Implications of Financial Support for the Academic Efficacy and Mental Health and Wellbeing of Engineering Undergraduates

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Implications of Financial Support for the Academic Efficacy of Engineering Undergraduates

Abstract

This research study explores the implications of financial support for academic efficacy and mental health and wellbeing (MHW) in undergraduate engineering. The socioeconomic status of students has been suggested to positively correlate to academic efficacy and success. Students who receive need-based financial support when compared to those who do not receive such support are reported to have higher levels of academic success. The detrimental effects of financial insecurity on the MHW of students have been verified by many studies. In our previous study, we identified financial support to be among the vital factors contributing positively to academic efficacy, and ultimately the MHW of undergraduate engineering students. In the current study, we further explored the importance of financial support by exploring the different ways in which it makes such contributions.

As part of a larger project about MHW of engineering undergraduates, qualitative data was collected from 105 participants through an online open-ended survey at a Western lang-grant institution of higher education in the Spring of 2022. The engineering undergraduate study participants were asked about the different ways in which financial support from different sources enabled them to be academically efficacious. Thematic analysis involving categorization and theming was carried out with two researchers participating in this process.

Findings from the thematic analysis of the data revealed that financial support contributed to engineering undergraduate students' academic efficacy as it: 1) afforded them more time to focus on studies to achieve academic goals, 2) decreased their psychological insecurities, and 3) even made engineering education possible for some study participants. Financial support came from different sources including parents, spouses, scholarships, and the educational institution.

1. BACKGROUND

The availability of financial resources significantly influences students' decisions regarding the selection of a particular educational institution for pursuing higher education, as well as their determination of whether to enroll in a two-year or a four-year [1]. Further, to avoid educational misadventures, students might be forced to take student loans that they may find hard to pay off after their graduation. According to recent statistics by the United States Department of Education, approximately 16% of students taking student loans are in default [2]. In short, the presence and nature of financial assistance have significant ramifications for students' success in higher education.

Financial support is important for students as this could guarantee access to quality education. Research indicates that student who are too poor to get an education may drop out of their programs with financial support in the form of scholarships being one of the preventing factors from dropout [3]. Not only this, financial support also has psychological ramifications for students. for example, it helps improve a sense of belonging to the educational institution environment which ultimately could result in a higher retention rate [4].

Our previous research about the mental health and wellbeing of undergraduate engineering students suggested financial support to be a cornerstone of their academic efficacy in addition to other perceived factors [5]. To further explore the reasons why financial support (and the other perceived factors) may be so important, we conducted a follow-up concurrent mixed methods study with engineering undergraduates as our participants. This paper reports on the qualitative responses of the study participants to the following open-ended question about the relation between financial support and academic efficacy.

> **Question:** How does financial support from different sources enable you to complete your assigned academic tasks successfully?

2. THEORETICAL BACKGROUND

2.1 Academic Efficacy

Renshaw and Bolognino (2016) [6] have outlined the concept of academic efficacy, which is derived from a synthesis of two key components: self-efficacy and grit. Self-efficacy, as defined by Albert Bandura [7], denotes an individual's belief in their capability to successfully execute a given task. This belief serves as a protective factor against feelings of anxiety and depression [8], contributing to overall psychological well-being. In academic settings, self-efficacy has been strongly linked to academic achievement and performance [9, 10].

Grit, on the other hand, embodies an individual's persistent determination and fervent pursuit of long-term goals. It represents a behavioral aspect of well-being and has been recognized as a significant predictor of various learning behaviors and achievement outcomes [11, 12].

According to Renshaw and Bolognino (2016) [6], academic efficacy encompasses elements of both cognitive and behavioral well-being. However, their analysis suggests that it predominantly reflects behavioral well-being rather than cognitive well-being. This implies that academic efficacy is more closely associated with the persistent pursuit of goals and determination rather than solely cognitive abilities or beliefs about one's capabilities.

3. METHODOLOGY

3.1 Methods

Both quantitative and qualitative data were collected concurrently for the concurrent mixed-methods study as advised by Creswell and Clark (2017) [13] through an online survey. The quantitative data were collected using a standardized questionnaire. Qualitative data was collected with the use of seven open-ended questions developed during our previous study [5]. Consistent with the pragmatic research paradigm and a phenomenological qualitative approach, we aimed to collect responses to the open-ended questions from all the participants who responded to the quantitative questionnaire.

3.2 Sampling and Participant Recruitment

Convenience sampling techniques were employed for this study to get maximum response to the research survey. Participants in this study were all undergraduate students in the College of Engineering at a land grant institution in the USA. After receiving approval from IRB, we aimed for the maximum possible responses by contacting all faculty in the College of Engineering through emails. Faculty were requested to post an announcement for the research survey on their Canvas course websites. The engineering advising office was sent an email to include the same announcement in their weekly college newsletter that is sent to all undergraduate students in the college. Participants who completed the survey in its entirety entered a drawing to win one of the offered four $50 Visa cash cards.

3.3 Participants

A total of 122 responses were received to the mixed methods survey. Four incomplete responses were discarded. Therefore, 118 responses were used in the data analysis in the qualitative data analysis. Further, 105 study participants completed the survey in its entirety including the qualitative parts. Therefore, our qualitative analysis consisted of these 105 study participant responses. Based on the total undergraduate enrollment at the College of Engineering in Spring 2022, the response rate was 6.70%. Following is a general description of the survey respondents.

A breakdown of the participant pool by demographics is provided in Table 1. Most of the participants were male (77.12%) and White (99.37%). Second-year participants (36.44%) dominated the participant list, while mechanical & aerospace engineering (62.71%) had the most presence discipline-wise. Most of the participants were continuing (i.e., not first) generation (88.13%). Most of the participants were categorized as either traditional (23.72%), minimally non-traditional (33.89%), or moderately non-traditional (38.98%) with only a handful (0.34%) of participants being highly traditional. This categorization was made based on the model presented by Horn and Carroll (1996) [14].

Table 1.

Survey participant demographics (N=118)

Participants	**Percentage (%)**
Gender	
Male	77.12
Female	22.03
Transgender	0
Gender non-conforming	0.84
Not listed (textbox to list)	0
Prefer not to answer	0
Race/ethnicity	
Asians	0.84
Black or African Americans	1.70
Hispanic or Latinx	1.70

Native American or Alaska Native	0.84
Native Hawaiian or Other Pacific Islander	1.70
White	92.37
More than one race	3.40
Year of study	
First year	15.25
Second year	36.44
Third year	23.73
Fourth year	15.25
Fifth year or more	9.32
Engineering major	
Biological	6.78
Civil & Environmental	9.32
Electrical & Computer	21.19
Mechanical & Aerospace	62.71
Generation	
First	11.86
Continuing	88.14
Traditionality	
Traditional	23.73
Min non-traditional	33.90
Mod non-traditional	39.00
Highly non-traditional	3.40

3.4 Data Analysis

An analysis of open-ended survey responses (qualitative) was conducted. A thematic analysis process adapted from Saldaña (2021) [15] and similar to that employed for our preceding study [5] data analysis was followed. Quotes and themes from the study informed the practical implications of the research study as suggested by Creswell and Poth (2016) [16].

Before analyzing the responses to the open-ended questions in the form of excerpts, they were thoroughly checked to remove any identifying information. An iterative and cyclical qualitative data analysis involving coding, categorizing, and theming was used involving two researchers [15]. In-vivo and descriptive coding were conducted to expand and explore what contributes to the perception of seven factors among the target engineering undergraduates. After three passes of categorizing data in subsequent superordinate categories, four themes emerged (Table 2) from responses to our open-ended question about the relationship between financial support and academic efficacy.

Table 2.

Resultant themes about the importance of financial support for academic efficacy

Perceived Factors/Constructs	Superordinate Categories from Data	Themes
Financial Support/Academic Efficacy	Financial support helps afford more time to focus on studies to achieve academic goals	Financial support helps afford more time to focus on studies to achieve academic goals
	Decrease in financial insecurity - less stress	Financial security decreases psychological insecurities
	Decrease in financial insecurity - less worry	
	Continuing engineering education may not be possible without financial support	Continuing engineering education may not be possible without financial support
	Sources of financial support: Parents, spouses, scholarships, and educational institutions	Financial support comes from different sources

Two researchers were involved in the coding process. The first author, was actively involved in the coding, categorizing, and theming process. The second researcher, who was a peer graduate student in the same department (i.e., Blinded for Review), acted as an observer and provided feedback on the codes/categories/themes produced. The feedback was applied and if any confusion was encountered, both researchers met in person for a clear understanding and consensus.

4. FINDINGS

Online survey question: How does financial support from different sources enable you to complete your assigned academic tasks successfully?

We explored the importance of financial support for engineering undergraduates' academic efficacy or their belief in themselves to efficiently complete their academic tasks. Four themes (Table 2) were developed from the analysis of participant responses to the open-ended question. Three of these themes were about the importance of financial support to achieve academic efficacy in undergraduate engineering education while the fourth theme described different sources to get financial support.

4.1 Financial Support Helps Afford More Time to Focus on Studies to Achieve Academic Goals

The most prevalent theme about the effects of financial support on academic efficacy was about gaining more time and hence focus to achieve academic goals due to the availability of financial support from various sources. In the presence of full or partial financial support for

engineering education, there was an increased level of belief about their academic goal achievement capabilities among the participating students. Participants were of the view that financial support allowed them to work less or not work at all and hence be more focused on their studies with less or undivided attention. For example, one of the study participants made the following or similar comment about the importance of financial support for their academic success.

> "Financial support aids in my focus and success of academic tasks/coursework. Without having to depend on my own source of income to pay for schooling, I am able to focus and put more effort into my academic tasks rather than split attention between work and school."

Work-related responsibilities to produce financial resources for engineering education were perceived to be a distraction and reduced academic efficacy. Working a full or part-time job undoubtedly consumes valuable time that could have been dedicated to involving in academic tasks as evidenced in this participant's response, "Without financial support, I would have to work far more hours and would be unable to study as effectively which would be detrimental." The focus required to effectively engage in engineering education needs financial support from various sources that would enable students to work less and dedicate more to their studies. One of the study participants stated the following about the importance of such financial support for fully focusing on their academics.

> "The financial support I have received has been through different sources like scholarships and FAFSA. It has enabled me to focus more fully on my classes because it allows me to live comfortably without having to work too many hours."

Financial support not only helped participants afford more time to focus on their academic goals but also allowed them to spend time socializing. Engineering students have tough study routines. If they have to work for more than they should to make money, they will not have the time to engage in social activities with their peers in the college of engineering and outside family and friends as emphasized by a study participant who wrote, "receiving financial support reduces the time I spend working, which offers more time for studying and socializing, which I believe are equally important and both contribute to my academic success." Financial support enabled them to "work less", and "spend more time with those" the participants cared about while, "diligently seeking educational goals."

Some of the student participants worked in the college of engineering in different part-time roles. They were particularly grateful for these types of opportunities as it not only produced needed financial resources but also helped them enhance their engineering skills working under their course-related job descriptions. One participant who worked in the labs or as a TA wrote this about the importance of working course-related jobs, "I am able to work less and focus on school, and have jobs (such as in labs or being a TA) that enhance my skills in engineering, rather than chasing an irrelevant job that might pay more." Working in an engineering-related job seemed more desirable. It's a win-win situation where they made money out of a job that helped perfect their academic skills.

4.2 Financial Security Decreases Psychological Insecurities

Financial security gained through different financial supports helped students not only find more time to focus on their studies but also helped with their overall MHW by decreasing psychological insecurities caused by financial insecurities. Financial help reduced stress and worrying conditions among the participating undergraduate engineering students which contributed towards psychological security and hence afforded them an emotional state where they could focus more on academic goals and objectives rather than being engulfed by psychological problems.

Decrease in stress. Engineering education is characterized by stress. It is a tense field of study where students might suffer from different mental health problems, including stress which negatively affects their ability to successfully and effectively complete their academic tasks and achieve their academic goals. In this study, many references were made to how the availability of financial support helped reduce participants' stress and allowed them to focus more on their studies with a clear mind. Apparently, working many hours was a source of stress that could be somehow avoided with the availability of financial support as stated by one of the study participants, "having financial support helps me not stress over money and not have to work as many hours during the week, thus giving me more time to study." Signifying the importance of financial support for enhanced learning experiences, one participant wrote, "I have received a good amount of financial support, which has allowed me to be less stressed during my learning experience." While another wrote, "Having financial support allows me to not be so stressed about paying for school, which allows me to focus more on the things I am learning."

Most of the responses dealt with the amount of time left after "not stressing" out to work and investing this time in focusing on studies. Stress is a mental activity that occupies mental faculties in such a way that people with stress will be consumed by stress and though they may look idle, their minds are busy not allowing them to do anything else.

Decrease in worry. Just like stress, worry is another psychological factor that is detrimental to productivity. For engineering students, worrying about financial resources may be a worrisome situation where they want to focus on their studies to achieve academic success but at the same time, they lack or do not have the financial resources to continue with their engineering education. How different types of financial support made the participating engineering undergraduates academically efficacious by reducing their worry can be seen in this participant's response who wrote, "The financial support helps me focus more on my studies. I don't have to worry about how I am paying for school as much." Just like stress, worrying about financial support availability was considered to be detrimental to study focus. Commenting about the relationship between the availability of financial support resulting in a decrease in worry and ultimately causing study focus to elevate several similar comments were made including financial support allowing to: "focus on school only and not have to worry about where money will come from", "the ease of mind to focus on course work and not worry about finances", and "focus on coursework because (the participant) did not need to worry as much about paying for school and keeping a heavy workload year-round."

An interesting response was given by one of the participants who appreciated the existence of financial support that enabled them to worry less about arranging financial resources.

> "Because of a scholarship, I have been able to worry less about how to pay for college and about getting into debt. That being said, it also affects my ability to perform because of added stress to keep that scholarship."

As can be noticed in the comment above, though the availability of financial resources may help lessen worry but may also cause stress to retain these resources. For example, scholarships are a great source of financial support but to hold on to these scholarships, students might need to continuously work hard to maintain a certain level of grades which may be stressful.

4.3 Continuing Engineering Education May Not Be Possible Without Financial Support

It was learned from the above discussion that the availability of financial resources helped the study participants focus more on their academic goals and objectives rather than get stressed and worried about different ways they can arrange these finances. For some student participants, the situation was even worse. For them, the availability of financial resources was a matter of staying in engineering as a student. Financial support was their main source to continue their undergraduate engineering studies. Some of the participating engineering undergraduates made very short and brief statements about the importance of available resources to them, such as: "without financial aid, I would likely not be in this university", "I wouldn't be here if my tuition was not paid (as a research assistant)", "If I didn't have my academic scholarship, I wouldn't be able to go to college", and "financial support makes my academics possible" etc.

While others provided more detailed responses about how financial support from different sources helped them continue their engineering education and how they may not be able to continue their engineering education without it. One of the participants who received 80% scholarship support made the following statement about how it enabled their engineering education.

> "I receive financial aid through the school. I won an 80% scholarship meaning my tuition is not very much. I also received some grants and it has been very helpful to have. Without financial aid, I would not be able to go to college because I don't receive much support from my parents."

Another participant whose engineering education depended on financial support from their spouse believed that this financial support was responsible for their focus and commitment to engineering education wrote the following.

> "At this point, I am not working and we are living on my wife's income. If we did not have her income, this would not have been a consideration for me. I have found that the academic workload in the college of engineering is such that it would be difficult to work much and still be able to focus on schooling at the level I want to."

In all, these responses, participants perceived the availability of one or another form of financial support to be the sole reason they were able to attend the college of engineering. This makes financial support vital and their steady supply utmost necessary to help these participants graduate as engineers.

4.4 Financial Support Comes from Different Sources

As seen in multiple responses stated in the above sections, financial support may originate from a variety of resources. The most prominent type of financial support came from family. It included parents or spouses. Another prominent type of financial support was working as a teacher

or research assistant at the college of engineering. Scholarships such as alumni scholarships and university scholarships were also among the available financial support resources available to the participating engineering undergraduates.

5. Limitations

The primary limitations of this study pertain to the participant sample, potentially impacting the generalizability of the findings. Firstly, the study utilized a convenience sample drawn from the undergraduate engineering student body at the USU College of Engineering. The utilization of convenience sampling may have led to several issues, including a) limitations in the generalizability of results to other contexts, and b) potential bias in results due to the voluntary nature of participation and self-selection among students. Secondly, there was an over-representation of the dominant racial/ethnic group, as the study was conducted within a predominantly historically white institution.

6. DISCUSSION

When students had some type of financial support through family or through scholarships (either from the university or outside) they were able to afford more time for their studies because they did not have to work to financially support themselves. Financial support was perceived to be an important contributor to academic efficacy in addition to the capability of efficiently organizing tasks by the study participants. The socioeconomic status of students has been suggested to positively correlate to academic success [17]. Also, students who receive need-based financial support when compared to those who do not receive such support are reported to have higher levels of academic success [18]. Financial support had several positive implications for the MHW of the participating engineering undergraduates. Working to earn money in either part or full-time ways requires time and dedication. Students in engineering education encounter a shortage of time because their studies are tough and require dedication and time commitment. Studies have indicated that the pursuit of employment for financial gains may have negative implications for academic goal achievement during undergraduate education [19, 20]. The proportion of students who seek part or full-time employment to survive the financial burdens of their studies is at an increase which would leave them with only limited time to complete their academic work [21]. This complements the finding of this study because our participants viewed financial support as a time saver to commit more to their studies and successfully complete their academic tasks.

Financial security was vital to the MHW of the study participants who thought that in the absence of such support, they may have increased levels of worry and stress. Outside research also supports this finding. The detrimental effects of financial insecurity on the MHW of students have been verified by outside studies as well [22]. For example, according to Jones et al. (2018), financial stress contributes to MHW problems in university students [23]. Study participants who had some form of financial security during their undergraduate engineering felt less worried about achieving their academic goals. Usually, the negative meanings attached to university life is dominated by financial worries from the start of it as students see news about the adverse situation of student loans [24]. Moreover, financial support also impacts students psychologically. For instance, it aids in fostering a sense of belonging within the educational institution environment, potentially leading to a higher retention rate [4].

Stress is among the most common fallouts of financial hardship in university students [25, 26], as was suggested by the findings of this study. Because of workload, engineering undergraduates may not have enough energy to even exert financial pressure due to the non-existence of financial support. This may put them under immense psychological pressure and may cause them to distract from their studies. Stress caused by financial burdens has been identified as a reason for students to work less toward achieving their academic goals and hence perform poorly academically [27]. Usually, the cost of higher education (including engineering education) is much higher. Students may engage in employment and remain at their jobs for longer hours. Such situations negatively impact their academic performance. Therefore, it is safe to say that students with adequate financial support enjoy a state of financial security and may not have to suffer from financial stress and hence dedicate more to their studies.

This study showed that financial assistance was crucial for some students as they believed that without it, they may not be able to continue their studies. Studies suggest that students facing financial hardship may be at risk of dropping out of their academic programs. However, financial support in the form of scholarships has been identified as one of the factors that can prevent dropout [3]. Getting admitted to engineering colleges may not be as challenging at first as an initial investment in it may not be as high as compared to its recurring expenses. Yet, for some students from low socio-economic statuses, finances may pose a barrier to even getting enrolled [28, 29]. Students who may come from difficult financial situations may rely on continuous financial support afterward to attain academic success [30]. Financial assistance does not only remove barriers encountered during student enrollment but also helps students to persist with their academics after their enrollment [31]. The reduction in dropout risks due to financial aid available to students has also been reported by Chen (2008) [32].

7. CONCLUSIONS

The availability of some form of financial support is important for undergraduate engineering students to be efficacious in their studies. Available financial support through parents, scholarships, college, and other resources contributed to academic efficacy as they afforded participants more time to focus on their studies without exerting out-of-proportion stress and worry. For some study participants, continuing engineering education without financial support might even have been impossible. Academic efficacy also increased because of task organizational strategies i.e., task prioritizing and to-do lists adopted by the engineering undergraduate participants. Further research may highlight the importance of financial support towards related but different constructs like the sense of belonging, engineering identity, and persistence etc. in undergraduate engineering.

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