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The Moderating Role of the First-Generation Status: Belongingness and Academic Engagement

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The Moderating Role of the First-Generation Status: Belongingness and Academic Engagement

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Dedication

I would like to dedicate this dissertation to my parents, who have given me endless support and love during my graduate school journey.

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Abstract

The Moderating Role of the First-Generation Status: Belongingness and Academic Engagement

by

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With the increasing number of first-generation students' enrollment in recent years, assisting this group of students has been an important topic in recent educational research (see Ives & Castillo-Montoya, 2020 for a review). The purpose of this study was to explore differences in sense of belonging and academic engagement for different definitions of first-generation college students. In addition, my goal was to examine their moderating effects of first-generation status on the relationship between sense of belonging and academic engagement. In this study, first-generation college students were either self-identified or defined in terms of their parents' educational attainment. A grouping variable was also created based on the overlap between the self-identified first-generation students and first-generation college students with neither parents having a bachelor's degree. t-tests were used to compare the differences between first-generation college students and continuing-generation college students on scores representing sense of belonging at course and campus levels and four subconstructs of academic

engagement (i.e., behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement). Using multiple regression models, the moderating effects of different first-generation statuses were tested on the relationship between sense of belonging and academic engagement. This study included 579 undergraduate students from the University of Texas at Austin who participated in a subject pool for course credit. Results from this study indicated that sense of belonging at two levels were positively correlated with four subconstructs of academic engagement. The results also indicated that first-generation college students with different definitions scored differently on variables of sense of belonging at course and campus levels, as well as on four subconstructs of academic engagement. Finally, some moderating effects were found between variables of sense of belonging and subconstructs of academic engagement for different first-generation statuses.

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Chapter 1: Introduction

RESEARCH BACKGROUND

First-generation college students have widely been acknowledged as at a distinct disadvantage in higher education (Chen & Carroll, 2005). For example, they have been found to be less prepared academically for college and have lower academic performance (e.g., Chen & Carroll, 2005; D'Amico & Dika, 2013), more likely to lack social, emotional, and financial support (e.g., Garriott & Nisle, 2018; House et al., 2020; Petty, 2014), and less likely to persist and attain a bachelor's degree (e.g., Engle & Tinto, 2008). With the increasing number of first-generation students' enrollment in recent years, how to help this group of students to overcome the barriers they meet and succeed in college has been an important topic in recent educational research (see Ives & Castillo-Montoya, 2020 for a review).

The definition of first-generation college students varies in current literature (see Toutkoushian et al., 2021 for a review). One of the mainstream definitions by U.S. Department of Education (2016) deems first-generation college students as those whose parents did not attain a college degree. Another popular definition states that first-generation college students are those whose parents did not attend college and they are the first member to attend college in their family (e.g., Auclair et al., 2008). Other than these two definitions, many studies on first-generation college students did not even include a specific definition for them (see Ives & Castillo-Montova, 2020 for a review). The inconsistencies in definitions of first-generation college students are problematic especially when researchers want to generalize research findings across different samples (Kim et al., 2020).

While looking into research about first-generation college students, I found two constructs particularly important for this group of students, namely sense of belonging and academic engagement.

One construct is belongingness. College students embarks on their lives on campus by building connectedness to their college community, which including building relationships with peers, faculty members, and extracurricular activities. Sense of belongingness is critical for college students, as the immersion in college life is one of the most important milestones for college students. According to Strayhorn (2019), sense of belonging in college refers to "students' perceived social support on campus, a feeling or sensation of connectedness, the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the group (e.g., campus community) or others on campus (e.g., faculty, peers)" (p.28-29). Feeling a sense of belonging to college is a crucial dimension of success at college, and can affect students' academic adjustment, achievement, and even their intention to stay in college (Staryhorn, 2019). Due to the importance of sense of belonging for college students, abundant research has been generated to help answer the questions about the influential factors of college students' sense of belonging (e.g., Chiu et a., 2016), and the effect of sense of belonging on academic outcomes and college retention (e.g., Fong Lam et al., 2015; Krause-Levy et al., 2021). For first-generation college students, their sense of belonging is especially essential as they are more vulnerable to the transition from their non-college-educated background to college life. First-generation college students' lack of social and cultural capital about college (Pascarella et al., 2004), and their perceptions of the campus environment (Museus & Chang, 2021) puts them at risk of not forming a sense of connectedness in college life. Additionally, because sense of belonging is socially constructed (Murphy & Zirkel, 2015), first-generation college students' sense of belonging should be examined in terms of a specific context as well, such as the types of colleges (e.g., 4-year institution vs. 2-year institution, public vs. private university).

Sense of belonging is associated with several academic outcomes in higher education, including academic engagement (Soria & Stebleton, 2012). Academic engagement is broadly defined as participation and investment toward studying, learning, and academic activities (Linnenbrink-Garcia et al., 2018). It is found to be an important factor associated with academic achievement, performance, and persistence (Fredricks et al., 2004). For first-generation college students, their involvement in academic activities is especially important for their success in college. As Pascarella and colleague (2004) suggested, they may benefit more from their cognitive engagement in academic work than their non-first-generation college students. Previous empirical studies have found a negative association between first-generation status and involvement and learning (Lundberg et al., 2007), as well as academic and social engagement (Pike & Kuh, 2005). One of the reasons that first-generation students have less involvement in college is the likelihood that they face more financial concerns than other students. Even more, they are less likely to get the financial help they need, as their family background does not guarantee a support in negotiating the financial aid process in higher education (McDonough, 1997). As Engle and Tinto (2008) revealed that first-generation college students are more likely to live and work off campus and study part-time in college, because they are employed more hours, have lower incomes, and have more financial dependents than the non-first-generation peers (Inman & Mayes, 1999). This results in their limited time and behavioral involvement in academic activities and college experiences.

Extensive studies have found a positive link between college belonging and academic engagement (e.g., Gopalan & Brady, 2019; Soria & Stebleton, 2012); however, limited research has examined this relationship focused specifically on the population of first-generation college students. In a recent study, Gillen-O'Neel (2021) found that sense of belonging was positively

related to academic engagement at both person (i.e., trait) and daily (i.e., state) levels. This reveals that sense of belonging, either as a trait or state, can be linked to academic engagement in a positive way. Additionally, her findings suggested that sense of belonging is an important resource for maintaining academic engagement for college students, and the effect is stronger for first-generation students. One limitation of her study, however, is that it was conducted in a small private college. This present study helped to extend this line of research to a larger population of college students in public universities.

STATEMENT OF THE PROBLEM

The ambiguity in the definition of first-generation college students makes it harder to get theoretical and practical inferences from the research findings among this group of students. Given the heterogenous characteristics of first-generation college students (Kim et al., 2020), it is necessary to take different definitions of first-generation college students into consideration when study this population.

PURPOSE OF THE STUDY

This study examined the relationship between sense of belonging and academic engagement among first-generation college students in a large public university. This study also sought to disentangle the influence of various definitions of first-generation college students on this relationship.

SUMMARY

In sum, although there has been research conducted on the experiences and outcomes of first-generation students, there remained questions about the relationship between these factors within a sample of undergraduate students at a large public university. To explore these questions, a cross-sectional study was conducted to examine if the sense of belonging is

positively related to academic engagement at both class and campus levels. Additionally, this study examined if there were stronger associations between sense of belonging and academic engagement for first-generation college students than for their continuing-generation peers. This study also investigated the effects of various definitions of first-generation college students on these relationships. Some demographic factors (i.e., gender, year in college, SES) as well as a motivational trait (i.e., persistence) were included in this study to provide more insights into the relationship between sense of belonging and academic engagement. Research questions were listed below:

1. Do college students with a stronger sense of belonging have stronger academic engagement?
2. Does academic engagement differ by gender, years in college and socioeconomic status? Do students' motivational traits (i.e., persistence) associate with their academic engagement? Does persistence associate with their belongingness?
3. What is the relationship between first-generation status and sense of belonging, academic engagement, and persistence? Do these relationships differ based on different definitions of first-generation college students?
4. Is there a moderating effect of first-generation status on the relationship between sense of belonging and academic engagement?

Chapter 2: Literature Review

In this chapter, I first reviewed the studies on first-generation college students (FGCSs), as well as its relationship with the sense of belonging and academic engagement. Then I reviewed the relationship between the sense of belonging and academic engagement. Lastly, I highlighted the potential moderating role of first-generation college student status in the association between the sense of belonging and academic engagement.

FIRST-GENERATION COLLEGE STUDENTS

Debating Definitions of First-Generation College Students

Research attention has increased substantially on first-generation college students (FGCSs) in the past decades. However, the definition of first-generation college students varies across studies, depending on who is counted as a parent, how many of their parents did not attend college, whether parents started or completed college, and the type of institution attended (Toutkoushian et al., 2021). One of the mainstream definitions deems first-generation college students as students whose parents did not attain a college degree, which is consistent with the definition in the U.S. government's Higher Education Act (U.S. Department of Education, 2016). Parents of first-generation college students within this definition may have some experience of college, but do not persist and complete their college degree. People without college degrees are more likely to have lower incomes and thereby covey this disadvantage to their children (Carnevale et al., 2011). Because of their lower family incomes, such students may have limited financial support throughout their college application and completion.

Meanwhile, other scholars posit different opinions on the definition of first-generation college students. Some broadly state that first-generation college students are those whose parents did not attend college, and they are the first member to attend college in their family (e.g., Auclair et al., 2008; Chen & Carroll, 2005; Engle & Tinto, 2008; Redford & Hoyer, 2017).

The difference between this definition and the previous one lies in whether their parents have any exposure to college experience. Within this definition, first-generation college students are less likely to get support from their parents in their transition to college from high school, and be familiar with academic skills and knowledge that may help them navigate their college life, as neither their parents have enrolled in a college (Auclair et al., 2008).

Other than these two definitions, a systematic review about first-generation college students has revealed that almost half of their included studies did not include a specific definition for first-generation college students (Ives & Castillo-Montova, 2020). The authors found that these studies either broadly defined first-generation college students as students whose parents did not have a college education or were the first in their family to attend college. For students whose parents did not have a college education, this definition of first-generation college students may include those whose parents have some exposure to college students but without a college degree as well as those whose parents no experience in college at the same time. For students who were the first in their family to attend college, this definition generally ignores those whose neither older sibling(s) or relatives in extended family attend college.

The inconsistencies in definitions and the binary constructions of generational status of college students are problematic considering the heterogeneity in first-generation college students and the need to generalize research findings across different samples (Kim et al., 2020; Toutkoushian et al., 2021). Therefore, it is necessary to consider the differences in defining the first-generation college students in studying this group of people, and take other demographic characteristics associated with their first-generation status into account. This study looked into the first-generation college students based on the first two definitions mentioned above, to see if the difference in definitions performed differently in moderating the relationship between sense

of belonging and academic engagement. Additionally, this study specifically investigated the underlying characteristics of first-generation college students in educational contexts, including their gender, year in college, and socioeconomic status, to have a more comprehensive understanding of this group of people as the focus of this study.

First-Generation College Students and Social and Cultural Capital Theory

In recent years, research about first-generation college students has situated the examination of this group of students under the lens of social and cultural capital theory (Bourdieu, 1986; Coleman, 1988; Lin, 1999). Though no consensus has arrived for the definitions of social and cultural capital, scholars acknowledged the importance of social and cultural capital in the field of higher education, especially for first-generation college students (e.g., Almeida et al., 2021; Lundberg et al., 2007; Pascarella et al., 2004; Soria & Stebleton, 2012). For example, in a study examining the effects of socioeconomic and first-generation status on social capital among working class, white male students, Moschetti and Hudley (2008) found significant correlations between social capital variables (i.e., communication with institutional agents, coursework help, and emotional support) and expectations toward the future for first-generation students. This study suggests that social capital may hold more value for first generation students. Therefore, social and cultural capital theory can help to explain the distinct academic experiences first-generation college students have to some extent.

According to Lin (1999), social capital refers "primarily to resources accessed in social networks" (p.471), which highlights the role of social networks in helping individual achieve goals. In college settings, though students can achieve some of their academic goals independent of their social networks, the resources provided by their social networks can tremendously boost their college success, which include their retention in college and getting a college degree (e.g.,

Wittner et al., 2020). For first-generation college students, their parents are among the most important social networks they have prior to their entrance to college. As their parents did not have any college experience or did not attain a college degree, they are more likely to lack the social capital that can help them successfully navigate the college using the tacit information passed down from their parents (Lundberg et al., 2007). When first-generation college students are defined as those whose parents have no bachelor's degree but with some college experience, they may inherit some social capital from their parents in terms of the knowledge and information about the transition to college and its attendance process. In contrast, when first-generation college students are defined as those whose parents have never attend college, they may not be able to get exposed to the social capital that students whose parents have some college experiences have. Therefore, the discrepancy in social capital between students with different parental education levels may further differentiate their academic experiences and outcomes.

Likewise, cultural capital comes along with the concept of social capital as it is transmitted through inherited social capital that necessary for excelling academically in college (Bourdieu, 1986). Lundberg and colleague (2007) referred to cultural capital as the extent to which a person is comfortable and familiar with the norms and dominant culture of the institution. The dominant culture in college expects that students to possess a middle-class cultural capital to succeed academically (Koh et al., 2020), which put first-generation college students at risk as they are less likely to be familiar with the middle-class cultural norms advocated in higher education (Jehangir et al., 2012). Consequently, when I seek to investigate the relationship between first-generation college students and related academic outcomes, social

and cultural capital theory can serve as a theoretical framework to provide predicted directions in these relationships.

First-Generation Status as an Identity

Aside from this traditional definition, in a recent focus group study about how college students make meaning of their first-generation status (Bettencourt et al., 2023), it suggested an alternative way to look into this group of students, by understanding first-generation status as part of students' identity. According to their findings, college students could understand their first-generation status as an identity shaped by institutional and familial contexts, instead of relying on the external categorization of this status (Bettencourt et al., 2023). As college students are in the critical stage of identity formation, their perception of first-generation status may be shaped not only by their parents' educational attainment, but also by their family background, and their experiences in college. For example, the definition by parents' educational attainment may neglect the possibility that some students may have elder siblings or close relatives who go to college before them, while none of their parents have a college degree. They can be identified as first-generation college students by schools, while they may not identify themselves as first-gene. Based on previous literature, little is known how the categorization by parents' educational attainment aligns with students' self-identification of their first-generation status, and how the academic outcomes may differ between these categorizations. This study could help to address this conceptual gap in studying the first-generation college students.

First-Generation College Students at University of Texas at Austin

In studies about first-generation college students, types of their institution have been highlighted in discussing the results specifically (e.g., Longwell-Grice et al., 2016; Tibbettes et al., 2018). Based on a review of three studies about first-generation college students in different

types of institutions, Longwell-Grice and colleague (2016) concluded that the characteristics of first-generation college students differ by school type. In a study about the first-generation students' fit at 2-year colleges, Tibbetts and colleague (2018) found that the first-generation students may feel more culturally matched with 2-year colleges than with 4-year institutions, which could result in fewer belonging concerns when they enroll in 2-year colleges. These findings suggested that the college/university where first-generation college students enrolled in should be specifically examined to provide contextual background for this group of students.

In this study, first-generation college students in University of Texas at Austin (UT) are the focus population. As a 4-year public university, the University of Texas at Austin (Faires, 2021), reports that about one fourth (23%) of all undergraduates are first-generation students, which is much lower than the published percentage (46%) of first-generation students in a typical 2-year public institution (Cataldi et al., 2018).

To support this group of students and help them succeed in college, UT has provided abundant resources and programs for first-generation college students. UT regards first-generation college students as First-Gen Longhorns and designs a website with resources and events specifically for these students. First-Gen Equity program creates a campus community for first-generation students, and the First-Generation Living Learning Community provides first-year Longhorns with access to a network of first-gen peers, faculty and staff to help them better integrate to the university environment. UT also offers scholarships specifically for first-generation students to ease their financial burdens on campus.

In addition to the emphasis on supporting first-generation college students on campus, UT is also known for its diverse cultural background with students from different ethnic and racial groups. According to the official statistics (University of Texas at Austin, 2023b), 34.6%

of students are White, 24.8% are Hispanic, 21.1% are Asian, 5.3% are Black, 2.7% are Multiracial (excl. Black or Hispanic), 0.1% are American Indian or Alaskan Native, 0.1% are Native Hawaiian or other Pacific Islander, and 1.6% are unknown.

This multicultural background on the UT campus may provide possibilities for first-generation college students to experience belongingness to certain groups or communities. Nonetheless, the diverse student population may pose challenges for them to feel connected to a specific group or community. Additionally, considering UT as one of the leading research universities in the U.S., the emphasis on academics may also put some first-generation college students at risk when they feel less academically prepared and need more support from faculties and staffs.

SENSE OF BELONGING AND ACADEMIC ENGAGEMENT

First-Generation College Students and Their Sense of Belonging in College

According to self-determination theory, the need for relatedness or belonging, autonomy and competence are considered as fundamental human needs for individual well-being and functioning (Deci & Ryan, 2008; Ryan & Deci, 2000). Feeling a sense of belonging and relatedness to others can facilitate psychological adjustment and intrinsic motivation (Deci & Ryan, 2008). Belonging has been deemed as a basic human need, which is important to positive cognitive outcomes through interactions with others (Baumeister & Leary, 1995). Despite the universal importance of belonging, it also plays a special role among students in higher education. Empirical studies have found positive links between sense of belonging in college setting and psychological outcomes, such as self-worth (Pittman & Richmond, 2007) and social acceptance (Freeman et al., 2007), as well as academic outcomes, such as grades and academic competence (Pittman & Richmond, 2007).

However, for first-generation college students, their underrepresentation and absence of relevant opportunities on campus can make them feel invalidated, isolated and less belonged to college life (Mangan, 2015). Though previous studies found differences in the levels of sense of belonging between first-generation and continuing-generation college students (Stebleton et al., 2014), limited studies have further conducted research into the differences in the effects of sense of belonging between first-generation and continuing-generation college students on academic outcomes. Pascarella and colleagues (2004) investigated the differences in levels of sense of belonging between these two groups of students and found that first-generation college students tended to benefit more when they experienced sense of belonging.

To study the sense of belonging of first-generation college students, some risk factors have been highlighted in previous research, which include lacking in social and cultural capital and perceived campus environment among this group of students (Museus & Chang, 2021; Pascarella et al., 2004).

Risk factors of forming a sense of belonging for first-generation college students. First-generation college students have been identified as lacking in social and cultural capital into college life (Pascarella et al., 2004), which suggests that first-generation college students may be disadvantaged in transition to college life that requires them to have some understanding of the cultural and socioeconomic attainment in higher education. This in turn, may hamper their decision-making for informed choices about college (i.e., degree plans, credit hours per semester), as well as their feelings of relatedness to others in college. For example, a first-generation college student whose parents have never attended college may not be familiar with the benefits of extracurricular activities in college, hence they may be less likely to engage in these activities that can help them build social connections with peers and college community. In

addition, first-generation college students are more likely than their continuing-generation peers to enroll in college part-time and live off-campus (Engle & Tinto, 2008; Pascarella et al., 2004)), which reduces their time on campus as well as with peers, and in the long term, may hinder their formation of relatedness/belonging to college life.

In a study about the impact of campus environment on sense of belonging for first-generation college students, Museus and Chang (2021) tested the structural model that included four factors related to perceived campus environment (i.e., common ground, learning activities, relevant community service, collectivist orientations), a mediator (validation), and the outcome variable (sense of belonging) in a four-year public research university. They found that perceptions of greater collectivist orientations (access to people with whom they share common backgrounds and experiences) had the strongest direct effect on students' sense of belonging, followed by validation of their backgrounds and identities, and relevant service that allow them to give back to their communities. Their findings indicated a positive link between the perceptions of relevant and responsive environment and sense of belonging among first-generation college students. For this group of students, their sense of belonging will be hindered if they perceive less commonness with campus communities, feel more alienated from their family communities, and get less validation of their identity as first-generation students.

Studying the possible differences between first-generation and continuing-generation college students in terms of their perceptions of sense of belonging may help to deepen the understanding how campus environment, social and cultural capital of college students impacts their sense of belonging.

Situating the sense of belonging at different contexts. In a national study about college students' sense of belonging, first-generation college students are found to have lower belonging

than their non-first-generation peers at 4-year institutions, while have higher belonging than their non-first-generation peers at 2-year institutions (Gopalan & Brady, 2019). Consequently, to help first-generation college students optimize their academic outcomes and achieve success in college, it would be beneficial to specify the types of school they feel belong to in study. In this study, I focused on the first-generation college students in a 4-year public university, where first-generation college students might experience more obstacles than those at smaller institutions due the size of the university (Stebleton & Soria, 2012).

As most people are exposed to multiple contexts, researchers indicated that we need to specify the context if we want to get a comprehensive understanding of sense of belonging (Osterman, 2000). When situating the sense of belonging into the educational context, it gets more complicated as the sense of belonging relies heavily on students' perception of the educational environment. Therefore, a student's sense of belonging is socially constructed (Murphy & Zirkel, 2015). For example, a college student's need to belong can be different if it is situated in different settings. Students' sense of belonging to a specific classroom is found to be shaped by their relationship with instructors and classmates, the goal orientation of that specific class, and even their perceived task values of the class (Anderman, 2003). When extending the context to the campus level, students' sense of belonging is found to be related to sense of social acceptance, and professors' pedagogical caring (Freeman et al., 2007). For first-generation college students, their sense of belonging should also be situated in a specific setting. For example, their connections to instructors and classmates may be limited if they have more off-campus responsibilities, hence their sense of belonging to a specific class may be hindered with the barriers set by their first-generation status. Likewise, their perceptions of university belonging may be different than their non-first-generation peers, as they are more likely to feel

more like an outsider with the limited social and cultural capital inherited from their parents (Pascarella et al., 2004).

First-Generation College Students and Their Academic Engagement in College

Academic engagement, or school engagement, defined as the extent to which students are committed to and involve in the curriculum and other school activities (Glanville & Wildhagen, 2007), has been studied to explain the academic motivations, emotions, and achievement (Fedricks et al., 2004; Newman et al., 1992). Some studies suggest that higher academic engagement is related to higher academic achievement and higher retention rate, especially among disadvantaged minority students (Connell et al., 1994; Finn & Rock, 1997). First-generation college students have been widely studied in terms of the barriers they faced for their college persistence and retention (D'Amico & Dika, 2013). Therefore, academic engagement is an important topic when exploring ways to help first generation students achieve academic success.

Scholars of academic engagement have debated the dimensionality of this construct, and many have supported the three-dimension approach to studying engagement in educational context, which divides engagement into behavioral engagement, emotional engagement, and cognitive engagement (e.g., Appleton et al., 2008; Fredrick et al., 2004). This study will focus on behavioral engagement, emotional engagement, cognitive engagement as well as agentic engagement when talking about the academic engagement, which reflects participation and investment in college education (Fredrick et al., 2004). The examination of these four forms of engagement can help to understand the dynamics of learning in college.

Limited involvement in academic and social or extracurricular activities is prevalent for first-generation college students, as Pascarella and colleague (2004) found that they completed

significantly fewer credit hours and work significantly more hours per week than other students. Higher working responsibilities of first-generation college students may be a reason that explains their less behavioral engagement than their peers. Additionally, Pascarella and colleague (2004) stated that first-generation college students tended to get more educational benefits from engagement in academic or classroom activities. They found that measures of academic effort and involvement had more positive effects on cognitive outcomes (i.e., critical thinking, writing skills, openness to diversity, learning for self-understanding, internal locus of attribution for academic success, preference for higher-order cognitive tasks, and degree plans) for first-generation college students than for other students. This suggests that first-generation college students may benefits more from their academic experiences than their continuing-generation peers as their cognitive engagement in academic work have greater influences on their accumulation of social capital.

In a research project focusing on the college success for first-generation students, Engle and Tinto (2008) found that first generation students were less likely to be socially and academically engaged to achieve success in college. For example, first-generation students were less likely to study in groups, interact with faculty and other students, participate in extracurricular activities, and use support services on campus. They argued that this may be due to that these students were more likely to live and work off-campus and spend limited time on campus to meet their financial needs. The financial barriers for the first-generation students may further hinder their active engagement in academic and social life in college. This provided additional support for Pascarella and colleague (2004)'s statement that first-generation college students may lack social capital that can help them make beneficial decisions in terms of academic engagement to achieve academic success in college.

Soria and Stebleton (2012) also examined the differences in academic engagement between first-generation students and non-first-generation students. They found evidence that first-generation student reported lower academic engagement in class than their continuing-generation peers during the first year of college. Their measure of academic engagement included the frequency with which they contributed to a class discussion, asked an insightful question in class, brought up ideas or concepts from different courses during class discussion, and interacted with faculty during lecture class sessions, which mainly fall into the categories of behavioral and cognitive engagement.

Studies on the Relationship between Sense of Belonging and Academic Engagement in Higher Education

The concept of sense of belonging can be interpreted at different contextual levels (Freeman et al., 2007; Stebleton et al., 2014). Extensive studies on sense of belonging have been focused on students in younger age, while limited studies have examined this construct among college students. Slaten and colleague (2014, 2016) suggested that sense of belonging to school looks different at the university level than at the school-age level. Consequently, it should be interpreted with caution when applying previous study results about sense of belonging in schools to the college level. Considering the cultural diversity of college students, study on sense of belonging at college should be more culturally sensitive (Guiffrida, 2006), especially when focusing on a specific group of college students in study.

Previous studies found that college students' sense of belonging is associated with adaptive academic outcomes, including better persistence and engagement (Gopalan & Brady, 2019; Soria & Stebleton, 2012), as well as academic task values, self-efficacy, and personal intrinsic motivation (Freeman et al., 2007). In a study focusing on the links between multi-level

belonging (classroom-level and campus-level) and forms of academic engagement (behavioral and cognitive engagement) among STEM undergraduates across five institutions in U.S., Wilson and colleague (2015) found that classroom belonging was most consistently linked to both behavioral and cognitive engagement in STEM coursework. Greater class belonging was linked to higher levels of participation and less negative emotional engagement. Their findings also highlight the importance of considering contextual variations that can shape the sense of belonging and its relationship to engagement. To better understand college students' sense of belonging, it is necessary to specify the context they feel connection to in research methods.

Persistence. In the search of literature about my topic, I found one motivational trait that was particularly related to sense of belonging and academic engagement. This motivational trait was persistence, or viewed as one indicator of regulation of motivation in this study. Regulation of motivation, as one essential aspect of self-regulated learning, is especially relevant in the higher education contexts (Pintrich, 2004)). As students enter college with increased academic demands, personal and social freedoms and responsibilities, as well as an emphasis on independence, this might present additional challenges to students' motivation and engagement. Given the motivational challenges students might encounter in college, regulating motivation could have a critical influence on their learning and academic achievement (Kim et al., 2018). Previous studies have found the critical role of self-regulated learning in students' academic engagement (e.g., Wolters & Taylor, 2012). In a review of the relationship between self-regulated learning and academic engagement, Wolters and Taylor (2012) suggested that a conceptual overlap between the cognitive aspects of self-regulated learning and cognitive engagement. In general, self-regulated learners, or learners with persistence are described as highly motivated individuals who actively use cognitive and metacognitive strategies to meet

their academic goals (Won et al., 2018). Empirical findings also revealed that when people had more regulatory strategies about motivation to overcome challenges in learning, they were more likely to engage in academic activities (e.g.,Wolters et al., 2023).

In terms of the relationship between self-regulated learning and first-generation status, a previous study found that first-generation college students differed in using the self-regulated learning strategies than their continuing-generation peers, and they had significantly lower scores in interest in coursework and academic success than continuing-generation college students (Antonelli et al., 2020). This indicated that first-generation college students might differ from continuing-generation college students in terms of their self-regulated learning. Taken together, persistence, as an indicator of self-regulation of motivation, could have a confounding effect on the moderation model in this study. To determine if it should be included in the moderation analysis, relationships between persistence, academic engagement, and first-generation status would be examined in the research questions.

Demographic factors. In previous studies, some demographic factors have been specifically investigated in relation to academic engagement. For example, in a study about the relationship between gender and student engagement in college, Kinzie and colleague (2007) found that female students participate more frequently than male students in educationally purposeful activities (e.g., spend time preparing for class, work up to one's potential in meeting instructor's standards, and complete challenging assignments). This study suggested that gender differences might exist for students' academic engagement, which highlighted the importance of considering gender as an influential factor for studies about academic engagement. A study on the undergraduate students in India also found significant differences in academic engagement based on year of study and genders (Karki et al., 2020). Wang and Eccles (2013) conducted a

longitudinal study of school engagement on middle school students, and they added socioeconomic status, gender, and race/ethnicity as controlling variables when studied the relationship between achievement motivation and school engagement to control for the effects of these demographic factors on school engagement. This altogether supported the importance that these demographic factors should be included in studying the academic engagement as an outcome variable.

Why Study the Role of First-Generation Status in the Relationship between Sense of Belonging and Academic Engagement

Aside from their findings about the relationship between first-generation students and academic engagement, Soria and Stebleton (2012) also noted that students' sense of belonging was positively associated with academic engagement. Though they did not investigate the interaction effect of sense of belonging and first-generation status on ~~the~~ academic engagement, they suggested that first-generation students tend to benefit significantly from involvement in high-impact educational practices, such as high-impact practices as involving in learning communities (Kuh, 2008) can have increased enhancement for first-generation students' academic engagement. Therefore, it would be meaningful to take a further step into Soria and Stebleton (2012)'s findings and investigate the moderation effect of first-generation status on the relationship between sense of belonging and academic engagement.

A recent study by Laajala-Lozano and Jenkins (2022) examined the interaction effect of first-generation status and gender on academic acculturative stress. Though the focus of their study was on the gender-differentiated analysis among the first-generation students, their research provided some insights into the possible moderating role the first-generation status plays on the relationship between some social, emotional, and cognitive factors in higher

education. In a study focused on the relationship between sense of belonging and psychological adjustment by Pittman and Richmond (2007), they explored the moderating effect of parental education (i.e., have college degree, some college experience, and no college degree) on this relationship and found some differences in the effect of parental education on the relationship between high school belonging and some psychological adjustment factors. Though no significant moderating effect was found on the relationship between university belonging and positive outcomes in their study, it can be inferred that first-generation status can be a possible moderator on the relationship between sense of belonging and academic outcomes. With scarce findings in the current literature about moderating role of first-generation students in educational research, this study can help to fill in the gap in this area.

Gillen-O'Neel (2021) conducted a study on the relationship between sense of belonging and student engagement (i.e., emotional and behavioral engagement) at both person and daily levels and used a first-generation status differentiated analysis on this relationship. Consistent with previous research findings, students' sense of belonging was positively associated with academic engagement at both levels, and first-generation college students reported marginally lower level of sense of belonging. Interestingly, she found that first-generation college students were especially sensitive to day-to-day fluctuations in sense of belonging, and the sense of belonging is an especially important resource for maintaining academic engagement among first-generation college students. However, she did not find the moderating effect of first-generation status on the average sense of belonging and academic engagement. One possible reason could be that she collected data from a small private college that all students were required to live on campus and mostly being employed on campus, which might counteract the effect of lack of belonging on academic engagement many first-generation students experienced in a public

university. As this study collected data in a 4-year public university, it could help to extend the findings from Gillen-O'Neel (2021) to more generalized types of institutions.

Chapter 3: Examining the Moderation Effect of First-Generation College Student Status on the Relationship between Sense of Belonging and Academic Engagement

CONTRIBUTION OF CURRENT STUDY

This study sought to answer questions related to first-generation college students, their sense of belonging, and academic engagement with an examination of these constructs in a public 4-year university. There would be several contributions of conducting this study.

First, with limited research that differentiates the definitions of first-generation status in studying this group of students and investigating its impact on educational outcomes, this study could help to fill the conceptual gap in understanding the consequences of defining first-generation students differently on sense of belonging and academic engagement specifically. Recognizing the heterogeneous characteristics of first-generation college students could help institutional administrators and policymakers to be more specific about their target population in designing intervention programs that further help them succeed in higher education.

Second, though Gillen-O'Neel (2021) investigated the moderating role of first-generation status on the relationship between sense of belonging and academic engagement, her finding could only be applied to the population in small private colleges that cannot be generalized to students in public universities, which constitutes the majority in higher education. As this study collected data in the University of Texas at Austin, a four-year public university, results and findings could have more practical meanings for administrators and policymakers in large public universities.

Finally, this study measured students' sense of belonging at coursework level as well as at the campus level. Previous research investigated the sense of belonging mainly at campus

level or school level (see Slaten et al. 2016 for a review), few researchers have paid attention to the sense of belonging in a more micro-level, such as in a classroom level (e.g., Freeman et al., 2007; Wilson et al., 2015). As Wilson and colleague (2015) revealed in their analysis, college students' sense of belonging was more consistently linked to academic engagement in coursework at classroom level, but not at campus level. By adding the specific measurement of sense of belonging in this study, it helped to expand the knowledge about how sense of belonging to coursework and their campus influence first-generation college students' academic engagement, considering the social and cultural capital entitled by their first-generation status.

RESEARCH QUESTIONS AND HYPOTHESIS

Research Question 1: Do students with a stronger sense of belonging have greater academic engagement?

Hypothesis 1: Based on previous research findings, I hypothesized that positive and significant associations between sense of belonging at the campus and classroom levels, and four subconstructs of academic engagement, namely behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement.

Research Question 2: Does academic engagement differ on genders, year in college and socioeconomic status? Do students' motivational trait (i.e., persistence) associate with their academic engagement?

Hypothesis 2: I hypothesized that academic engagement differed by gender, with female students have higher academic engagement. I also hypothesized that academic engagement increased with more years of study in college, and higher socioeconomic status levels was associated with higher academic engagement. I expected that students with a higher level of persistence had a higher level of academic engagement. As the academic engagement was

measured by four subconstructs (i.e., behavioral, agentic, cognitive, and emotional) in this study, the associations between these demographic factors and subconstructs were hypothesized to have the same direction of association between these demographic factors and academic engagement as a holistic construct. Additionally, I hypothesized that students' persistence was positively associated with academic engagement.

Research Question 3: What is the relationship between first-generation status and persistence, sense of belonging and academic engagement? Do these relationships differ based on different definitions of first-generation college students?

Hypothesis 3: Based on the literature review, I expected first-generation college students to have less sense of belonging and academic engagement than the continuing-generation college students to their coursework and campus. I hypothesized that the means of sense of belonging at the coursework and campus level, as well as the means of all subconstructs of academic engagement (i.e., behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement) were significantly different between first-generation college students and continuing-generation college students. The first-generation college students were expected to have lower mean values in terms of their sense of belonging at both the course and campus levels, and academic engagement. I also hypothesized that these relationships might differ based on different definitions of first-generation college students.

Research Question 4: Does first-generation college student status moderate the relationship between the sense of belonging and academic engagement?

Hypothesis 4: I hypothesized that the status of first-generation college students (FGCSs) had a moderation effect on the relationship between sense of belonging and academic engagement, regardless of the different definitions of first-generation college students. In the

moderation analysis, I expected that the regression coefficient for the interaction term of sense of belonging would be significant. This meant that the effect of sense of belonging on academic engagement would be statistically different for first-generation college students (FGCSs) and non-first-generation college students (non-FGCSs). By doing post hoc probing following the moderation analysis, I expected the effect of sense of belonging on academic engagement would be stronger for first-generation college students (FGCSs) than non-first-generation college students (non-FGCSs) based on findings from Gillen-O'Neel (2021).

METHOD

Participants and Procedure

Participants were undergraduate students from the University of Texas at Austin. They were recruited in Spring 2023 from the Educational Psychology (EDP) subject pool. Students participated in the subject pool to fulfill their course requirement in EDP. These students came from different schools and colleges at UT Austin, such as McCombs School of Business, LBJ School of Public Affairs, College of Natural Sciences, and Moody College of Communication, and could be a reasonable representation of the university population. Once they registered for this study and signed the consent form, they were asked to complete an online survey. This survey lasted for about 45 minutes, mostly consisting of Likert-scale questions, and asked participants to provide their responses to measures of sense of belonging, academic engagement as well as their demographic information.

The data collection ended after the closure of the EDP Subject Pool, which resulted in a total of 652 cases in record. Prior to my data analysis, all collected data were anonymized and checked for completeness. Participants were required to answer all the survey questions, but they could quit taking the survey at any time. Accordingly, some partial responses were recorded as

evidence of attrition. There were sixty cases without complete responses. Among these cases, twenty-six respondents only consented to participate in this study but did not proceed to answer the following survey questions. Five only answered questions about the identification of a specific course, four only partially answered questions about sense of belonging at coursework level before they stopped, five stopped taking the survey before they got to the questions about motivation, fourteen stopped before they got to the questions about sense of belonging at campus level, and six partially answered questions before they were asked about their demographic information.

Therefore, as these respondents did not provide the key information about their first-generation college student status, a total of 60 cases of attrition were excluded from further analysis. Among the remaining 592 responses, twenty-five participants did not answer the last question, which asked them to provide their university ID for accreditation purpose. As they provided all the essential information needed for data analysis, their responses were included for further analysis. As a result, the final sample consisted of 592 participants with complete answers to all required questions.

Measures

Socioeconomic status. Students were asked to self-identify their socioeconomic status by choosing a number on the rung (as a ladder) to represent what they thought they stand at this time in their life, relative to other people in the United States. They were instructed that those who at the top of the ladder (with larger score on the rung) were people who were better off – those who have more money, more education, and more respected jobs, and those who at the bottom of the ladder (with smaller score on the rung) were people who were worse off –those

who had less money, less education, and less respected jobs or no job. The range of numbers on the rung were 1-10, as 1 represented the bottom and 10 represented the top.

First-generation Status – Self-identified. Students were also asked to self-identity their first-generation status. If they self-identified as a first-generation college student, they would be able to check the "first-generation college student" when asked about their status in college. Students who self-identified as a first-generation college student were coded as 1, and the others were coded as 0.

First-Generation Status – Parents' Educational Attainment (no bachelor's degree). Students were asked about their parents' education levels separately for their father and mother. Each question asked them about the highest education completed by their father/mother, and they could choose from less than high school graduation, high school graduation, some college, associate's degree, bachelor's degree, master's degree, and doctoral degree.

When the first-generation college student was defined as those whose parents did not get a bachelor or 4-year degree, participants were coded as first-generation college students (1) if both of their parents had less than bachelor or 4-year degree, and they were coded as continuing-generation college students (0) if either of their parents had at least a bachelor's degree or more.

First-Generation Status – Parents' Educational Attainment (no college experience).

When the first-generation college student was defined as those whose parents did not have any college experience, participants were coded as first-generation college students (1) if neither of their parents having education beyond high school diploma, and they were coded as continuing-generation college students (0) if either of their parents having educational experience beyond high school diploma.

Sense of Belonging/Fit. Sense of belonging was measured at both course and campus levels to capture the differences of contextual influence on this construct.

Sense of Fit at Couse Level. The 10-item measurement was adapted from the scale used by Walton and colleague (2015) using a 7-point Likert scale (1=strongly disagree, 7=strongly agree). One example item is: "I feel comfortable in this class". Three items were reverse coded, and one of them is: "I feel alienated from this class.". Walton and colleague (2017) showed that this 10-item scale is sufficiently reliable with a Cronbach's alpha of .87. All ten items were averaged to form a composite score for the sense of fit at course level.

Sense of Fit at Campus Level. Twelve items were used to measure the sense of fit at campus level. These items were adapted from the Subject Sense of Fit Scale used by Phillips and colleague (2020), which measured students' comfort being themselves in the college environment as well as their sense of compatibility with the values that are common at their university on a 7-point Likert Scale (1=strongly disagree, 7=strongly agree). One example item is: " I feel like I belong as a students at UT." Two items were reverse coded, which included " I have become a different person to fit in at UT." According to Phillips and colleague (2020), these items were reliable as a scale with an overall Cronbach's alpha of .65 and .82 measured at two time points. In this study, all items were averaged to form a composite score for the sense of fit at campus level.

Academic Engagement. Academic engagement was measured by participants' self-report of behavioral, agentic, cognitive, and emotional engagement in academic activities in college. This 22-item scale were adapted from the scales used by Reeve and Tseng (2011), with five items measuring behavioral engagement, five items measuring agentic engagement, eight items measuring cognitive engagement and four items measuring emotional engagement. One

example item of *behavioral engagement* is: “I work hard when we start something new in class”. One example item of *agentic engagement* is: “During class, I express my preferences and opinions”. One example item of *cognitive engagement* is: “When I study, I try to connect what I am learning with my own experiences”. One example item of *emotional engagement* is: “When we work on something in class, I feel interested”. Participants will be asked to respond to these items using a 7-point Likert scale (1=strongly disagree, 7=strongly agree). According to Reeve and Tseng (2011), each subscale of academic engagement had sufficient internal reliabilities, with behavioral engagement having a Cronbach’s alpha of .94, agentic engagement having a Cronbach’s alpha of .82, cognitive engagement having a Cronbach’s alpha of .88, and emotional engagement having a Cronbach’s alpha of .78. The scores were averaged within each subscale to form four composite scores representing four subconstructs.

Persistence. Persistence was measured by 12 items adapted from the Brief Regulation of Motivation Scale (Kim et al., 2018). This scale assessed students perceived general tendency to engage in regulation of motivation in response to a variety of motivational challenges in academic activities using a 7-point Likert Scale (1=strongly disagree, 7=strongly agree). Considering the connection between self-regulated learning and academic engagement and success in previous research (e.g., Pintrich & Zushuo, 2007), it is reasonable to include the measurement of this construct in this study to control for its effect on the outcome variable. One example item for this scale is: “I use different tricks to keep myself working, even if I don’t feel like studying”. All items were averaged to form a composite score for the persistence.

Data Analysis Plan

This study used three types of data analysis to answer the research questions: descriptive analyses, factor analyses, and moderation analyses. All the descriptive data analysis were

conducted using R Studio (R Studio Team, 2020), which was performed prior to the moderation analysis to test the first three hypotheses under the first three research questions. For every test of significance, an alpha level of .05 was used.

First of all, descriptive analyses were performed to describe participants' demographic information and their responses to all variables. Means of standard deviations were calculated for participants' demographic information, including their age and socioeconomic status, as well as for their responses to all items that were part of scales. Frequency tables were also provided to examine the characteristics of participants' gender, race/ethnicity group, year in college, and first-generation status. Additionally, bivariate correlations were computed to describe internal consistencies between all observed variables, and reliabilities were measured by obtaining the Cronbach alphas of each variable. Before running analysis on the observed variables, I tested whether the collected data met a set of assumptions for further analysis. For example, I got skewness/kurtosis statistics and Kolmogorov-Smirnov test statistics for normal distribution assumption and ran Bartlett's test for the homoscedasticity assumption. The results of these tests did not indicate any serious problems that violate the assumptions to run the analysis in the next step.

As the first-generation status was the focus of this study, more descriptive analysis was conducted on the different definitions of first-generation college status. Crosstabulation were created to show more information about the within-group differences of first-generation and continuing-generation college students in terms of their gender, race/ethnicity groups, and year in college. I also ran a chi-square test to examine the association between various definitions of first-generation college status. After displaying the crosstabulation between the self-identified first-generation status and first-generation status defined as neither parent having a bachelor's

degree (the definition used by UT Austin), one new grouping variable was created for the overlapping first-generation college students and their continuing-generation peers.

Then, to test the group differences of all observed variables based on participants' first-generation college student status, I ran *t*-tests to compare the group means between first-generation and continuing-generation college students on all the variables. These *t*-tests were conducted separately for four definitions of first-generation college students.

I also conducted a factor analysis on the construct of academic engagement using confirmatory factor analysis to see if I needed to retain the four-factor model in the next-step analysis. The four-factor model included behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement as four factors. The Maximum Likelihood (ML) algorithm was employed for parameter estimation. Model fit indices (i.e., chi square difference test, CFI, RMSEA, and SRMR) were calculated, and a path diagram was provided to help determine if the four-factor model should be retained.

For the moderation analysis, the interaction terms were created for variables related to sense of belonging and variables related to first-generation status. These interaction terms were included in the regression model with each of the four variables related to sense of belonging (i.e., sense of belonging at course level, sense of fit at course level, sense of belonging at campus level, sense of fit at campus level), each of first-generation statuses, and each of the four variables related to academic engagement (i.e., behavioral engagement, agentic engagement, emotional engagement and cognitive engagement). According to a review by Tinto (1975), student's attributes and family background have an impact on their academic performance. Therefore, demographic information should be taken into consideration when studying the relationship between sense of belonging and academic engagement. Selective demographic

factors (i.e., gender, age, SES) were entered into this regression model to control for their influence on the moderating effect of first-generation status.

RESULTS

Descriptive Statistics

Table 1. provides the descriptive statistics for age, gender, race, year in college and socioeconomic status of the participants. As shown in Table 1, more than half of the participants (mean age = 20.52) were in junior or senior years. More female students (59%) than male students (39%) were included in this study, which reflects the gender percentages (female: 56%; male: 44%) within the university population (The University of Texas at Austin, 2023b). As there were 13 respondents indicated their gender as "Other", their responses were excluded from the further analysis as the biological sex would be the only focus in this study, leaving a total of 579 responses. The distribution of different racial and ethnic groups indicated that the Caucasian/European American group was the largest, constituting 32% of the sample, followed by the Hispanic American/Latino/Chicano group, representing 25% of the sample, and the Asian American group, with 23% of the sample. The percentages of each racial and ethnic group in this sample reflected their presence in the broader university population (White: 34.6%; Hispanic: 24.8%; Asian: 21.1%; Black: 5.3%; Multiracial: 2.7%; American Indian or Alaskan Native: 0.1%; Native Hawaiian or other Pacific Islander: 0.1%; Unknown: 1.6%).

In this sample, first-generation status was identified using four methods. One method involved self-identification by participants, which resulted in 140 first-generation college students. The second method involved their parents' educational attainment. Specifically, the first-generation college students were defined as those with neither parent getting a bachelors' degree, which was also the definition used by UT Austin. Using this definition, 162 participants

were identified as first-generation college students. The third method also involved their parents' educational attainment, but with a different definition. In this method, first-generation college students were defined as those with neither parent attending college. Using this definition, 104 participants were identified as first-generation college students. To explore the first-generation college students more in detail, I also created a new variable to group first-generation and continuing-generation college students. This grouping variable defined first-generation college students as those who self-identified as first-generation college students as well as those defined by University of Texas at Austin as neither parent having a bachelor's degree (see Table 6). In other words, the first-generation college students in this variable were the overlapping first-generation college students by two definitions, which included 113 first-generation college students. Crosstabulations were also created for this first-generation grouping variable by demographic variables (see Tables 2-4).

University of Texas at Austin identifies the first-generation college students as students whose parents or guardians have not had the opportunity to complete a bachelor's degree in the U.S., and students whose parents have degrees from outside of the U.S. are also considered as first-generation college students (University of Texas at Austin, 2023a). According to the statistics from UT News (Faires, 2021), almost one fourth (23%) of all undergraduates are first-generation students in Fall 2021. In this study, the percentage of first-generation college students with neither parent having a bachelor's degree (28%) was slightly higher than that reported by the university, while the percentage of self-identified first-generation college students (24%) was closer to that reported by the university.

Table 1

Descriptive Statistics of Demographic Factors

Variables	Number	Percentage (n=579)	Mean	S.D.
Gender				
Male	229	40%		
Female	350	60%		
Race				
African American/Black	39	7%		
Hispanic American/Latino/Chicano	149	26%		
Native American	1	0.002%		
Asian American	133	23%		
Caucasian/European American	178	31%		
Middle Eastern/Arab American	7	1%		
Biracial/Multiracial	54	9%		
Other**	18	3%		
Year in College				
Freshman	106	18%		
Sophomore	120	21%		
Junior	168	29%		
Senior	173	30%		
Other***	12	2%		
FG Status				
FG-Self ID	140	24%		
Else	439	76%		
FG-Parents ED1	162	28%		
Else	417	72%		
FG-Parent ED2	104	18%		
Else	475	82%		
FG-Overlap	113	20%		
Else	466	80%		
Age			20.52	1.90
SES			6.48	1.74

Note. FG-Self ID: self-identified first-generation college students; FG-Parents ED1: first-generation college students with neither parent having a bachelor's degree; FG-Parent ED2: first-generation college students with neither parent having college experience; FG-Overlap: first-generation college students who were self-identified as well as with neither parent having a bachelor's degree; Else: Continuing-generation college students

*Gender-Other included: Gender non confirming, non-binary, trans man, and Genderfluid.

**Race-Other included: Asian, Mediterranean, White and Jamaican, Samoan, and European.

***Year in college-Other included: Graduate student, and 5th year.

First-Generation College Students

The distribution of first-generation college students by their year in college was shown in Table 2, and Table 3 presents the distribution of first/continuing students by racial and ethnic groups. As shown in Table 3, about half of the self-identified first-generation college students were Hispanic American, while continuing-generation college students were overwhelming Caucasian American. Hispanic Americans only consisted of less than one fifth of the continuing-generation college students. The percentages of gender within the self-identified first-generation college students were slightly different from those within the continuing-generation college students, with higher percentage of female students in the self-identified first-generation status than those in the continuing-generation status.

Table 2

First-Generation Status by Year in College

First-Generation Status	Freshman	Sophomore	Junior	Senior	Other	Total
FG-Self ID	24	27	37	49	3	140
	16%	18%	27%	36%	2%	100%
Else	82	93	131	124	9	439
	19%	21%	30%	29%	2%	100%
	Freshman	Sophomore	Junior	Senior	Other	Total
FG-Parent	27	36	45	51	3	162
ED1	16%	23%	28%	32%	2%	100%
Else	79	84	123	122	9	417
	19%	20%	29%	30%	2%	100%
	Freshman	Sophomore	Junior	Senior	Other	Total
FG-Parent	18	22	30	33	1	104
ED2	17%	21%	29%	32%	1%	100%
Else	88	98	138	140	11	475
	19%	21%	29%	29%	2%	100%
	Freshman	Sophomore	Junior	Senior	Other	Total
FG-Overlap	20	23	27	41	2	113
	18%	20%	24%	36%	2%	100%
Else	86	97	141	132	10	466
	18%	21%	30%	28%	2%	100%

Note. FG-Self ID: self-identified first-generation college students; FG-Parent ED1: first-generation college students with neither parent having a bachelor's degree; FG-Parent ED2: first-generation college students with neither parent having college experience; FG-Overlap: self-identified first-generation college student with neither parent having a bachelor's degree.

Table 3

First-Generation Status by Race/Ethnicity

Status	African American	Hispanic American	Native American	Asian American	Caucasian American	Middle Eastern American	Multiracial American	Other	Total
FG-Self ID	10 7%	68 49%	1 1%	32 23%	9 6%	--	16 11%	4 3%	140 100%
Else	29 7%	81 18%	--	101 23%	169 38%	7 2%	38 9%	14 3%	439 100%
Status	African American	Hispanic American	Native American	Asian American	Caucasian American	Middle Eastern American	Multiracial American	Other	Total
FG-Parent ED1	15 9%	75 46%	--	34 21%	16 10%	--	19 12%	3 2%	162 100%
Else	24 6%	74 18%	1 0.2%	99 24%	162 39%	7 2%	35 8%	15 4%	417 100%
Status	African American	Hispanic American	Native American	Asian American	Caucasian American	Middle Eastern American	Multiracial American	Other	Total
FG-Parent ED2	5 5%	60 58%	--	19 18%	3 3%	--	15 14%	2 2%	104 100%
Else	34 7%	89 19%	1 0.2%	114 24%	175 37%	7 1%	39 8%	16 3%	475 100%
Status	African American	Hispanic American	Native American	Asian American	Caucasian American	Middle Eastern American	Multiracial American	Other	Total
FG-Overlap	7 6%	59 52%	--	22 19%	7 6%	--	14 12%	3 3%	113 100%
Else	32 7%	90 19%	1 0.2%	110 24%	171 37%	7 1.5%	40 8.5%	15 3%	466 100%

Note. FG-Self ID: self-identified first-generation college students; FG-Parent ED1: first-generation college students with neither parent having a bachelor's degree; FG-Parent ED2: first-generation college students with neither parent having college experience; FG-Overlap: self-identified first-generation college student with neither parent having a bachelor's degree.

Table 4

First-Generation Status by Gender

Status	Male	Female	Total
FG-Self ID	50	90	140
	34%	62%	100%
Else	179	260	439
	40%	58%	100%
	Male	Female	Total
FG-Parent ED1	60	102	162
	36%	61%	100%
Else	169	248	417
	40%	58%	100%
	Male	Female	Total
FG-Parent ED2	37	67	104
	36%	64%	100%
Else	192	283	475
	40%	60%	100%
	Male	Female	Total
FG-Overlap	37	76	118
	31%	64%	100%
Else	192	274	474
	41%	58%	100%

Note. FG-Self ID: self-identified first-generation college students; FG-Parent ED1: first-generation college students with neither parent having a bachelor's degree; FG-Parent ED2: first-generation college students with neither parent having college experience; FG-Overlap: self-identified first-generation college student with neither parent having a bachelor's degree.

In terms of the educational attainment of participants, the majority of the participants had parents with higher educational levels (i.e., bachelors' degree, master's degree and doctor's degree) (see Table 5).

By using the chi-square test, a significant association between the first-generation college students with neither parent having a bachelor's degree and self-identified first-generation college students was found (χ^2= 254.83, df =1, p<0.01). To examine the differences and similarities between these two first-generation statuses, a crosstabulation was created to see how participants were categorized as first-generation and continuing-generation college students based on two definitions (Table 6). Additionally, significant associations were also found

between the first-generation college students with neither parent having college experience and self-identified first-generation college students (χ^2= 185.41, df =1, p<0.01), as well as between the first-generation college students with neither parent having a bachelor's degree and with neither parent having college experience (χ^2= 326.32, df =1, p<0.01).

As shown in Table 6, for those self-identified as first-generation college students (n=140), most of them (n=113; 81%) were classified as first-generation college students with neither parent having a bachelor's degree. However, a small portion of them (n=27;19%) were classified as continuing-generation college students based on the definition of first-generation status at UT, which indicated a slight misalignment between self-identification of their first-generation status and their first-generation status defined by institution. This was also the case when examining the 162 first-generation college students with neither parent having a bachelor's degree, as 49 of them did not identify themselves as first-generation college students (30%). It indicated that this small portion of the first-generation college students defined by the mainstream definition of first-generation college students might not self-identify themselves as first-generation college students, otherwise, they were more likely to regard themselves as continuing-generation college students.

Using the independent sample t-tests to compare the mean scores on the socioeconomic status of participants based on their first-generation status, first-generation college students had significantly lower socioeconomic status than their continuing-generation peers, as defined by self (t = 8.00, p <.001), neither parent having a bachelor's degree (t = 8.50, p <.001), neither parent having college experience (t = 7.39, p <.001), and overlapping groups (t = 7.35, p<.001) (see Table 7).

Table 5

Parents' Educational Attainment

	Did not complete high school	High school diploma or GED	Some college	Associate or 2-year degree	Bachelor or 4-year degree	Master degree	Doctoral degree	Other	Total
Father EDU	71	88	47	26	168	113	57	10	579
Mother EDU	48	86	49	35	212	113	0	11	579

Table 6

First-Generation College Students: Self-Identified by Parents' Educational Attainment

	FG-Parent ED1	Else-Parent ED1	Total
FG-Self ID	113	27	140
Else-Self ID	49	390	439
Total	162	417	579

Note. FG-Self ID: self-identified first-generation college students; FG-Parent ED1: first-generation college students with neither parent having a bachelor's degree.

Table 7

t-tests Results Comparing First-Generation College Students and Continuing-Generation College Students on SES

	Mean: FG	Mean: Else	*t*	p	95% CI for Mean Difference	
					Lower	Upper
SES-FG-Self ID	5.49	6.80	8.00	<.001	1.00	1.65
SES-FG-Parent ED1	5.51	6.86	8.50	<.001	1.03	1.66
SES-FG-Parent ED2	5.36	6.73	7.39	<.001	1.01	1.75
SES-FG-Overlap	5.45	6.74	7.27	<.001	.94	1.64

Note. FG-Self ID: self-identified first-generation college students; FG-Parent ED1: first-generation college students with neither parent having a bachelor's degree; FG-Parent ED2: first-generation college students with neither parent having college experience; FG-Overlap: self-identified first-generation college student with neither parent having a bachelor's degree.

CFA of Academic Engagement Scale

Before I moved on to test the research hypothesis, I checked if the four-factor model of academic engagement should be kept in the following analysis, and if any sub-construct of these four should be dropped for construct validity. Though previous research has suggested that Academic Engagement Scale is a valid instrument to measure academic engagement, this instrument was developed based on responses from high school students (Reeve & Tseng, 2011). To see if this measurement is valid among college students, specifically among students at University of Texas at Austin, a Confirmatory Factor Analysis should be conducted before using this four-factor model in the following analysis.

Using R Studio, I fitted the four-factor model with the data set using "cfa()" function in *Lavaan* package (Rosseel, 2012). I used the "estimator ='MLR'" to specify the robust maximum likelihood estimation method. Factor loadings were also created to see the parameter estimates for all items.

In terms of the model fit statistics, the scaled estimation for chi-square test was significant for the 4-factor model (chi-square = 785.12, df=203, $p < .001$), which suggested that the model does not fit. As the model chi-square test statistic was sensitive to sample size, other model fit indices were also included to evaluate the goodness of fit. The robust estimation of comparative fit index (CFI) is .937, which did not exceed the good fit criteria of .95 but was larger than .90 as a more conventional threshold. The scaled root mean square error of approximation (RMSEA) was .057 (90% C.I.=[.052, .062]), which did not indicate a good model fit as it exceeded the good fit criteria of .05. The scaled standardized root mean square residual (SRMR) was .051, which met the good fit criteria of less than .08 (Hu & Bentler, 1999).

For the parameter estimates for the four-factor model (Figure 1), z-statistics and p-values associated with the parameter estimates of factor loadings were significant and ranged from .60 to .89, which was acceptable for a developed instrument (Hair et al., 2020). With factor loadings all higher than .50, it suggested that these items explained the corresponding constructs at medium to high levels. The path diagram for the Academic Engagement Scale (Figure 2) showed how each item loaded on each subconstructs and how subconstructs were correlated.

Although the evidence supporting the four-factor model was not consistent, I decided to use the four scales, since there was some evidence in support of these four-factor model and this evidence was consistent with previous findings.

Figure 1

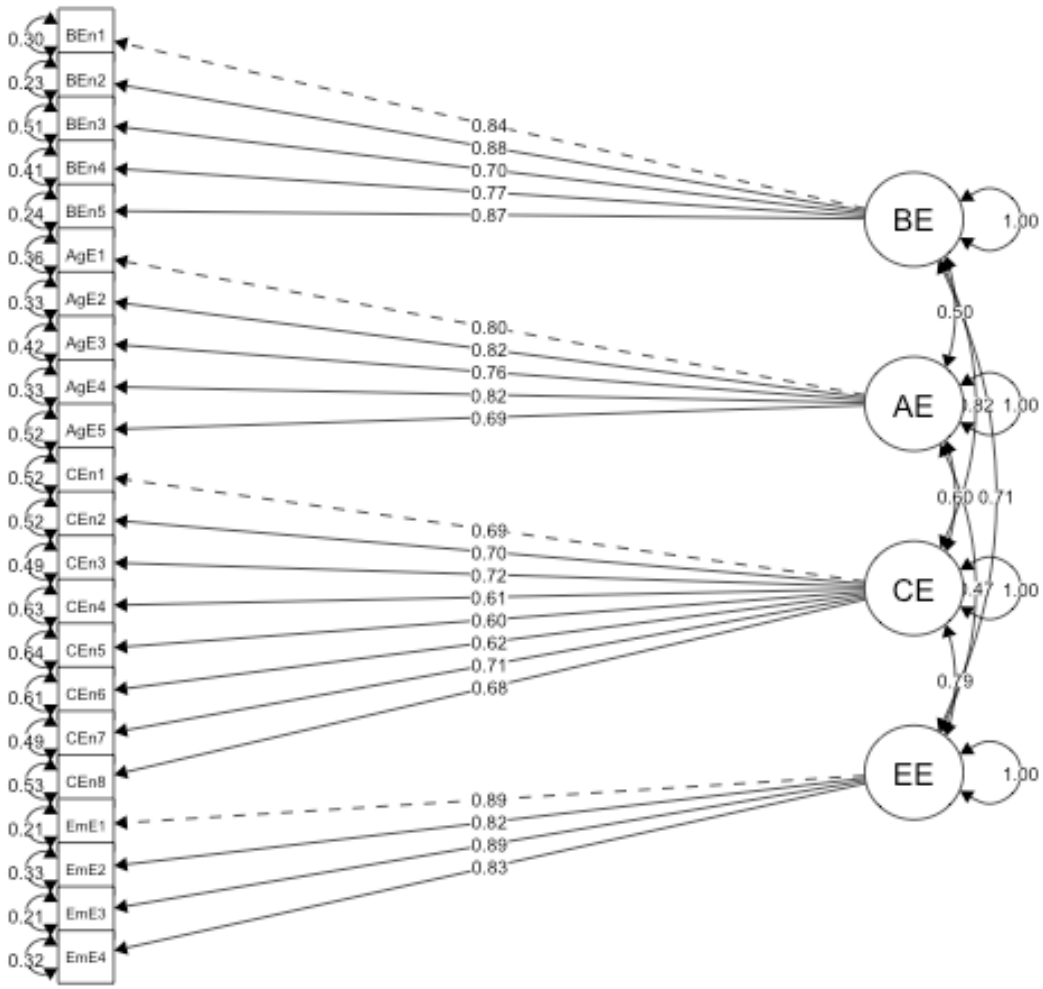
Factor Loadings for the Four-Factor CFA Model

Table. Academic Engagement Scale Factor Loadings

Latent Factor	Indicator	B	SE	Z	p-value	Beta
BE	BeEngage1	1.000	0.000	NA	NA	0.839
BE	BeEngage2	1.048	0.041	25.709	0	0.877
BE	BeEngage3	0.822	0.052	15.910	0	0.703
BE	BeEngage4	1.007	0.054	18.741	0	0.767
BE	BeEngage5	1.041	0.042	24.984	0	0.872
AE	AgEngage1	1.000	0.000	NA	NA	0.800
AE	AgEngage2	1.039	0.041	25.070	0	0.822
AE	AgEngage3	0.970	0.045	21.560	0	0.760
AE	AgEngage4	1.025	0.044	23.218	0	0.820
AE	AgEngage5	0.848	0.046	18.419	0	0.690
CE	CoEngage1	1.000	0.000	NA	NA	0.691
CE	CoEngage2	0.911	0.061	14.897	0	0.696
CE	CoEngage3	0.915	0.067	13.597	0	0.715
CE	CoEngage4	0.937	0.074	12.716	0	0.609
CE	CoEngage5	0.814	0.074	11.023	0	0.602
CE	CoEngage6	0.889	0.068	13.059	0	0.625
CE	CoEngage7	1.030	0.080	12.926	0	0.715
CE	CoEngage8	0.898	0.075	12.047	0	0.683
EE	EmoEngage1	1.000	0.000	NA	NA	0.886
EE	EmoEngage2	1.065	0.042	25.351	0	0.818
EE	EmoEngage3	0.972	0.033	29.799	0	0.890
EE	EmoEngage4	0.943	0.040	23.728	0	0.827

Figure 2

Path Diagram for the Academic Engagement Scale



TESTING HYPOTHESES

In this study, sense of belonging was measured at both course and campus levels, using two measures (i.e., sense of fit at course level, and sense of fit at campus level). Composite scores were obtained for each measure by averaging scores of all items within each measure, in other words, all variables were mean centered in the data analysis. Academic engagement was measured using four subconstructs, namely behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement. Composite scores were calculated for each subconstructs by using means of all items. Persistence was also measured to capture participants'

perceived tendency to engage in motivational regulation in response to a variety of challenges in academic activities.

Table 8 and Table 9 provide the means, standard deviations, reliabilities, and correlations of all the variables. All the observed variables presented sufficient reliability, with the Cronbach's alpha level ranging from 0.77 to 0.87. Bivariate correlations between variables also indicated that sense of fit at course level, and sense of fit at campus level were positively correlated, and the strength of correlation was moderate ($r_{sof\text{-}sofut}$=.41, p<.001, 95% C.I.=[0.34, 0.48]). Considering the moderate strength of this association, it suggested that sense of fit at two levels could be examined separately in the following analysis.

Four subconstructs of academic engagement were also positively correlated, with behavioral engagement highly correlated with cognitive engagement ($r_{be\text{-}ce}$=.72, p<.001, 95% C.I.=[0.68, 0.76]). Socioeconomic status was positively correlated with sense of fit at both course ($r_{sof\text{-}ses}$=.16, p<.001, 95% C.I.=[0.08, 0.24]) and campus levels ($r_{sofut\text{-}ses}$=.34, p<.001, 95% C.I.=[0.26, 0.41]), and the strengths were weak to moderate in magnitude.

Hypothesis One: Correlations between Sense of Belonging and Academic Engagement

To answer the first research question about whether students with a stronger sense of belonging having greater academic engagement, correlations between these variables were examined. According to the correlation coefficients in Table 9, all four subconstructs of academic engagement were positively correlated with variables related to sense of belonging/fit. This indicated that students with a stronger sense of belonging, regardless of at course level or at campus level, were predicted to have greater behavioral engagement, agentic engagement, cognitive engagement and emotional engagement. These correlation coefficients were all

significant at the alpha level of .001. This finding was consistent with suggestions from previous literature (e.g., Wilson et al., 2015).

Additionally, the strengths of these correlations were stronger between sense of fit at course level and subconstructs of academic engagement (ranging from .39 to .58), than between sense of fit at campus level and subconstructs of academic engagement (ranging from .18 to.36). This implied that the effect of sense of fit at course level might be stronger on the academic engagement than the effect of sense of fit at campus level. It made sense as the academic engagement mainly measured students' involvement in class activities, which were at the same contextual level as the sense of fit at course level.

Hypothesis Two: Correlations between Demographic Variables, Motivational Traits, Sense of Belonging, and Academic Engagement

Demographic variables age, gender, socioeconomic status, and year in college were also entered into the correlation table to see if any of them were significantly correlated to sense of belonging and academic engagement. As shown in Table 9, age and gender had a positive but weak correlation with behavioral engagement ($r_{age\text{-}be}$=.09, p<.05, 95% C.I.=[0.001, 0.16]; $r_{gender\text{-}be}$=.16, p<.001, 95% C.I.=[0.08, 0.24]), socioeconomic status had a positive but weak correlation with agentic engagement($r_{ses\text{-}ae}$=.11, p<.01, 95% C.I.=[0.03, 0.13]), gender had a positive but weak correlation with cognitive engagement ($r_{gender\text{-}ce}$=.16, p<.001, 95% C.I.=[0.08, 0.24]), and age, gender and grade had a positive but weak correlation with emotional engagement ($r_{age\text{-}ee}$=.09, p<.05, 95% C.I.=[0.006, 0.17] ; $r_{gender\text{-}ee}$=.12, p<.01, 95% C.I.=[0.02, 0.18] ; $r_{grade\text{-}ee}$=.09, p<.05, 95% C.I.=[0.01, 0.17]). These statistics showed that female students reported higher behavioral engagement, cognitive engagement, and emotional engagement than male students, more senior students reported higher behavioral engagement and emotional engagement,

students self-identified with higher socioeconomic status reported higher agentic engagement, and students with more years in college reported higher emotional engagement.

Interestingly, socioeconomic status was positively associated with sense of fit at both course and campus levels. This indicated that students perceived themselves with higher socioeconomic status tended to have higher sense of belonging to their class as well as their college. Specifically, the strength of association between socioeconomic status and sense of fit was stronger at the campus level. As age and grade were highly correlated ($r_{age\text{-}grade}$=.72, p<.001, 95% C.I. = [.68, .76]), to avoid the multicollinearity in the regression model, only age was selected as one of the control variables. Therefore, age, socioeconomic status, and gender would be included as control variables in the subsequent moderation analysis.

Motivational trait variable persistence was found positively correlated with four subconstructs of academic engagement. Specifically, persistence was strongly and positively correlated with cognitive engagement ($r_{age\text{-}grade}$=.64, p<.001, 95% C.I. = [.59, .69]). Considering cognitive engagement implied the use of self-regulated learning strategies (Fredricks, et al., 2004), it was reasonable that it related to persistence to a large extent. Persistence was also found to be positively correlated with sense of fit at both course and campus levels. These correlations were weak to moderate in magnitude, ranging from .29 to .39. As persistence was both positively associated with the predictor and outcome variable in this study, it indicated that persistence might exert an extraneous effect on the relationship between sense of belonging and academic engagement. To see if persistence should be added as a covariate in the moderation model, this study also examined if persistence differed between first-generation college students and their continuing-generation peers in answering the next research question.

Table 8

Mean, Standard Deviations, and Cronbach's Alphas of Measures

Variable Name	Measure	Mean	S.D.	Cronbach's Alpha
Sense of belonging/fit	Sense of fit at coursework level	5.04	0.98	0.79
	Sense of fit at UT	4.80	0.91	0.77
Academic engagement	Behavioral engagement	5.36	1.16	0.85
	Agentic engagement	3.91	1.47	0.85
	Cognitive engagement	5.00	1.01	0.80
	Emotional engagement	5.22	1.30	0.87
Motivational trait	Persistence	4.83	1.03	0.79

Table 9

Bivariate Correlations among Key Variables

	1	2	3	4	5	6	7	8	9	10	11
1.Age	--										
2.Gender	.01 [-.08, .09]	--									
3.Grade	**.72***** [.68, .76]	**.08*** [.002, .16]	--								
4.SES	-.03 [-.11, .05]	-.08 [-.15, .01]	-.06 [-.14, .02]	--							
5.SOF	.05 [-.03, .14]	**.09*** [.004, .17]	.07 [-.01, .15]	**.16***** [.08, .24]	--						
6.BE	**.09*** [.001, .16]	**.16***** [.08, .24]	.03 [-.05, .11]	.06 [-.02, .14]	**.50***** [.44, .56]	--					
7.AE	.07 [-.01, .15]	-.03 [-.11, .05]	.07 [-.01, .15]	**.11**** [.03, .19]	**.39***** [.32, .45]	**.45***** [.38, .51]	--				
8.CE	.07 [-.01, .15]	**.16***** [.08, .24]	.04 [-.04, .12]	.05 [-.03, .13]	**.53***** [.47, .59]	**.72***** [.68, .76]	**.53***** [.46, .58]	--			
9.EE	**.09*** [.006, .17]	**.12**** [.03, .20]	**.09*** [.01, .17]	-.02 [-.10, .07]	**.58***** [.53, .64]	**.63***** [.57, .67]	**.42***** [.35, .48]	**.69***** [.65, .73]	--		
10.PE	.06 [-.02, .14]	**.10*** [.02, .18]	.02 [-.06, .10]	**.08*** [.002, .16]	**.39***** [.32, .46]	**.58***** [.52, .63]	**.38***** [.32, .45]	**.64***** [.59, .69]	**.45***** [.38, .51]	--	
11.SOFUT	-.02 [-.10, .07]	.05 [-.03, .13]	-.06 [-.14, .02]	**.34***** [.26, .41]	**.41***** [.34, .48]	**.36***** [.29, .44]	**.19***** [.11, .26]	**.37***** [.30, .44]	**.24***** [.16, .32]	**.29***** [.21, .36]	--

Note. SOF = Sense of Fit at Course Level, BE = Behavioral Engagement, AE = Agentic Engagement, CE = Cognitive Engagement, EE = Emotional Engagement, PE = Persistence, SOF UT = Sense of Fit at Campus Level

* p<.05. ** p<.01. *** p<.001. 95% Confidence Intervals were provided in the bracket under correlation coefficients.

Hypothesis Three: Mean-Level Differences between First-Generation and Continuing-Generation College Students

Several independent two-sample t-tests were used to examined whether the means of the observed variables differed between first-generation and continuing-generation college students, separately for three definitions of first-generation status, as well as between the overlapping group of first-generation college students versus continuing-generation college students.

According to Table 10, only one of the t-tests were statistically significant when comparing self-identified first-generation to continuing-generation students. Specifically, for self-identified first-generation college students, their sense of fit at campus level was significantly lower than their continuing-generation peers, $t_{sofcampus\text{-}level.self}$= 3.24, p <.01, 95% C.I.=[.11, .45].

For first-generation college students defined as those neither parent having a bachelor's degree (see Table 11), their sense of fit at both course and campus levels were significantly lower than their continuing-generation college students, $t_{sofcourse\text{-}level.parent1}$=2.69, p<.01, 95% C.I.=[.07, .43]; $t_{sofcampus\text{-}level.parent1}$=4.52, p<.01, 95% C.I.=[.21, .53]. No other significant differences in means were found in other observed variables for this first-generation status.

When first-generation college students were defined as those neither parent having college experience (see Table 12), their sense of fit at both course and campus levels were also significantly lower than their continuing-generation peers, $t_{sofcourse\text{-}level.parent2}$=2.50, p=.01, 95% C.I.=[.06, .48]; $t_{sofcampus\text{-}level.parent2}$=4.33, p<.01, 95% C.I.=[.23, .61].

For the overlapping first-generation college students of two definitions (i.e., self-identified and those with neither parent having a bachelor's degree; see Table 12), their behavioral engagement (t_{be} = -2.05, p=.04, , 95% C.I.=[-.44, -.01]) and cognitive engagement

(t_{ce}=-2.24, p=.03, , 95% C.I.=[-.42, -.03]) were significantly higher than their continuing-generation peers, while their sense of fit at campus level was significantly lower than their continuing-generation peers, $t_{sofcampus\text{-}level}$=2.93, p<.01, , 95% C.I.=[.09, .46]. No other significant differences in means were found in other observed variables between the overlapping first-generation college students and their continuing-generation peers.

Based on the t-test results, persistence did not differ significantly between first-generation college students and their continuing-generation peers, regardless of different definitions and categorizations. As shown in Table 10-12, the mean scores of persistence were systematically higher for first-generation college students than those for continuing-generation college students, though these differences were not statistically significantly.

Table 10

t-test of Observed Variables between Self-Identified First-Generation and Continuing-Generation College Students

	First-generation	Continuing generation	t	p	95% C.I. Lower	Upper
Sense of fit at course level	4.98	5.06	.85	.40	-.11	.27
Behavioral engagement	5.48	5.33	-1.47	.14	-.37	.05
Agentic engagement	3.99	3.88	-.80	.43	-.39	.16
Cognitive engagement	5.14	4.96	-1.90	.06	-.37	.01
Emotional engagement	5.30	5.18	-.92	.36	-.36	.13
Persistence	4.88	4.82	-.66	.50	-.26	.13
Sense of fit at campus level	4.61	4.88	3.24	<.01**	.11	.45

Note. * <.05, ** <.01

Table 11

t-test of Observed Variables between First-Generation with Neither Parent Having a Bachelor's Degree and Continuing-Generation College Students

	First-generation	Continuing generation	t	p	95% C.I. Lower	Upper
Sense of fit at course level	4.86	5.11	2.69	<.01**	.07	.43
Behavioral engagement	5.43	5.34	-.81	.42	-.28	.12
Agentic engagement	3.89	3.91	.21	.83	-.24	.29
Cognitive engagement	5.05	4.99	-.63	.53	-.23	.12
Emotional engagement	5.18	5.22	.37	.71	-.20	.29
Persistence	4.90	4.81	-1.00	.32	-.27	.09
Sense of fit at campus level	4.55	4.92	4.52	<.01**	.21	.53

Note. * <.05, ** <.01

Table 12

t-test of Observed Variables between First-Generation with Neither of Parent Having College Experience and Continuing-Generation College Students

	First-generation	Continuing generation	t	p	95% C.I. Lower	Upper
Sense of fit at course level	4.82	5.09	2.50	.01*	.06	.48
Behavioral engagement	5.41	5.35	-.48	.63	-.28	.17
Agentic engagement	3.89	3.91	.13	.90	-.28	.32
Cognitive engagement	5.09	4.99	-1.06	.29	-.31	.09
Emotional engagement	5.13	5.23	.68	.50	-.19	.38
Persistence	4.89	4.82	-.60	.55	-.27	.14

Sense of fit at campus level	4.47	4.89	4.33	<.01**	.23	.61

Note. * <.05, ** <.01

Table 13

t-test of Observed Variables between First-Generation and Continuing-Generation College Students Defined by Overlapping First-Generation College Students of Self-Identified and Neither Parent Having a Bachelor's Degree

					95% C.I.	
	First-generation	Continuing generation	t	p	Lower	Upper
Sense of fit at course level	4.93	5.06	1.23	.22	-.08	.34
Behavioral engagement	5.54	5.32	-2.05	.04*	-.44	-.01
Agentic engagement	3.99	3.89	-.69	.49	-.40	.19
Cognitive engagement	5.19	4.96	-2.24	.03*	-.42	-.03
Emotional engagement	5.31	5.19	-.96	.34	-.39	.13
Persistence	4.91	4.82	-.90	.37	-.31	.11
Sense of fit at campus level	4.60	4.87	2.93	<.01**	.09	.46

Note. * <0.05, **<0.01

Hypothesis Four: Moderating Effect of First-Generation Status

To test the hypotheses about the moderation effect of first-generation status, I conducted multiple linear regression analysis, with tests of simple slopes and interaction terms to test for moderation effects. For each subconstruct of academic engagement, I first ran multiple linear regression models with control variables (i.e., demographic variables), sense of belonging/fit at course and campus levels as an independent variable, first-generation status as a moderator, and interaction terms between sense of belonging and first-generation status.

The moderation equation between variables of sense of belonging/fit, first-generation status, control variables (i.e., demographic variables), and academic engagement is as follows:

$$Y_{ae} = \beta_0 + \beta_1 X_{senseofbelong} + \beta_2 X_{age} + \beta_3 X_{gender} + \beta_4 X_{SES} + \beta_5 X_{firstgen} + \beta_6 X_{senseofbelong} X_{firstgen} + \varepsilon_i$$

Using the above regression models, I examined the moderation effect of different first-generation statuses (i.e., self-identified, neither parent having a bachelor's degree, neither parent having college experience, and overlapping group) on the relationship between sense of belonging and academic engagement. To test the moderation effect, the interaction term between the predictor, variables of sense of belonging and the moderator (i.e., first-generation status), and control variables (i.e., demographic variables), were entered into the regression models between variables of sense of belonging and academic engagement. The interaction term was tested for its significance in the regression model.

Sense of belonging/fit were measured both at the course level and campus level, so these variables were entered one by one into the regression model as the predictor. First-generation college students were defined by four definitions as discussed earlier, and these four grouping variables were entered one by one into the regression model as the moderator. The interaction terms between moderator and predictor were also created, which resulted in eight interaction terms. As there were four dependent variables, they were entered into the respective regression model listed above. In sum, this study ran thirty-two multiple regression models with one predictor, control variables, moderator, integration terms and one outcome variable.

Self-identified First-Generation Status as a Moderator

Based on the outputs of the regression models, four models presented significant interaction terms. These models included self-identified first-generation status as a moderator, on

the relationship between sense of fit at course level and behavioral engagement. As shown in Table 14, after controlling for the effects of age, gender, and socioeconomic status, self-identified first-generation status significantly moderated the relationship between sense of fit at course level and behavioral engagement (Beta Estimate=-.24, p=.013). Only 28% of the variance in behavioral engagement can be explained by the sense of fit at course level, self-identified first-generation status, demographic factors (age, gender, and socioeconomic status), and their interaction term (F(6,572)=37.23, p<.001). To examine if the multicollinearity presented, I checked the Variance Inflation Factor (VIF) for each predictor in the model using "*vif*" function in "*car*" package. It turned out none of my predictors had a VIF greater than 2, so I assumed that the statistical assumption of no linear intercorrelation between predictors was not violated.

Table 14

Moderation Model by Self-Identified First-Generation Status

	DV: Behavioral Engagement			
	Estimate	S.E.	t	p
Intercept	.93	.54	1.75	.08
Age	.03	.02	1.53	.13
Gender	.28	.08	3.27	<.01**
SES	.01	.03	.44	.66
SOF	.63	.05	13.03	<.001***
FG-Self ID	1.41	.50	2.82	<.01**
SOF x FG-Self ID	-.24	.10	-2.47	.013*
R^2	.28			
F	37.23***			

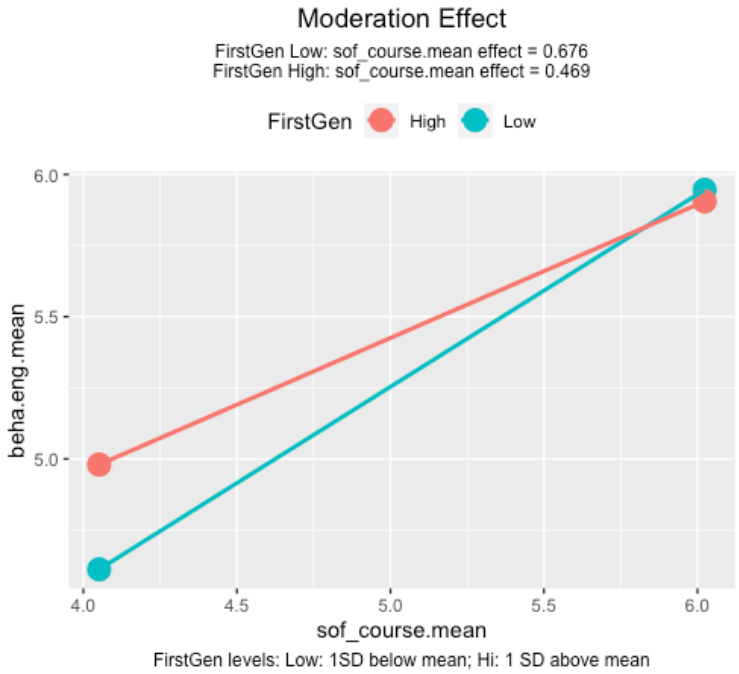
Note. SES = socioeconomic status; FG-Self ID = self-identified first-generation status; SOF=sense of fit at course level; SOFUT=sense of fit at campus level. * p<.05. ** p<.01. *** p<.001

To elaborate on the moderating effect of self-identified first-generation status in detail. I obtained the simple regression slopes between predictors and outcome variables. As shown in Figure 3, the slopes were significantly different between self-identified first-generation college

students and continuing-generation college students. This indicated that the association between sense of fit at course level and behavioral engagement differed significantly between self-identified first-generation and continuing-generation college students. In particular, the strength of association between sense of fit at course level and behavioral engagement was stronger for continuing-generation college students.

Figure 3

Self-Identified First-Generation Status as a Moderator on the Relationship between Sense of Fit at Course Level and Behavioral Engagement



Note. FirstGen-High: Self-identified first-generation college students; FirstGen-Low: Self-identified continuing-generation college students.

None of the moderation models were found significant for the first-generation status defined as neither parent having a bachelor's degree and the overlapping first-generation college students.

First-Generation Status Defined as Neither Parent Having College Experience as a Moderator

When first-generation status defined as those with neither parent having college experience was entered in the regression model as a moderator, significant moderating effects were found on the relationship between sense of fit at course level and behavioral engagement as well as between sense of fit at campus level and emotional engagement.

As shown in Table 15, the interaction terms between this first-generation status and sense of fit at course level was significant in the regression model of behavioral engagement (Beta Estimate=-.29, p=.007). This first-generation status also moderated the relationship between sense of fit at campus level and emotional engagement (Beta Estimate=-.24, p=.013). VIF values were also obtained for predictors in these two models, and none of them exceeded 2.

Table 15

Moderation Model by First-Generation Status Defined by Neither Parent Having College Experience

DV: Behavioral Engagement				
	Estimate	S.E.	t	p
Intercept	.92	.54	1.71	.09
Age	.03	.02	1.60	.11
Gender	.28	.08	3.34	<.001***
SES	.01	.03	.37	.71
SOF	.63	.05	13.48	<.001***
FG-Self ID	1.61	.54	2.99	.002**
SOF x FG-Parent ED2	-.29	.11	-2.67	.007**
R^2	.28			
F	37.36***			
DV: Emotional Engagement				
	Estimate	S.E.	t	p
Intercept	1.92	.68	2.81	.005**
Age	.06	.03	2.20	.03*
Gender	.25	.11	2.36	.02*
SES	-.08	.03	-2.30	.02*

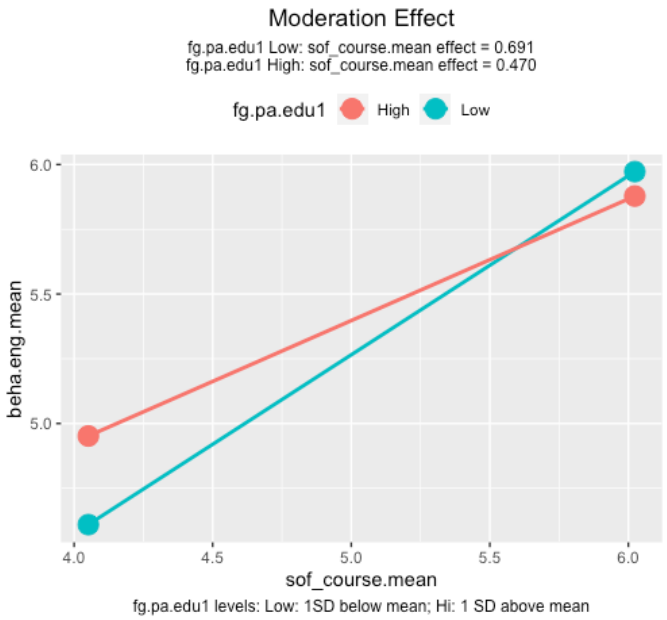
SOFUT	.45	.06	6.67	<.001***
FG-Self ID	1.41	.70	2.02	.04*
SOFUT x FG-Parent ED2	-.32	.15	-2.13	.03*
R^2	.09			
F	9.83***			

Note. SES = socioeconomic status; FG-Parent ED2 = First-generation status defined as neither parent having college experience; SOF=sense of fit at course level; SOFUT=sense of fit at campus level. * p<.05. ** p<.01. *** p<.001

To further examine the moderating effect of the first-generation status defined as neither parent having college experience, I created the simple regression slopes between slopes and outcome variables. Figure 4 provided that the slopes were significantly different between the first-generation college students defined as those with neither parent having college experience and the continuing-generation college students with at least one parent having college experience. This indicated that the association between sense of fit at course level and behavioral engagement differed between these two groups of students. Specifically, the strength of association was weaker for first-generation college students with neither parent having college experience. Similarly, regression slopes in Figure 5 also conveyed the information that the relationship between sense of fit at campus level and emotional engagement was different between these two groups of students. The strength of association was also weaker for first-generation college students with neither parent having college experience.

Figure 4

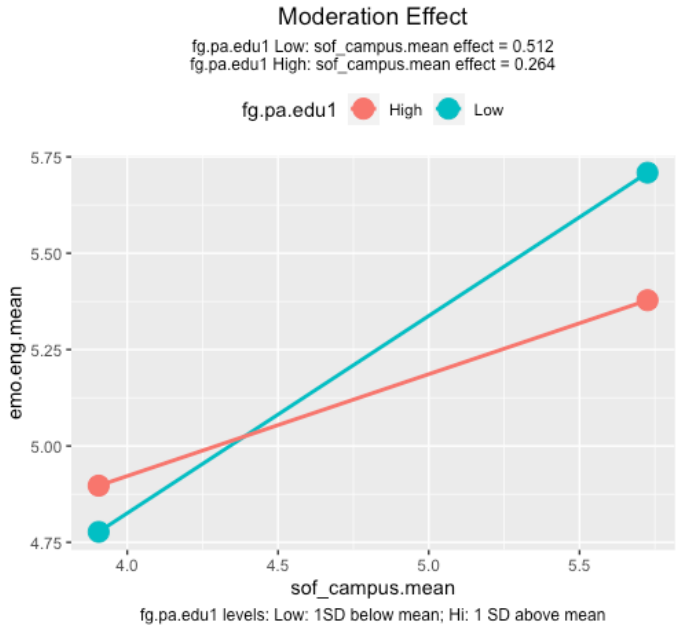
First-Generation Status Defined as Neither Parent Having College Experience as a Moderator on the Relationship between Sense of Fit at Course Level and Behavioral Engagement



Note. fg.pa.edu1-High: First-generation college students with neither parent having college students; fg.pa.edu1-Low: Continuing-generation college students with at least one parent having college students.

Figure 5

First-Generation Status Defined as Neither Parent Having College Experience as a Moderator on the Relationship between Sense of Fit at Campus Level and Emotional Engagement



Note. fg.pa.edu1-High: First-generation college students with neither parent having college students; fg.pa.edu1-Low: Continuing-generation college students with at least one parent having college students.

Summary

For the first research question about the relationship between sense of belonging and academic engagement, this study found positive associations between sense of belong, regardless of course and campus levels, and four subconstructs of academic engagement, which supported the hypothesis and was consistent with findings from previous research (e.g., Wilson et al., 2015). Additionally, sense of fit at course level and at campus level had a moderate and positive correlation, which suggested that these two constructs did not have much shared variance in this study. It further indicated that sense of fit should be measured at two contextual levels. This finding was in line with discussion from previous studies (e.g., Murphy & Zirkel, 2015).

For the second research question about the associations between academic engagement and gender, age, and socioeconomic status, as well as persistence, this study found that as students advanced through college, their behavioral engagement and emotional engagement increased. Students with higher socioeconomic status tended to have higher agentic engagement. Female students tended to have higher behavioral engagement, cognitive engagement, and emotional engagement. Limited study has focused specifically on the associations between demographic factors and subconstructs of academic engagement, these exploratory findings provided insights about how different aspects of academic engagement might differ by gender, age, socioeconomic status, and year in college. This study also found that motivational traits, such as persistence, were positively related to all four subconstructs of academic engagement, which indicated that students with higher level of persistence tended to have higher academic engagement. Persistence was also found to be positively associated with sense of belonging at both course and campus levels. This finding supported previous finding that persistence was a positive predictor of academic engagement (e.g., Moreira et al., 2013).

For the third research question about the differences in sense of belonging, academic engagement, and persistence between first-generation college students and continuing-generation college students, the hypothesis was supported partially by the statistical results. When students were self-identified as first-generation college students, they had significantly lower sense of fit at campus level. When first-generation college students were defined as neither parent having a bachelor's degree, they had significantly lower sense of fit at both course level and campus level. Their academic engagement did not differ significantly. When first-generation college students were defined as neither parent having college experience, they also had significantly lower sense of fit at both course and campus levels. When first-generation college students were grouped by the overlapping first-generation college students from previous two definitions, they scored significantly lower for the sense of fit at campus level, while they also scored significantly higher for behavioral engagement and cognitive engagement than their continuing-generation peers. As no difference was found for persistence between first-generation and continuing-generation college students, across four definitions, it suggested that first-generation status was not a good differentiator for persistence. Therefore, persistence would be excluded in the following moderation analysis.

For the last research question about the moderating effect of first-generation status, study results partially supported the hypothesis. Moderation effect was only found for self-identified first-generation status and first-generation status defined as neither parent having college experience, on the relationship between sense of belonging and academic engagement, after controlling for the demographic factors. The follow-up examinations revealed that the strengths of these relationships were systematically stronger for continuing-generation college students. The self-identified first-generation status moderated the relationships between sense of fit at

course level and behavioral engagement. When first-generation status was defined as neither parent having college experience, it moderated the relationships between sense of fit at course level and behavioral engagement as well as between sense of fit at campus level and emotional engagement. The strengths of associations between these variables were also systematically stronger for continuing-generation college students.

Chapter 5: Discussion

In this chapter, I discuss the findings from the analysis in the previous chapter. After my discussion about how my results can be connected to the existing literature, I discuss the implications for theory as well as for practice. Then I conclude with a discussion of limitations of this study and suggestions for future study.

DISCUSSION OF FINDINGS

In recent educational research, a focus on the first-generation college students has been highlighted due the increasing enrollment of these students in higher education (see Ives & Castillo-Montoya, 2020 for a review). Helping first-generation college students succeed in college has been a critical topic in higher educational research. This study contributed to the existing literature about the relationship between first-generation college students, their sense of belonging and academic engagement in a college setting by adding more nuance in the examination of different first-generation statuses, sense of belonging at course and campus levels, and subconstructs of academic engagement. Consistent with the previous findings (Wilson et al., 2015), this study added to the existing literature that sense of belonging at different contextual levels was positively related to four subconstructs of academic engagement (i.e., behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement).

Although first-generation college students have been widely acknowledged as at a distinct disadvantage in higher education (Chen & Carroll, 2005), findings from this study revealed that these students generally feel as engaged academically in college as continuing-generation college students. Interestingly, self-identified first-generation college students with neither parent having a bachelor's degree perceived themselves as more behaviorally and cognitively engaged in learning than the continuing-generation peers, which was contrary to the

previous finding that first-generation college students were less likely to engage in academic and social activities (Soria & Stebleton, 2012). Cognitive engagement was defined by Fredricks and colleagues (2004) as the thoughtfulness and willingness to exert efforts to master difficult skills and a preference for challenge. This subconstruct of academic engagement implies the use of self-regulated learning strategies, which was quite similar to constructs in the motivation literature (Fredricks et al., 2004). We found that the overlapping first-generation college students did not differ from their continuing-generation peers in terms of persistence. This finding might partially explain their higher cognitive engagement, as they were as motivated as their continuing-generation peers in academic activities. Another possible reason might be that the University of Texas has made an effort to foster an inclusive campus and provide more support for first-generation college students in recent years (University of Texas, 2023c). The campus climate might be more engaging for first-generation college students as they were provided with more assisting programs and financial aids with the increasing institutional awareness of college success for these students. Findings from previous research about first-generation college students may be outdated and need to be interpreted with more caution in future studies.

Additionally, one contextual factor to explain the differences in cognitive engagement is that UT have provided abundant campus resources to support students' learning, by advocating various scholarships and fellowships, fostering mentorships with faculty and seniors, holding Student Success Symposium, and all other supports to help students succeed. College students can get information about these resources not only from classes, but also from browsing campus websites by themselves. UT also specifically advocated a sense of community for first-generation college students by providing them with a multi-tiered support network, various academic and social experiences, workshops, resources, and events via First-Gen Equity

program. Therefore, it is reasonable that students who are self-identified as first-generation college students as well as categorized by the university as first-generation college students were more likely to invest in learning, as they are open to and aware of the resources based on their self-awareness of first-generation identity.

Moreover, when students' self-perception as a first-generation college student was consistent with campus's acknowledgement of their first-generation status, they were found to be more likely to become involved in learning and academic activities and be motivated to invest in learning. Previous research on ethnic identity found that students with positive feeling about their ethnic group membership help promote positive psychological functioning and academic outcomes (Pina-Watson et al., 2018; Rivas-Drake et al., 2014). Similarly, students who internalized their first-generation status are more likely to be content with their identity as a first-generation college student. Hence, their self-identification as well as external affirmation from college as a first-generation college students may positively impact their academic involvement and attitudes. In a qualitative study about the first-generation college students at UT, Payne et al. (2023) found that first-generation college students actively and effectively engaged in help-seeking strategies to help them manage academic challenges. Their study recruited self-identified first-generation college students whose parents did not have a bachelor's degree, which fell in the same categorization of first-generation college student with higher behavioral and cognitive engagement in this study. However, more insights were needed to address why self-identified first-generation college students with neither parent having a bachelor's degree tended to have higher behavioral and cognitive engagement than their continuing-generation peers. One possible reason could be the selection bias in this study. As more participants were in junior or senior years in this study, they went through the pandemic in their first two years of college. Since they

chose to persist in college despite all the difficulties during pandemic, they were more likely to be motivated in learning and value the college education than those who dropped out of college during that time. Therefore, though these first-generation college students felt less belonged to their class and campus, they were more engaged in learning and more motivated to succeed in college.

Results about the differences in sense of belonging between first-generation college students and their continuing-generation peers in this study aligned with previous findings (e.g., Stebleton et al., 2014). Both self-identified first-generation college students and those whose first-generation status defined by their parents' educational attainment reported having lower sense of fit at campus level, and significant differences were also found for sense of fit at course level for first-generation college students defined by two parents' educational attainment levels. This indicated that self-identified first-generation college students and those defined by parents' educational attainment might differ in their pattern of responses to the same variables. This contributed to the literature about first-generation college students that the definition should be explicitly defined for study about first-generation college students, and the findings from one certain definition might not be generalized to those with a different definition. Additionally, this study suggested that students differentiated on their responses to sense of belonging at two contextual levels, which was in line with previous literature that students' sense of belonging is socially constructed and should be examined at different settings (Murphy & Zirkel, 2015).

This study also addressed the question of whether the effects of sense of belonging on subconstructs of academic engagement may differ between first-generation college students and continuing-generation college students. Surprisingly, though the patterns of moderating effects differed for first-generation college students defined by different definitions, the strengths of

associations between variables of sense of belonging and subconstructs of academic engagement were found to be systematically stronger for continuing-generation college students. It generally indicated that the magnitudes of the positive effect of sense of belonging on academic engagement were not always the same between first-generation and continuing-generation college students, controlling for the impact of demographic background (i.e., age, gender, and socioeconomic status). The inclusion of these control variables ruled out the influences of age, gender, socioeconomic status on the relationship between sense of belonging and academic engagement, which provided more confidence in findings.

IMPLICATIONS

Implications for Future Research and Theory

Previous literature has provided solid empirical support for the significant distinction between first-generation college students and continuing-generation college students in academic settings, however, some researchers acknowledged the arbitrary distinction between these two groups of students (Spiegler & Bednarek, 2013). The nuances in the definitions of first-generation college students explained partially for the arbitrary distinction between first-generation college students and their continuing-generation peers. As shown in this study, the self-identified first-generation college students and first-generation college students with two commonly used definitions, those whose parents did not get a bachelor's degree and those whose parents did not have college experience, differed in their responses about sense of belonging at different contextual levels and subconstructs of academic engagement. The intragroup variances within the first-generation college students, regardless of their various definitions, suggested that the differences found between first-generation college students and their continuing-generation peers in empirical studies may "merely lie in a higher or lower likelihood to find specific

patterns, not in the existence of fundamentally different phenomenon" (Spiegler & Bednarek, 2013, p.330). Therefore, when investigating first-generation college students as the focus of the study, it would be better to treat it as a heterogeneous group and have a closer look at the nuances within this group. Additionally, more caution should be taken when applying the previous findings of first-generation college students for future studies. For example, the definitions of first-generation college students should be explicitly examined, and the contextual factors related to first-generation college students (e.g., types of college) should also be taken into consideration.

Next, all significant moderation effects of first-generation status on the relationship between sense of belonging and academic engagement were found negative in direction. This indicated that the strengths of effects of sense of belonging at two contextual levels on subconstructs of academic engagement, were stronger for continuing-generation college students. This finding implied that promoting sense of belonging among college students may be less beneficial to first-generation college students' involvement in academic activities than non-first-generation college students, which was contrary to what previous studies suggested (Pascarella et al., 2004). Considering the differences in learning experiences and family backgrounds of college students, more research is needed to study the moderating effect of first-generation status on this relationship by taking a closer look at the differences between these two groups of students. For example, race/ethnicity can be a great differentiator within first-generation college students and continuing-generation college students. Future study may add race/ethnicity to create subgroups within these groups, to provide more insightful findings for generational status.

Additionally, significant moderation effects were found for self-identified first-generation status and first-generation status defined by neither parent having college experience, but not found for the first-generation status defined by neither parent having a bachelor's degree. This indicated the differences in the effect of first-generation status based on different parents' educational attainment levels. With a narrower definition of parents' educational attainment, the group differences were more salient between first-generation college students and continuing-generation college students. This made sense as more respondents were included in the continuing-generation college students' group with a narrower definition, which implied more variations in their responses to questions. Therefore, the strength of association between sense of belonging and academic engagement might be more salient for the continuing-generation college students. Future studies may examine how and why different parents' educational attainment levels exert influences on academic outcomes, by taking a closer look at the differences in their social and cultural capital.

Implications for Practice

This study confirms the positive relationship between sense of belonging and academic engagement among college students, which suggested that promoting sense of belonging in college may encourage students to engage in learning and academic activities more actively. For administrators in higher education, they should consider advocating programs and events to foster a stronger sense of belonging, sense of fit, and sense of community for all college students. For educators in college, they should be more attentive to students' need for connection. For students, they should open their mind and seek out more opportunities to connect with people and surroundings on campus.

This study also provides some insights about first-generation college students, specifically focusing on the differences between self-identified first-generation college students, those whose parents do not have a bachelor's degree, and those whose parents do not have college experience. Considering the heterogeneity of first-generation college students, this group of students should be treated with more caution for future researchers. Additionally, administrators in higher education should be more careful in identifying these group of students, as those who identified by the common definition of first-generation college students may not self-identified as first-generation college students.

Limitations and Future Direction

There are several limitations to this study. First, this study is cross-sectional so that no cause-and-effect relationship should be concluded from findings (Wang & Cheng, 2020). The relationship between sense of belonging and academic engagement should be interpreted with caution in practice, as having a higher sense of belonging would not necessarily lead to higher academic engagement. Additionally, as this study only collected data using a convenient sample from UT EDP Subject Pool at one time, the data collected is susceptible to sampling bias. UT is a public university with students from diverse background and demographics, with less than one fourth of first-generation college students. To help improve the representation of findings for first-generation college student, future studies may consider using random sampling in various types of institutions (i.e., small liberal arts colleges, community colleges, and universities for historically ethnic minority students) to get more representative data and more geographically diverse sample.

Second, sense of belonging is found to be fluctuated in different settings (Wilson et al., 2015) and across time (Gillen-O' Neel, 2021). Though this study touched based on examining

sense of belonging at two contextual levels, it neglected the fact that students reported their sense of belonging at different time points, which may introduce more variance in this construct. Therefore, it would be valuable to explore sense of belonging using longitudinal data in different contextual settings, to control for the effect of time and have a more comprehensive understanding of sense of belonging.

Next, this study only explored four definitions of first-generation status and their moderating effects. Therefore, limited implications could be drawn from the findings to provide more insights about the heterogeneity of first-generation college students. In a previous study, Toutkoushian and colleague (2021) constructed eight definitions of first-generation college students based on parents' highest educational level and the number of parents at that level to study the associations between different definitions and student success. They suggested that it is important to jointly analyze a variety of definitions and pathways with a single dataset. Future researcher may consider include more definitions of first-generation college students to analyze their moderating effect on the relationship between sense of belonging and academic engagement.

Last, this study only controlled for limited demographic information (i.e., age, gender, and socioeconomic status) in the regression model, which might not sufficiently account for the confounding variables on the relationship between sense of belonging and academic engagement. For example, students' affiliation with associations or groups on campus, and their perceived support from teachers and peers, may also confound the relationship between sense of belonging and academic engagement. Therefore, future study may consider investigating more confounding variables to reveal the actual relationship between these two constructs. A qualitative study may provide valuable insights for how these two constructs make meaning for college students.

Appendix – Measures

Socioeconomic status

Think of this ladder as representing where people stand in the United States.

At the **top** of the ladder are the people who are the best off -- those who have the most money, the most education and the most respected jobs. At the **bottom** are the people who are the worst off -- who have the least money, least education, and the least respected jobs or no job.
The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom.

Where would you place yourself on this ladder?

Please choose a **number** on the rung to represent where you think you stand at this time in your life, relative to other people in the United States.

1 2 3 4 5 6 7 8 9 10

()

First-generation status

1. What's the highest education completed by your father?
    - Less than high school graduation
    - High school graduation
    - Some college
    - Bachelors degree
    - Masters degree
    - PhD, J.D., M.D.
2. What's the highest education completed by your mother?
    - Less than high school graduation
    - High school graduation
    - Some college
    - Bachelors degree
    - Masters degree
    - PhD, J.D., M.D.

Sense of belonging at Course Level (Murphy & Zirkel, 2015)

Participants used a 7-point Likert Scale to respond.

1. How much do you anticipate feeling like you belong as a student in math-related courses at UT?
2. How comfortable do you think you might feel as a student in math-related courses at UT?
3. How much do you feel like you could "be yourself" during math-related courses at UT?

Sense of fit at Course Level (Walton et al., 2015)

Participants used a 7-point Likert Scale to respond.

Answer the following questions about *what this specific class is like for you*. Indicate the extent to which you agree or disagree with each statement using the scales below. Please use the whole range of each scale.

1. I belong in this class.
2. I feel comfortable in this class.
3. Other people understand more than I do about what is going on in this class.
4. I think in the same way as do people who do well in this class.
5. It is a mystery to me how this class works. (R)
6. I feel alienated from this class. (R)
7. I fit in well in this class.
8. Compared with most other students, I am similar to the kind of people who succeed in this class.
9. Compared with most other students, I know how to do well in this class.
10. Compared with most other students, I get along well with people in this class.

Sense of belonging at campus level (Imperial College London, 2022)

When you respond to the questions below, think about yourself as a student at UT.

7-Point Likert scale (1 = Not at all, 4 = Somewhat, 7 = Completely)

1. How well do people at UT understand you as a person?
2. How connected do you feel to the university staff at UT?
3. How welcoming have you found UT to be?

4. How much respect do other students at UT show toward you?
5. How much respect do members of staff at UT show toward you?
6. How much do you matter to others at UT?
7. How happy are you with your choice to be a student at UT?
8. How enriching is your experience at UT?
9. How 'at home' do you feel at UT?
10. Overall, how much do you feel like you belong at UT?

Sense of fit at campus level (Phillips et al., 2020)

Participants used a 7-point Likert Scale to respond.

1. I am able to act the same way at UT as I do at home.
2. I am able to act the same way at UT as I did in high school.
3. I have become a different person to fit in at UT. (reversed)
4. My friends from home act very differently from students at UT. (reversed)
5. My personal values are compatible with the values that are common at UT.
6. The culture of my high school is similar to my impression of the culture of UT.
7. My parents understand my reason for attending UT.
8. My friends from home understand my reasons for attending UT.
9. I feel comfortable as a student at UT.
10. I feel like I belong as a student at UT.
11. My parents feel comfortable visiting UT.
12. The values of my family are similar to those at UT.

Academic engagement (Reeve & Tseng, 2011)

Participants used a 7-point Likert Scale to respond.

Behavioral engagement

1. I listen carefully in class

2. I try very hard in school

3. The first time my teacher talks about a new topic, I listen very carefully

4. I work hard when we start something new in class

5. I pay attention in class

Agentic engagement

1. During class, I ask questions

2. I tell the teacher what I like and what I don't like

3. I let my teacher know what I'm interested in

4. During class, I express my preferences and opinions

5. I offer suggestions about how to make the class better

Cognitive engagement

1. When doing schoolwork, I try to relate what I'm learning to what I already know

2. When I study, I try to connect what I am learning with my own experiences 3. I try to make all the different ideas fit together and make sense when I study

4. I make up my own examples to help me understand the important concepts I study

5. Before I begin to study, I think about what I want to get done

6. When I'm working on my schoolwork, I stop once in a while and go over what I have been

doing

7. As I study, I keep track of how much I understand, not just if I am getting the right answers

8. If what I am working on is difficult to understand, I change the way I learn the material

Emotional engagement

1. I enjoy learning new things in class

2. When we work on something in class, I feel interested

3. When I am in class, I feel curious about what we are learning

4. Class is fun

Academic persistence (Kim et al., 2018)

Participants used a 7-point Likert Scale to respond.

1. I use different tricks to keep myself working, even if I don't feel like studying.
2. If I lose interest in an assignment, I have ways to boost my effort to get it done.
3. If I feel like stopping before I'm really done, I have strategies to keep myself studying.
4. Even when studying is hard, I can figure out a way to keep myself going.
5. It's easy for me to make myself study, even if I would rather be doing something else.
6. If what I am studying seems unimportant, I can still convince myself to stick with it.
7. If I need to, I have ways of convincing myself to keep working on a tough assignment.
8. If studying gets too boring, I find a way to make it fun.
9. Even if a reading seems pretty pointless, I still push myself to keep going till it is done.
10. If a reading is difficult, I still find a way to stick with it and finish the job.
11. I push myself to keep working even when a reading is really dull.

12. I can force myself to keep reading, even if I feel like giving up.

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