ignoring physiological and psychological symptoms, attributing their feelings as "normal," due to the "hustle-culture" that exists within the community. Participant 2 noted:

> I definitely think stress is normalized in engineering. It's like cool to be stressed. It's romanticized. The grind is romanticized. If you're not grinding you're not doing it right.

Participant 7 also noted:

> There's a hustle culture. I can down five coffees in a day if it means I'll finish this lab. So it's pretty toxic. It was sort of a ritual to find everyone at the lab cramming. It's sort of ingrained and has been normalized. I think that's just the nature of engineering though.

This study fills a gap in the literature where the normalization of stress was not fully explored, providing evidence that shows its prevalence within the UofT engineering culture. This particular finding addresses the second research question, highlighting that although there exists a tight-knit community that is willing to help each other out, there is also another side of the culture that glorifies the stress and the grind. Engineering students will go to great lengths to ensure they meet their academic obligations, even at the cost of their own mental and physical health. This finding also highlights the intensity at which engineering students experience stress, addressing the first research question.

6.1.4 Resilience

Throughout the study, while the participants recalled their schedules and their workload, the researcher observed their "matter-of-fact" manner of speaking. The participants spoke about their busy schedules and high workload as normal parts of their everyday life. This shows that although engineering students might complain about their workload and schedules, they still have a positive mindset. This is interesting to note as there seems to be a sense of knowingness among all the participants that they will eventually accomplish their goals and complete their undergraduate engineering degree. None of the participants ever mentioned dropping out of the program, although 3 out of 10 mentioned "questioning their self-worth" and whether or not they were "cut out for the program." Despite this; however, there seems to be a strong mentality among the participants. Participant 7 noted:

> My schedule is absolutely crazy but you know I'm doing this for a reason.

Participant 2 also noted:

> The outcome of the deadlines aren't going to change, it's just how you mentally deal with things. At the end, these are good problems to have. We're privileged to be interviewing and to be studying engineering.

Furthermore, besides employing coping methods and maintaining a strong mentality, all participants felt that they were working towards a goal. The study mentioned during the literature

review, which stated that “engineering students held a belief that anything worthwhile was difficult,” is supported by the findings [10].

6 out of 10 also noted that there was a sense of superiority among non-engineering programs. However, it’s important to note that only 2 out of the 6 participants who observed this behaviour, believe in that sentiment. Most of them described it as a behaviour ingrained within the culture, from non-engineering students or even engineering frosh leaders reminding them that “they are better than everyone else.” Further research is needed to explore whether or not feelings of superiority come from a place of wanting to comfort themselves, or if engineering students truly believe this sentiment.

In addition, 7 out of 10 mentioned that they were looking forward to completing the degree with mentions of how they were going to be employable in the future. Participant 8 noted:

> Yes, I think this comes from knowing our relevance in society. We’re always going to need engineers in any field. We’re meant to make the world a safer and better place.

Participant 9 also noted:

> If there was no pay-off for this degree then I wouldn’t be here now. This is the only comfort that I have right now, to continue on.

Other participants shared a similar sentiment. To summarize, the strong mentality of engineering students, coupled with the idea that they are working towards a goal, keep them motivated despite the challenges that come with the program. The belief that their hard work and effort will pay off in the future, is crucial in understanding the resilience of UofT engineering students. These two factors are relevant in ensuring students stay motivated, despite the heavy workload and busy schedule.

7.0 Limitations

Although it was mentioned earlier that 6 out of 10 participants were able to predict their exam performance based on their preparation, there seems to be another narrative that contradicts this finding. 3 out of 10 mentioned putting in “too much effort” for the grade they achieve. Participant 6 noted:

> I feel like I put in too much effort and sometimes the grades don’t really reflect that. But I’ve accepted it.

Thus, the third research question cannot be fully addressed given the contradicting information. There is insufficient information to confirm whether or not a strong work ethic leads to better

academic performance. There remains a gap in the literature that does not address the reason why UofT engineering students have a significantly lower cGPA than expected [9].

In addition, the researcher recognizes the importance of employing more than one form of triangulation. Peer debriefing would be beneficial in mitigating any bias that might arise given the researcher's positionality. This would further enhance the credibility and depth of the research findings [19].

8.0 Conclusion

Within the UofT engineering community, stress is often normalized. There is a romanticization of "the grind" and a strong emphasis of the "hustle culture." Hard work is often glorified and seen as a key to success, even at the expense of a student's mental and physical well-being. The study reveals the need for better ways to perceive and manage stress without normalizing high stress levels. The researcher hopes that these findings will shed light on the challenges of engineering students, and the need for more accessible and responsive mental health support systems within the university.

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Appendix

Appendix A: Interview Script

Researcher: “Thank you so much for taking part in our study. To give you a brief overview, the study is meant to explore how stress may impact academic performance in the UofT undergraduate engineering community. It’s also meant to explore how the ingrained notion of how stress is just a standard part of pursuing an engineering education and how it’s part of the culture. Before we begin the interview, do you have any questions about the study?

At any point in time, feel free to stop me for any reason should you wish to stop the interview or if you wish to take a break. Remember that there are no right or wrong answers during this interview. Here is your signed-copy of the consent form for you to review before we begin.”

Given with your permission, I will start recording this call. Recording will allow us to transcribe the interview for later review since I won’t be able to take comprehensive notes. You will receive a copy of this transcript for you to review in the near future.”

Pre-Screening:

Researcher: “Would you be able to tell us a bit about yourself?”

Interview:

Researcher: “To start off, could you describe your high school experience and background?

Can you describe a typical week as an engineering student? What are some personal strategies you practice to deal with your academic obligations?

When was the last time you experienced stress and what happened?

Where do you think most of your stress comes from? Can you differentiate between positive and negative stress?

In what ways do you think stress may affect your academic performance? Please provide your insights and give a specific example (project, exam, etc.).

In what ways do you think stress may affect your mental well-being?

Is there a common approach in handling stress among you and your peers?

Have you or your peers ever had to choose between meeting academic obligations over your mental well-being?

Could you describe the engineering culture at UofT in your own words?

How does the culture and/or how you interact with members of the community affect your perceptions of stress?

In what ways do you see stress as being culturally accepted within the community?

Do you think the amount of work you invest in your academic responsibilities translate over to your desired grades?

Have you used services at UofT to help you deal with feelings of stress or other mental health issues?"

Wrap-Up:

Researcher: "Before we finish the interview, is there anything else you'd like to add or talk about?

You'll receive a copy of the transcript within the next week or so! You'll have the chance to review and modify and/or delete anything in the transcript before the next phase. You will also have a chance to review the final report before publication.

Thank you for your participation. Your insights will be valuable to this research and remember that your participation is confidential."

Appendix B: Participant Breakdown

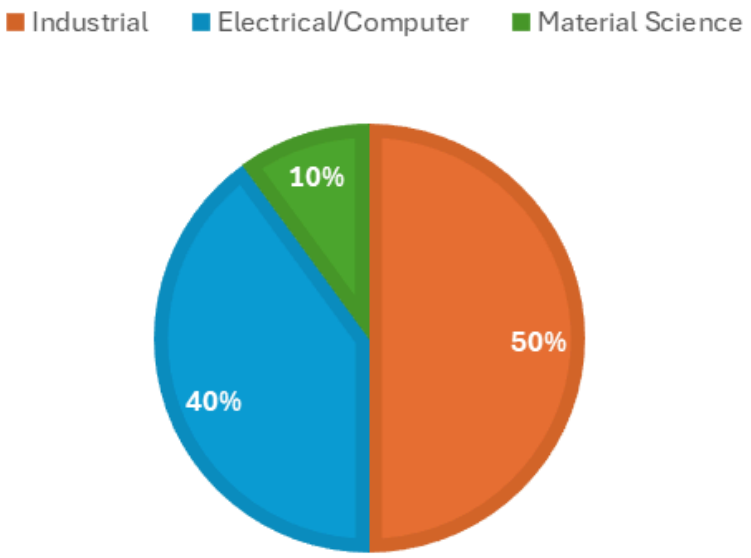

Figure 1: Students Interviewed Among Different Engineering Disciplines

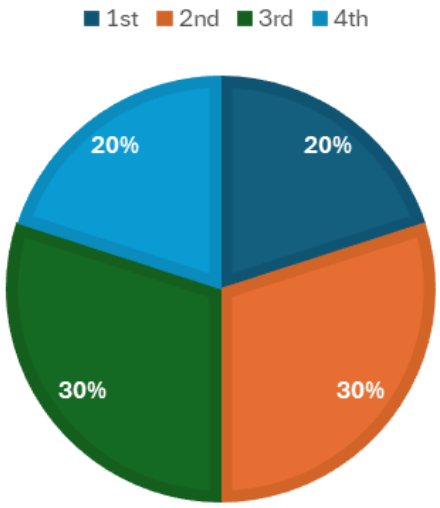

Figure 2: Students Interviewed Among Different Years of Study

Appendix C: Sample of Coded Data

Below is the coded data from the Interview with Participant #2. A copy of the de--identified transcript can be seen on Appendix D.

Table 2: First Round of Coding

Code	**Description**	**Examples**
Time Management	How a student manages their time	"A lot of my time is spent tackling school work. That takes up majority of my time everyday."
		"A good 85% is spent focused on school and my remaining time was for job hunting and other extra-curriculars such as dragon boating."
		"Things move really fast and if you're not caught up for the next class, then it'll be double the work. Then it snowballs."
Sleep Schedule	Student's sleep schedule during the academic year	"Having a good sleep schedule is really important, especially with 9AM classes."
Coping Strategies	How a student manages their responsibilities	"Just maintaining general health such as eating well and getting exercise in is really important to help your mental focus."
		"I would say it's nice to pre-read the course notes if you can before going to the class."
		"Talking to people and working with people during that period of time was helpful. To deal with interview stress, I would study with other people and that took my mind off of things. Or I would rely on boyfriend for emotional support. Talking about stress is really helpful to manage the stress."
		"I've seen the academic advisor for certain things to deal with issues such as stress. I got prescribed some medication to help with that. I know the therapy services at UofT has a long wait time. So I never had the chance to try that out."
Analytical Memo: How many students have used services at UofT?		
Academic Stressors	Stressors unique to being a student	"There was a period of time I was super stressed because I had a big interview and an essay due shortly

		after that interview. That week was super stressful because I wanted to prioritize my interview but I wanted to finish my essay."
Mentality	The student's mentality	"The outcome of the deadlines aren't going to change, it's just how you mentally deal with things. At the end, these are good problems to have. We're privilege to be interviewing and to be studying engineering."
		"I think people learn the best when they're interested in the topic being taught. If you do get really stressed about it, you might lose your interest or love of learning and it becomes more of a chore. And when that happens, that can affect how motivated you are when you study for certain courses and topics."
		"I do think that there's a correlation that if you work hard, you'll get better grades than if you didn't work hard. But I think it's good to be smart with how you work too."
Analytical memo: Is this a mentality unique to this student or a cultural thing?		
Burnout	Extreme form of stress	"I've experience burnout and I think that happens if you don't give yourself enough time to take breaks."
		"When you're burnt out, you're just not as motivated to pursue that was once were motivating to you. You kind of want to take a really long break and you kind of lack motivation and energy to work on the things you would normally want to work. I felt a lot of anxiety during exam season."
Culture		"I think expectations and there's a community that poses certain expectations such as where you should be working and what you should be doing with your time. If you let go of those expectations, then it's not that bad."
		"I think a good thing about the eng community is that it's more of a community than other programs. It's less competitive, I don't think marks matter as much as opposed to if you're trying to pursue medicine. So people band together to work on labs and projects. I think that's one of the best qualities in being in eng."
		"I think it's supportive but definitely pushes you.

		Challenging. But also competitive. I would say it's competitive."
		"There is that hustle culture that is put on the pedestal within the eng community. There are pretty bad consequences with that if it's not regulated."
		"I definitely think stress is normalized in engineering. It's like cool to be stressed. It's romanticized. The grind is romanticized. If you're not grinding you're not doing it right."

Table 3: Second Round of Coding

Themes	**Codes**	**Description**
Personal Management and Wellness	Time Management, Sleep Schedule	This explores how students are able to manage their responsibilities through methods such as time management and a good sleep schedule.
Coping Strategies for Academic Pressures	Coping Strategies, Academic Stressors	This shows how students are able to handle academic stressors with their own coping strategies. This also delves into the unique academic pressures an engineering student experiences throughout the year.
Psychological Impact	Mentality, Burnout	This explores the mental and emotional aspects of stress with regards to being an engineering student.
Cultural Influences	Culture	This shows the existing culture within the engineering community.

Appendix D: Participant 2 Interview Transcript

Pre-Screening:

Researcher: “Would you be able to tell us a bit about yourself?”

Participant: “I’m currently a 3rd year UofT for ECE. My courses lean more on Computer Engineering, my career path is software developer.”

Interview:

Researcher: “To start off, could you describe your high school experience and background?

Participant: “I went to high school in Toronto. It was particularly academic, it’s more focused on sports and music. I’d say I was a good student. A lot of my interests involved science and math. I only took STEM courses in my last two years. I was in music, so I was in strings. I played some badminton so I was on the badminton team.”

Can you describe a typical week as an engineering student?

Participant: “Go to class. There’s quite a lot of ECE I’d say, mostly because every course has a lab component. Lab is usually 2 hours or even longer and you have to do the lab beforehand at home. A lot of my time is spent tackling school work. That takes up majority of my time everyday. August to October is interview season for internships in the summer. I would say first semester is so much busier just because if you’re trying to find an internship, that’s when you’d start applying, interviewing and balancing that on top of your course work load. A good 85% is spent focused on school and my remaining time was for job hunting and other extra-curriculars such as dragon boating.”

What are some personal strategies you practice to deal with your academic obligations?

Participant: “Having a good sleep schedule is really important, especially with 9AM classes. What I found is that if you miss one lecture and tell yourself you’d rewatch the lecture later, then it can pile up. Things move really fast and if you’re not caught up for the next class, then it’ll be double the work. Then it snowballs. So having a good sleep schedule and sleep schedule in general. Just maintaining general health such as eating well and getting exercise in is really important to help your mental focus. I would say it’s nice to pre-read the course notes if you can before going to the class.”

When was the last time you experienced stress and what happened?

Participant: “There was a period of time I was super stressed because I had a big interview and an essay due shortly after that interview. That week was super stressful because I wanted to prioritize my interview but I wanted to finish my essay. Talking to people and working with people during that period of time was helpful. To deal with interview stress, I would study with other people and that took my mind off of things. Or I would rely on boyfriend for emotional support. Talking about stress is really helpful to manage the stress. The outcome of the deadlines aren’t going to change, it’s just how you mentally deal with things. At the end, these are good problems to have. We’re privilege to be interviewing and to be studying engineering.”

Where do you think most of your stress comes from? Can you differentiate between positive and negative stress?

Participant: “There is a limit in which you do get burnt out, then it becomes a negative stress. I’ve experience burnout and I think that happens if you don’t give yourself enough time to take breaks. I think expectations and there’s a community that poses certain expectations such as where you should be working and what you should be doing with your time. If you let go of those expectations, then it’s not that bad. But because we have external factors that pushes us, that’s the biggest cause of stress.”

In what ways do you think stress may affect your academic performance? Please provide your insights and give a specific example (project, exam, etc.).

Participant: “I think people learn the best when they’re interested in the topic being taught. If you do get really stressed about it, you might lose your interest or love of learning and it becomes more of a chore. And when that happens, that can affect how motivated you are when you study for certain courses and topics.”

In what ways do you think stress may affect your mental well-being?

Participant: “When you’re burnt out, you’re just not as motivated to pursue that was once were motivating to you. You kind of want to take a really long break and you kind of lack motivation and energy to work on the things you would normally want to work. I felt a lot of anxiety during exam season.”

Is there a common approach in handling stress among you and your peers?

Participant: “I think a good thing about the eng community is that it’s more of a community than other programs. It’s less competitive, I don’t think marks matter as much as opposed to if you’re

trying to pursue medicine. So people band together to work on labs and projects. I think that's one of the best qualities in being in eng."

Have you or your peers ever had to choose between meeting academic obligations over your mental well-being?

Participant: "Yeah I think so. A lot of people switch or change their program. For example, you can split your 2nd year into two years. So that would be a move to balance out the mental health aspect."

Could you describe the engineering culture at UofT in your own words?

Participant: "I think it's supportive but definitely pushes you. Challenging. But also competitive. I would say it's competitive."

How does the culture and/or how you interact with members of the community affect your perceptions of stress?

Participant: "There is that hustle culture that is put on the pedestal within the eng community. There are pretty bad consequences with that if it's not regulated."

Based on the studies I've read, there were three main insights that were found. 1) They view stress as a normal part of being an engineering student. 2) Feelings of superiority over non-engineering students. 3) Comfort in knowing that the degree is worth it for it's hireability. Do you agree with these sentiments?

Participant: "I definitely think stress is normalized in engineering. It's like cool to be stressed. It's romanticized. The grind is romanticized. If you're not grinding you're not doing it right."

I don't think eng is necessarily harder than artsci. I would say math for example, it's an artsci degree. It's very complicated. I think part of the superiority comes from the fact that I think engineers are more employable in the work force. It's easier to get jobs in engineering. It revolves around money and financial status. The degree is worth it for the hardship you go through during the years of studying. It keeps you going to know that you will be employable."

Do you think the amount of work you invest in your academic responsibilities translate over to your desired grades?

Participant: "I do think that there's a correlation that if you work hard, you'll get better grades than if you didn't work hard. But I think it's good to be smart with how you work too. Some

things I had to refine as a student is to optimize the way that I studied. And that was most helpful than achieving better grades rather than straight up studying for."

Have you used services at UofT to help you deal with feelings of stress or other mental health issues?"

Participant: "I've seen the academic advisor for certain things to deal with issues such as stress. I got prescribed some medication to help with that. I know the therapy services at UofT has a long wait time. So I never had the chance to try that out."