

Advising and belonging among undergraduate women in engineering: A narrative approach

by

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B.S., Emporia State University, 1996

M.S., Emporia State University, 1998

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Special Education, Counseling and Student Affairs
College of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Abstract

Higher education has long recognized women's numerous challenges in undergraduate engineering programs. Several factors contribute to this lack of belonging, including a lack of diversity among student populations, microaggressions, prejudices, and traditions still rooted in male customs. An overlooked factor that may help foster a sense of belonging is undergraduate women's conversations with academic advisors. Other studies have demonstrated that these conversations can contribute to a sense of belonging for underrepresented student groups. Faculty academic advisors, primary role advisors, and peer advisors are crucial in helping students connect with their educational, career, and life goals.

This qualitative study focused on the following research question: To what extent do conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering? Using narrative inquiry to examine the stories women shared about their academic advising experiences, three themes emerged from the findings and underscore how these conversations contributed to feelings of belonging among undergraduate women in engineering. The first theme involves conversations with academic advisors who provide personalized support and guidance. The second theme revolves around conversations with academic advisors who offer encouragement during challenging experiences. The third and final theme concerns participation and engagement in conversations with peer advisors. This study highlights the positive impact that academic advising can have in fostering a sense of belonging among this population.

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Chapter 1 – Introduction

Twenty years ago, the Committee on Equal Opportunities in Science and Engineering (CEOSE; 2004), a congressionally mandated advisory committee to the National Science Foundation expressed concern about the shrinking number of science and engineering graduates. In 2007, revised in 2010, the National Academies of Science, Engineering and Medicine (NASEM) presented “Rising above the Gathering Storm” to a bipartisan group of policymakers in the U.S. House and Senate. The purpose of the report was to provide “the top ten actions, in priority order, that federal policymakers could take to enhance the science and technology enterprise so that the United States can successfully compete, prosper, and be secure in the global community, . . . [including an] implementation strategy, with several concrete steps to implement the actions” (p. xi).

In 2010, considering the objectives of the NASEM, one Midwestern state’s governmental leaders and higher education administrators met to discuss the impending shortfall of engineering graduates and the economic importance of the profession to the state. According to a summary of those meetings, officials projected a substantial shortage of engineering graduates. This Midwestern state depends on engineering and related occupations to have a robust economy. More specifically, these professions contribute to one-third of the statewide payroll and tax base. As a result, a strategic plan between the state’s Board of Regents, Department of Commerce, and Workforce Development Board, private industry, and three public universities was developed “to ensure engineering industry partners find new talent, designs, and techniques needed to fuel economic growth and business successes in the state” (Board of Regents, 2024, para 1).

The University Engineering Initiative Act resulted from the meeting of those invested leaders. Designed to address the state’s engineering shortage by recruiting more undergraduate

students, this multi-year statute aimed to increase the number of students who graduate to expand the capacity and infrastructure of the state's engineering schools. The act uses tax dollars that the state legislature invests, \$105 million over 10 years (2012–2022) for engineering education, with the understanding that institutions, along with the support of industry and the private sector, will match this \$105 million investment. Hence, \$210 million is devoted explicitly toward the education of engineers. The program received a 10-year renewal that began in July 2022. No federal dollars are attached to this initiative (B. Flanders, personal communication, July 14, 2015).

Additionally, a decline in enrollment at state universities and drastic reductions in state support for years (Delaney & Marcotte, 2024) make it imperative that public higher education institutions help students persist through graduation. Students who leave engineering before graduating have multiple costs that constitute expenses at the individual, institutional, and societal levels, so higher education must help these students succeed. When individuals leave engineering before graduating, they experience a substantial loss in their earning power over the long term because engineering careers are high-demand, high-paying jobs. This loss is particularly significant for women and their earning power. The economic impact of engineering careers is substantial because of their higher personal per capita income and higher state tax base, which contribute to a more robust economy (Dahl et al., 2023).

Federal research initiatives and interventions to support women in engineering have nearly amounted to a separate industry. However, women still earn only approximately one-quarter of all degrees in engineering nationwide (Trapani & Hale, 2022). Studies have shown that women in engineering often feel isolated inside and outside the classroom despite decades of attempts at broadening participation with underrepresented groups (McKoy, 2019; Ong et al.,

2020). To account for the persistent underrepresentation of women in engineering, researchers have begun to study their experiences more closely. One of the critical factors identified in the recent literature is a sense of belonging. This finding is significant because a sense of belonging may be one of the keys to student success (Salazar et al., 2022; Strayhorn, 2019; Wilson & VanAntwerp, 2021).

Previous research on the national level on the success of women enrolled in engineering education programs has focused on individual characteristics. These studies have sought to explain the lack of presence of women due to biological reasons or intelligence. A large body of research-based evidence has dispelled these notions, while more current research has focused on institutions and barriers in the academy (Hill et al., 2010; Ong et al., 2020). In contrast, I argue that identifying the factors that positively influence a sense of belonging for women in the engineering field is essential.

A sense of belonging refers to a student's "perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff, and peers" (Strayhorn, 2018, p. 4). Evidence suggests that a sense of belonging is essential for underrepresented students, particularly in STEM education programs. Specifically, student connectedness with others beyond the classroom also influences their commitment to learning and their ability to overcome obstacles (Rodriguez & Blaney, 2021).

Academic advisors are often the first relationships students have outside the classroom. Quality academic advising is essential because the experience often helps students integrate into an institution. Additionally, academic advisors have valuable knowledge about classes, course

content, and other relevant opportunities within their department and the university, which may be critical success factors for students in higher education settings (Yuan et al., 2024).

Quality advising is a meaningful institutional experience that can increase a student's sense of belonging. Indeed, previous research has found a connection between quality advising and an increase in feelings of belonging (Ahn & Davis, 2019). What remains lacking in the literature is a better understanding of how conversations with academic advisors influence a sense of belonging, particularly for women in engineering.

Statement of the Problem

Why does the success of women in engineering matter? Several reasons exist. First, engineering degrees have some of the highest economic returns for an undergraduate education. Moreover, these careers are projected to have above-average long-term growth until 2030. This statistic is significant for women because high-paying positions provide economic power and prestige and hold considerable social capital. Due to the low number of college graduates in this field, broader educational practices that impact women in engineering must be explored (Burke et al., 2022).

Second, the engineering workforce needs women to avoid the impending shortfalls of engineers and related careers because engineering positions are the foundation of the state's economy. In *Practical Wisdom and the Value of Cognitive Diversity*, Jefferson and Sifferd (2022) made a compelling argument for including diverse viewpoints in what the authors called "cognitive diversity," or simply differences in how individuals think. Their concern was not specifically with gender but with bringing people from various backgrounds together to examine complex local and global problems. Jefferson and Sifferd (2022) argued that multiple ways of problem solving can lead to far better solutions and progress than those suggested by a

hegemonic group of individuals. A diverse workforce, which includes gender diversity, can help meet innovation demands and lead to productivity in complex environments (Charlesworth & Banaji, 2019; Wilson & VanAntwerp, 2021).

Third, research has shown that many women report feeling a lack of belonging in various male-dominated academic programs. Several factors support this argument, including a lack of diversity among student populations, microaggressions, prejudices, and traditions still steeped in male customs. Numerous recent studies have shown that feelings of belonging in higher education positively influence student success outcomes. Included in the list of student success outcomes are higher levels of motivation, an increase in student identity, meaningful academic engagement, improvement in mental and physical health, increased persistence, and achievement (Barry et al., 2021; Gopalan & Brady, 2020; Kirby & Thomas, 2022; Pedler et al., 2022).

Several other studies have shown that quality academic advising can foster a sense of belonging among many underrepresented student groups. Academic advisors serve a vital role in helping students make connections between their educational, career, and life goals. Thus, these advisors may help students become more reflective and strategic about their choices and the learning in which they are involved (Kinzie & Lofton, 2022).

It is also noteworthy to point out that quality advising for engineering students is a criterion for Accreditation Board for Engineering and Technology (ABET) which aims to assure high standards at higher education institutions (ABET, 2018). However, one national study found that advising was barely recognized in an analysis of continuous improvement plans required as part of the ABET reaccreditation process. Factors that received the most attention were course development, curriculum changes, and faculty feedback. Much less attention was given to academic advising experiences (Azzouni & Parham-Mocello, 2021).

Yet, to date, only limited research has provided insight as to how academic advising influences undergraduate women enrolled in undergraduate engineering programs. Without meaningful analyses, little is known about how conversations with academic advisors may foster a sense of belonging. Understanding the phenomena inherent to quality advising within undergraduate engineering education programs is necessary because increasing students' sense of belonging can positively affect student success outcomes (Pedler et al., 2022).

Additionally, a variety of university representatives can provide academic advising. The most common approach is by faculty who advise through the students' departments (Dean, personal communication, November 2, 2020). However, increasingly, institutions have hired primary-role academic advisors to assist students, mainly first- and second-year students (Higgins et al, 2023). Peer advising is also an approach seen in higher education and are examined in this study.

Based on the most recent Board of Regents University Engineering Initiative (2024) report, Bennett University (BU), the higher education institution that is the focus of this study, has used these resources to increase enrollment, add to scholarships and internship opportunities, and better connect students with industry partners before they graduate. The overall number of enrolled undergraduate engineering students dropped from 2,988 to 2,680—a decrease of 308 students between 2012 and 2023. The total number of graduates per year increased from 480 to 558 over the same period. However, increasing overall enrollment does nothing to help with the graduation rates of those students who are currently enrolled (Dawson et al., 2020).

What is also notable about these data is that the percentage of enrolled students, compared to the total number of graduates, has remained below 25%. For example, in academic year (AY) 2012, 2,988 students were enrolled, with just 480 graduating, or 16%. In AY 2023, the

enrollment number of 2,680 had 558 graduates, or 20% (Board of Regents, 2024). Indeed, the pandemic affected higher education enrollment numbers, which accounted for some of this change; however, enrollment numbers for undergraduate women have remained consistently lower.

Table 1

University Engineering Initiative Scorecard (Board of Regents, 2024)

Year	Total students enrolled	Graduates	Difference
	<i>n</i>	<i>n</i>	%
2012	2988	480	16
2013	3116	471	15
2014	3306	529	15
2015	3450	498	14
2016	3599	494	19
2017	3814	609	16
2018	3653	694	19
2019	3508	691	20
2020	3321	787	24
2021	3022	674	22
2022	2776	635	17
2023	2680	558	20

While the overall enrollment of women at BU has increased yearly since the initiative, parity has remained inconsistent across science, technology, engineering, and mathematics (STEM) fields, particularly in engineering. According to the Office of Data, Assessment and Institutional Research, enrollment for women in the College of Engineering at BU dropped from 646 in 2018 to 491 in 2022. As previously mentioned, the drop in numbers may be the continued impact of COVID-19.

Research Purpose and Questions

The primary purpose of this narrative inquiry study is to understand how conversations with academic advisors contribute to a sense of belonging among undergraduate women in

engineering. Limited studies have investigated a sense of belonging specifically for this population and how academic advising fosters feelings of belonging. Evidence suggests that a sense of belonging—a feeling of mattering and connectedness—is essential for underrepresented students, particularly in STEM education programs (Strayhorn, 2019). Several recent studies have reported that academic advising fosters a sense of belonging (Abrica et al., 2022; Clemons, 2022). However, little else is known about the extent to which this phenomenon is reflected among undergraduate women in engineering. Therefore, this study addresses the following research question: To what extent do conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering?

Significance of the Study

This study seeks to contribute to the existing body of literature in several ways. Currently, limited studies exist on the sense of belonging among women in undergraduate engineering programs. Most have focused on STEM rather than engineering. These studies have revealed that a sense of belonging predicts key student outcomes such as engagement and persistence (Batty & Reilly, 2022; Pietri et al., 2019; Stachl & Baranger, 2020; Winterer et al., 2020).

While it is heartening to discover emerging research on students of color in STEM and engineering (Ash et al., 2023; Hayes, 2023; Wallace, 2021), a limited focus on women remains. The utility of using a narrative inquiry approach to studying the academic advising experiences of undergraduate women in engineering is that it attempts to access participants' life experiences and retell their stories. While substantial literature exists on the many challenges women face in engineering, the existing literature offers scant insight into which experiences most influence

women's sense of belonging. Even less research has focused on supportive contexts like academic advising.

Hence, while much emphasis has been placed on belonging in STEM, less attention has been devoted to academic advising. Existing studies have primarily focused on classroom experiences (Lytle & Shin, 2020) or the benefits of feelings of belonging (Lyles et al., 2022). Other studies have focused on living-learning programs (Dison, 2022; González-McLean, 2021). Nonetheless, little investigation has explored academic advising experiences. As a result, considerable work remains to be accomplished, particularly regarding how academic advising fosters a sense of belonging.

Definition of Terms

This study relies on a few terms that warrant specific definitions.

- The first, *advising approaches*, refers to the interactions between representatives from within an institution of higher education intended to support students to successfully navigate higher education (Chan, 2016; Larson et al., 2018).
- This study specifically focuses on students enrolled in the *College of Engineering* at BU, which enrolls nearly 3,000 undergraduate students.
- The term *engineering students* in this study alludes specifically to students who identify as women, are enrolled at BU, are declared in an engineering program, and have completed 30 or more credit hours.

Regarding advising, a few more terms warrant definition.

- *Faculty advising* denotes members within an academic department who have teaching, research, and service responsibilities. In many cases, advising is a component of their service requirements.

- *Primary-role advisors* refer to academic advisors whose main responsibility is to guide and support students within an advising unit.
- *Peer advising* refers to undergraduate students who help with an advising unit's administrative functions and may also mentor fellow students (Berry, 2020). Peer advisors differ from primary-role academic advisors, as university community members whose primary role is to advise students.

Finally, the term *sense of belonging* demands precision.

- This phrase embraces Strayhorn's (2012) conceptual model and is so important that it deserves another mention. A *sense of belonging* is defined as a student's "perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff, and peers" (p. 3).

Summary

Due to impending shortfalls of engineering graduates, BU leaders have increased support for undergraduate education programs to \$410 million between 2012 and 2032 (Board of Regents, 2024). Research suggests that belonging is essential for underrepresented students, particularly in STEM education programs because connecting with others beyond the classroom can positively influence their commitment to learning and can help them overcome barriers. Academic advisors are vital in helping students make connections across their educational, career, and life goals. Research into this vital topic is justified, given the present concerns surrounding the shortage of engineering graduates. The primary purpose of this study is to

describe how conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering.

Chapter 2 - Literature Review

This literature will examine key factors related to the sense of belonging among undergraduate women in engineering. First, the foundations of belonging will be reviewed followed by a discussion of the specific theoretical frame that guided this study. A discussion of the effects of belonging among women in engineering and gender issues in STEM will follow. From there, an examination of academic advising will include approaches to advising, the importance of conversations with academic advisors followed by a discussion of core competencies of effective advising. To understand the role of advising in a student's sense of belonging, current studies will be discussed. This review will conclude with an examination of the different types of advisors and their specific role at BU. However, a brief review of Chapter 1 will set the context for this literature review.

As mentioned in Chapter 1, almost 20 years ago, the CEOSE (2004) expressed concern about a decrease in science and engineering graduates. Thus, the NASEM (2007, revised in 2010) presented "Rising above the Gathering Storm" to bipartisan U.S. House and Senate policymakers. The report listed the top ten priorities federal policymakers could take to enhance science and technology so that the United States could compete, prosper, and be secure in the global community. The report also defined a strategy that included concrete steps for implementation.

According to a 2008 National Academy of Engineering report, engineers "contribute to economic development, quality of life, national security, and health" (p. 2). Engineers influence nearly everything in modern society, including energy sources, the food supply, clean water, housing and other structures, mobility, health, and transportation. The U.S. Department of Education (2019) has expressed concern about the lack of engineering graduates for decades

because engineering, engineering technologies, and many related professions are critical to global competitiveness, national security, and economic prosperity.

As stated, in 2010, governmental leaders and higher education administrators discussed the impending shortfall of engineering graduates and its economic implications. These officials projected a substantial shortage of engineering graduates who contribute one-third of the statewide payroll and tax base. Hence, a collaborative strategic plan sought to ensure “new talent, designs, and techniques needed to fuel economic growth and business successes in the state” (Board of Regents, 2024, para 1).

Substantial research has shown why women avoid or leave engineering education programs. Overall, these studies have shown that women in engineering often feel isolated inside and outside the classroom despite decades of attempts at broadening participation for this underrepresented group (Meiksins & Lane, 2022). Research initiatives to support women in engineering have contributed to a multi-million-dollar industry, yet this group earns only approximately one-quarter of all degrees in engineering (Trapani & Hale, 2022). Despite the challenges faced by women in engineering, some women persist. One primary concept in the literature on student success is a sense of belonging.

Academic advising is a critical component of student success and is one of the primary ways students engage with the campus community. Academic advisors are often a student’s first relationship with a university representative. This service integrates students socially and academically into an institution because academic advisors have valuable knowledge about classes, course content, and other relevant departmental opportunities. The following literature review focuses on two key areas: a sense of belonging and undergraduate academic advising.

Sense of Belonging

A fundamental human need, *belonging*, is an individual's psychological desire to connect with others (Allen et al., 2021). Within the academic domain, based on Strayhorn's (2019) conceptual model, feelings of belonging matter for many underrepresented groups. Strayhorn's model specifically articulates why belonging matters. The following sections explore the foundations of a sense of belonging and the current research on women in engineering programs.

Foundations of Belonging

Maslow (1943) famously described a hierarchy of needs that focused on what motivated people to achieve their full potential. The five levels of the hierarchy include physiological conditions (e.g., food and water), safety needs (e.g., personal security and employment), social needs (e.g., love and belonging), esteem (e.g., appreciation and respect), and self-actualization (e.g., fulfillment of full potential). According to Maslow (1943), belonging includes

[a] hunger for affectionate relations with people in general, namely, for a place in his group, and he will strive with great intensity to achieve this goal. He will want to attain such a place more than anything else in the world. (p. 381)

While empirical data to fully support Maslow's theory are lacking (Rojas et al., 2023), the need to belong is a central tenet of psychological theories. Following Maslow's (1943) hierarchy of needs, Strayhorn (2019) applies these concepts to higher education. In his research, Strayhorn points out that students from marginalized or underrepresented groups, such as students of color or women in engineering, often face barriers to developing a sense of belonging due to social, cultural, or institutional factors like discrimination, microaggressions, or lack of support. However, fostering environments where students feel included and supported can enhance their educational experience, helping them to persist and succeed.

A Theoretical Frame of Belonging

Strayhorn (2018) defines a sense of belonging as "students' perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff, and peer" (p. 4). According to this author, a college student's sense of belonging contains these key tenets:

- Belonging is universal and students have a desire to belong.
- The desire to belong is strong enough to drive a student's behavior.
- Context, time, and other factors determine the relative importance of belonging.
- Feelings of mattering to others on campus impact a sense of belonging.
- A sense of belonging is influenced by a student's social identity.
- Feelings of belonging have a positive impact on several student success factors.
- Belonging is not static and must be satisfied as conditions, contexts, and circumstances shift.

Evidence suggests that a sense of belonging is essential for underrepresented students, particularly in undergraduate STEM education programs. Not surprisingly, connections among students beyond the classroom influences their commitment to learning and their ability to overcome obstacles (Rodriguez & Blaney, 2021). Thus, the author, and others, argue that positive feelings of belonging are critical to marginalized groups (Ahn & Davis, 2023; Rodriguez & Blaney, 2021). More specifically, failure to meet the needs of belonging may cause women social pain, including feelings of rejection, isolation, alienation, and loneliness (Ong et al., 2020).

According to Strayhorn (2018),

The sense of belonging consists of both cognitive and affective elements. An individual assesses his/her position or role in relation to the group (cognitive), which in turn results in a response, behavior or outcome (affective). Sense of belonging, then, reflects the extent to which students feel connected, a part of or stuck to a campus...for example, some scholars measure a sense of belonging as how much others would miss you if you went away (p. 31).

The fourth and fifth tenets, as listed above, were used to examine feelings of belonging and the reasons for doing so will be described now. The fourth tenet of Strayhorn's (2018) posits that a "sense of belonging is related to, and seemingly a consequence of, mattering" (p.36). In one study on Black students' sense of belonging at a predominant white institution, Clemons (2022), using Strayhorn's frame, described participants connections with advisors as positively and negatively related to their sense of mattering. For example, their "the ability to feel as if they mattered through positive and holistic advising experiences held significant influence on the development of their sense of belonging" (p. 94).

The fifth tenet of Strayhorn's work emphasizes how social identities—such as gender, race, ethnicity, or sexual orientation—intersect and shape an individual's sense of belonging. According to Strayhorn (2018), belonging is not a universal experience that everyone attains equally; it can vary depending on a person's social identity and the challenges associated with it. For example, gender can play a significant role in how women in male-dominated fields like engineering perceive their belonging.

Strayhorn (2018) and other scholars, such as Batz-Barbarich et al. (2024), have found that connections with peer advisors can have a significant impact on feelings of belonging for undergraduate women in engineering. The shared social identities between students and

successful peers allow women to relate to one another's experiences, and these connections help them visualize themselves as engineers, solidifying their sense of identity within the field. This process strengthens their belief that they belong in engineering, reinforcing the idea that representation and relatability are key factors in nurturing a sense of belonging.

Strayhorn's (2018) framework underscores the role of peer and academic advisors' role in fostering a sense of belonging. Conversations with advisors, especially those who share similar identities, allow students to feel appreciated, recognized, and relevant in their academic journeys. By offering personalized support and creating positive academic experiences, advisors help foster an inclusive environment where students feel connected, valued, and more likely to persist in their studies.

Strayhorn's framework also highlights the critical role of mattering and social identities in helping college students develop a sense of belonging. The following section will explore the impact that belonging has when students feel understood and what contributes to a sense of belonging. Research on the sense of belonging among undergraduate women in engineering will also be discussed.

Impacts of Belonging

In the broader literature on equity in higher education, studies have indicated that developing a sense of belonging is critical. As previously mentioned, studies have shown that positive belonging influences several student success outcomes (Barry et al., 2021; Kirby & Thomas, 2022; Pedler et al., 2022; Rodriguez & Blaney, 2021). Conversely, additional research has suggested that individuals in college who fear a lack of acceptance due to an underrepresented status may suffer negative impacts on academic performance (McKoy, 2019). This assertion is in line with Strayhorn's (2019) research on belonging. Both McKoy and

Strayhorn posited that people often cannot excel or strive in environments where they feel threatened, vulnerable, or lonely. Specifically, failure to meet the needs of belonging may cause women social pain, including feelings of rejection, isolation, alienation, and loneliness (Ong et al., 2020).

Feelings of belonging happen in the context of relationships. According to the National Survey of Student Engagement (NSSE), students, particularly those from marginalized groups, benefit from intentional actions created by the university that help them develop a sense of belonging. For example, students who experience positive interactions with campus representatives in an institutional context can positively influence a sense of belonging (BrckaLorenz et al., 2021). Specifically, students who connect and have positive relationships with helpful and supportive academic advisors better develop their sense of belonging. Similarly, Rodriguez and Blaney (2021) found that women in STEM who built relationships with others on campus were less likely to experience feelings of isolation.

The literature on the impacts of a sense of belonging has heavily focused on students enrolled in STEM programs. Indeed, few studies have examined how a sense of belonging develops among women in engineering. Nonetheless, understanding what contributes to a sense of belonging may provide valuable insight to help women succeed. The literature lacks details on how conversations with academic advisors contribute to students' feelings of belonging. While a sense of belonging is a concern for all students, marginalized student groups, particularly women in engineering, may be positively impacted by a strong sense of belonging (Wilson & VanAntwerp, 2021). Ways in which a sense of belonging affects undergraduate women in engineering will be discussed next.

Sense of Belonging Among Women in Engineering Education Programs

In engineering education, ample evidence has suggested that many women struggle to belong, including undergraduate programs still steeped in the hegemonic traditions of White men. The literature also cites microaggressions, the lack of role models, a chilly climate, competitive environments, gendered biases, and stubborn gender stereotypes as factors. These negative influences often adversely affect a sense of belonging and are associated with students' loss of interest in pursuing an engineering degree (Campbell-Montalvo et al., 2021; Rodriguez & Blaney, 2021; Wilson & VanAntwerp, 2021).

However, Johnson's (2020) study found that shared identity in a male-dominated environment was necessary for a sense of belonging among women in engineering. Participants reported that a lack of diverse faculty contributed to their feelings of lack of belonging, while sharing an identity with their peers had a positive effect. Students who sought help from others who looked like them were motivated to persist because they found someone to whom they could relate.

Wilson and VanAntwerp (2021) reviewed the literature on belonging for women in engineering. These scholars identified 36 articles that included measurements of belonging, including its antecedents and manifestations. These sources comprised six dissertations, 14 conference articles, and 16 journal articles, five of which were conducted after 2018, with two focused on belonging to STEM. However, none examined academic advising.

One of these studies examined a small engineering school in the Midwest. The participants were asked to share advice about strategies and resources that impacted success in their STEM degrees, although the focus was more specifically on engineering students. A common theme that emerged was the significance of a sense of belonging, which students

discovered through mentorship in professional or cultural organizations. Advising, while mentioned in the literature review, was not a topic in the discussion section. However, Berry and Fenn (2018) mentioned mentoring and described mentors as role models for STEM majors. Nevertheless, students frequently sought out faculty and staff for affirmation, encouragement, and guidance.

Another study looked closely at a sense of belonging in an engineering department but focused on the development of an engineering identity. The authors did not mention academic advising experiences (Godbole et al., 2018). Since the Wilson and VanAntwerp (2021) study, three additional studies have emerged focusing on academic advising and a sense of belonging. These studies are explored below.

Wallace's (2021) study on Black women in STEM found that positive experiences with academic advisors contributed to these women's sense of belonging. Examples included advisors with whom they could relate and with whom they could easily schedule meetings. The study also found that advisors who understood the curriculum and who were willing to share resources acted as positive influences on these women. However, negative interactions arose when the participants felt their advisors were less interested in helping them, which resulted in trust issues. Both positive and negative experiences with faculty advisors, primary-role advisors, and peers contributed to a sense of belonging in some way.

In another study by Abrica et al. (2022), academic and community support, specifically academic advising, reinforced a sense of belonging for engineering students. These students reported that academic advisors who worked to know them individually became a source of strength and contributed to their sense of belonging. Of all the institutional agents, academic advisors often had the most direct contact with students outside of the classroom.

Many current studies on academic advising and undergraduate women have focused on STEM majors or emphasized specific areas within STEM but not engineering (Blackburn, 2022; Loyola & Grebing, 2022; Suárez & Beatty, 2022; Wilson & VanAntwerp, 2021). Other recent studies have focused on women who leave engineering to examine the factors associated with attrition or retention (González-Perez et al., 2022; Morris et al., 2019; Whitcomb et al., 2020). According to Zhao and Liu (2021), the current literature provides a considerable understanding of the obstacles that undergraduate women encounter. However, at present, studies have rarely investigated factors positively influencing this population. Quality academic advising may be one of those important factors and will be discussed after a brief discussion of gender issues in STEM.

Gender Issue in STEM

The overall enrollment of women in higher education institutions has increased yearly since 1980, with U.S. females earning 57% of bachelor's degrees overall and nearly 50% of all STEM bachelor's degrees (Hussar et al., 2020). Previous research, now viewed as antiquated, on the success of women in STEM, focused on individual characteristics and sought to explain their lack of presence in STEM due to biological reasons or intelligence. A large body of research-based evidence has dispelled these notions, and today, the issue of a female's capacity to succeed no longer exists, yet significant gender gaps persist in the physical sciences and engineering (Trapani & Hale, 2022).

Females have made strides in almost all areas of higher education and are well represented in biological sciences and across many other STEM areas; however, parity has been inconsistent across fields, particularly in engineering (Hussar et al., 2020). Engineering remains one of the most gender-segregated fields in STEM. Research initiatives and interventions to

support females in engineering have nearly amounted to industry, yet the national graduation rate for undergraduates in engineering remains below 22% and has risen just 1.4% over the last ten years (Hassar et al., 2020; Trapani & Hale, 2022).

When advisors acknowledge and validate the unique challenges women face in engineering, it helps students recognize that their struggles are a normal part of the journey. This validation can reduce feelings of isolation and self-doubt. Advisors who encourage perseverance through setbacks play a key role in building students' resilience. In one study, Gray et al. (2024) found that perceived support from academic advisors had a statistically significant impact on students' resilience levels.

Females fail to graduate at the same rate as their male counterparts in engineering. Additionally, little research exists that explores conversations with academic advisors and women in engineering. A new perspective must be added to the understanding of academic advising in engineering, which may have implications for the sense of belonging among students (Byrd & Kerns, 2019).

Next, I will provide a brief history of academic advising, followed by an explanation and overview of various advising approaches including both prescriptive and developmental advising. This section will also address the importance of advising conversations and will explore the skills and competencies that foster feelings of belonging.

Academic Advising

Academic advising is a complex process that involves students' conversations with campus and community members, which empowers students to successfully navigate their college environment (Larson et al., 2018). The origins of academic advising date to approximately 1635, when universities were newly established. During this time, students and

faculty shared the same spaces. They lived as “a large family, sleeping, eating, studying, and worshipping together under one roof” (Rudolph, 1962, p. 88), with administrators largely serving in loco parentis. Faculty taught mathematics, Latin, Greek, history, philosophy, and courses related to religion and moral development (Frost, 2000). The curriculum was described as rigid, and students had few choices concerning it (Kuhn, 2008).

Between 1870 and 1970, American institutions of higher education expanded their curriculum beyond the liberal arts to incorporate vocational programs and electives (Kuhn, 2008; Rudolph, 1962; Thelin, 2011). As a result, students had choices in selecting classes, which resulted in the “recognition that size and the elective curriculum required some closer attention to undergraduate guidance” (Rudolph, 1962, p. 460). Advising was less rigid but still prescriptive, designed to help students make curricular choices (Cate & Miller, 2015).

A new era of advising began with the publication of Crookston’s (1972) “A Developmental View of Academic Advising as Teaching.” Crookston’s seminal article was one of the first to define and examine academic advising. He applied student development concepts to academic advising and posited that planning for the college student “should be placed in the context of a life plan” (Crookston, 1972, p. 5).

Crookston (1972) described two types of advising: prescriptive and developmental. He compared prescriptive advising to the relationship between a sick patient and a physician. The physician diagnosed and prescribed a specific course of action, and the patient followed the recommendation with little to no discussion. Thus, the prescriptive style focuses on academic matters like course registration and degree completion. In contrast, developmental advising was described as a collaborative effort between the student and the advisor in which a personal

relationship developed. Crookston described advisors as individuals who helped students with goal setting, problem solving, decision-making, and personal growth and development.

O'Banion (1972) also formulated an advising model based upon a developmental advising construct in his 1972 article "An Academic Advising Model." He posited a five-step linear process that emphasized the exploration of life and vocational goals as precursors to choosing a major and to scheduling courses. O'Banion (1972) wrote, "Students are responsible for making decisions throughout the process. It is the responsibility of the adviser to provide information and a climate of freedom in which students can best make such decisions" (p. 11). The works of Crookston and O'Banion are discussed in detail later in the discussion.

The faculty continued to be the primary contact for students' academic advising needs until the 1970s. While recognized as experts in their respective academic disciplines, faculty members were often inexperienced at guiding students through complex systems that involved academic, environmental, and interpersonal issues (Folsom et al., 2015). Simultaneously, primary-role advisors grew in numbers as campus administrators recognized that quality academic advising was more of a process than a "one-stop shop" (Grites & Gordon, 2009). The benefits of peer advising were also recognized as correlated to other forms of advising. Thus, its use has grown for decades (Latino & Unite, 2012).

Academic advising is a conversation between someone serving in an advising capacity and a student. As previously discussed, advising can occur through several roles. However, a fundamental outcome of the practice of advising is a successful college experience, which often results from the development of a relationship between an advisor and a student. When conversations happen and relationships are developed, students can more fully explore their educational goals and plans (Larson et al., 2018).

Support for students has been a part of higher education since the 17th century. Academic advising has evolved from in loco parentis with little student input to an intentional practice of support across several programs and departments. As previously mentioned, the current literature describes two predominant approaches for academic advising: prescriptive and developmental styles. The next section reviews these with an emphasis on their developmental styles.

Approaches to Advising

A considerable amount of literature has compared advising approaches. Prescriptive and developmental processes permeate this literature (Alvarado & Olson, 2020). Therefore, exploring these approaches is essential to establish a shared understanding of their differences.

Prescriptive Advising

Crookston (1972) described prescriptive advising as authoritarian and compared it to the relationship between a sick patient and a physician. The physician diagnosed and prescribed, and the patient did what was recommended with little discussion. Put another way, in prescriptive advising, an advisor would not address more comprehensive academic concerns. Rather, the advisor would address specific questions asked by the student. Thus, the prescriptive style focuses on academic matters like course selection and registration, degree completion, and other curricular conversations.

Prescriptive advising can be criticized for being limited. The nature of the conversations does not necessarily address the unique student in a comprehensive way. However, research has suggested that students desire this approach. Students need accurate information and support about navigating the institution (i.e., prescriptive), just as they need academic advising that connects their academic, career, and life goals (i.e., developmental). Certain students benefit most from experiences that combine elements of both advising styles. For example, Harris

(2018) questioned the assumption that students preferred a developmental advising approach and investigated whether students preferred a prescriptive or a developmental style of advising. The study found that students preferred advising related to their requirements for graduation, course selection, planning a course of study, and exploring career options—thus, prescriptive advising.

Developmental Advising

By comparison, O'Banion (1972) described developmental advising as a relational conversation between students and advisors who assist with goal setting, problem solving, decision-making, and personal growth and development. These meaningful conversations influence undergraduate students' sense of belonging. If done well, academic advising provides students with a source of strength and support.

Lowenstein (1999) argued that developmental advising is not a style of advising that is the opposite of prescriptive advising. Instead, he suggested that developmental advising is a theory concerned with the content of advising and likened developmental advising to that of teaching. This author proposed an advising model focusing instead on a learning-centered paradigm concerned with cognitive growth and development (Lowenstein, 2005). According to this scholar, Lowenstein (2013) argues that “advising is fundamentally an academic activity focused on teaching and learning as well as the integration of each student’s curriculum” (p. 257) and involves more than the mere transfer of information but also seeks to enhance individual student development through active learning (Lowenstein, 2005). Byrd and Kerns (2019) study found that students preferred academic advising that involved more significant interaction with advisors than provided through a prescriptive advising model. The findings from this study underscored the importance of critical interactions between academic advisors and women. Byrd and Kerns found that female students reported a stronger desire for a developmental approach to

advising than male students. Hence, these authors advocated for a qualitative investigation into the academic advising experiences of women in engineering. The present study seeks to partially fill this research gap.

Conversations resulting from a developmental advising approach may begin a meaningful relationship between academic advisors and students. Several studies have determined that students desire a relationship with their academic advisors. The results from these studies found that an advising approach that demonstrates care and support for students helps students develop a psychological sense of community through interpersonal connections and positive reinforcement. These findings underscore the value students find in meaningful interactions with academic advisors (Johnson et al., 2023). The importance of meaningful conversations between academic advisors and students will be discussed next.

Conversations Matter

Academic advising is often the first conversation students have with faculty and staff members. According to the BU College of Engineering website, academic advising for engineering students is identified as part of student success and is described as “a decision-making process in which advisers assist students with establishing their academic and career goals and guide them through the courses and activities to accomplish those goals” (College of Engineering Academic Advising, n.d., para 1). This service integrates students socially and academically into an institution (Strayhorn, 2019).

Academic advisors play an important role in helping students make meaningful connections, which helps students become more reflective and strategic about their academic choices (Winterer et al., 2020). Relationships that result from a developmental advising approach may catalyze a meaningful relationship between advisors and students. Recent studies have

determined that students' desire to have relationships with their academic advisors with a marked preference for a developmental style of advising that includes conversations that demonstrate care and support. Indeed, students develop a psychological sense of community through interpersonal connections and positive reinforcement (Freshour, 2023).

Students are interested in being partners in advising and are more likely to take an active role if they sense trust between them and their advisors. The findings from related studies underscore the value students find in meaningful conversations with their academic advisors (Parks, 2023; Pitts & Myers, 2022). Conversations that support and encourage students are critical components of quality advising, especially when academic advisors interact with students from underrepresented or marginalized groups (Abrica et al., 2022). Due to the significance of the advisor and the student conversation, Strayhorn's sense of belonging framework was used to explore aspects of the undergraduate engineering student academic advising experience.

The previous section examined various advising approaches. This discussion emphasized the importance of advising conversations. The following section will delve into the core competencies essential to the skill set of academic advisors, with a particular focus on the relational competency in fostering a sense of belonging.

NACADA Core Competencies

NACADA: The Global Community for Academic Advising (2017) described three core competencies as foundational to effective advising, which were designed to provide specific skills advisors ought to develop. These included conceptual, informational, and relational competencies. The conceptual component provides the context for academic advising delivery and covers the ideas and theories advisors must understand to advise students effectively. A few examples include the history and role of academic advising, theories relevant to academic

advising, and approaches and strategies. The second core competency is the informational component, which involves institution-specific information, curricular information, and some student population characteristics. The third competency is crucial for building strong relationships with students. One key aspect of this is the importance of developing strong communication skills. These descriptions are incomplete but provide a sense of the professional competencies of the academic advising community.

Of these, relational competency is important for fostering students' sense of belonging. Competency ensures that academic advisors are well-equipped to support students holistically. Competencies in this area identify skills related to articulating an individual advising philosophy, creating relationships with students and other support services on campus, developing inclusive and respectful communication, and participating in the ongoing development of self and advising practice (Collins, 2023).

The relational competency is considered essential to building relationships with students and is closely aligned with developmental advising in that they both emphasize the interactions between an academic advisor and the advisee (Snyder-Duch, 2018). A few examples of relational competencies include establishing rapport, developing trust, as well as honest and respectful communication. However, too often opportunities to develop and enhance this competency were the lowest among the three components of academic advising and largely absent from advising training and professional development opportunities (McGill et al., 2020a). In one study on faculty advisors' development of academic advising knowledge and competencies, participants in that study discussed using previously learned relational competencies in developing advising approaches and skills. They did not describe experiences in learning relational competencies in their work as advisors (Twiton, 2020).

Role of Academic Advising in a Student's Sense of Belonging

Academic advising has a role to play in the development of a sense of belonging.

Advising comprises some of the few conversations in a college student's experience focused on them alone. The following section will explore studies that indicate conversations with academic advisors as positive influences on students' sense of belonging and mattering in higher education. They primarily focus on faculty advising and primary role advisors.

Lawson et al. (2018) examined faculty advising behaviors that support and encourage women in male dominated academic majors. The results determined that personal connections, specifically academic advising, positively influenced a sense of belonging. Examples included learning students' names, providing opportunities for students to engage outside of class, and forwarding helpful information related to internships and jobs. Additionally, the amount of time students spent with their academic advisors buffered them against negative experiences impacting their sense of belonging.

Interestingly, Lawson et al. (2018) found that the gender of the faculty member had no impact on the level of support felt by the student. It has been a commonly held belief that more women in faculty roles in STEM education programs are essential in supporting and encouraging women. However, the Lawson study suggested that gender alone was insignificant. Students reported that the faculty member needed to be viewed as competent, likable, and approachable, while overall gender had little influence.

Another notable study by Abrica et al. (2022) focused on underrepresented students in STEM. The authors found that holistic and structured opportunities, specifically within academic advising, were the starting point for developing students' sense of belonging. Like Lawson et al.'s (2018) study, Abrica et al. provided evidence that advisors who invested their time and

energy into knowing students individually were a source of support and solidified feelings of belonging. Other factors included academic and community support in the form of connecting with other students who were of similar backgrounds and identities.

Moreover, Yenney's (2020) academic advising case study on rural higher education students identified emergent themes related to advising and belonging on campus. These themes included the importance of building rapport, setting clear expectations, incorporating positive feedback, developing rapport through small talk, and catching up from previous appointments, all of which positively influenced a sense of belonging. Setting expectations involved academic advisors taking the time to explain or reinforce previous explanations about how complex college systems impacted students' feelings of belonging on campus. These actions were meaningful because sharing knowledge empowered students to take control of their educational journeys. Genuine, positive academic advisor feedback also significantly influenced these students' belonging, which bolstered their confidence.

International students have also been the focus of research about academic advising and a sense of belonging. This group has a unique set of challenges, including language barriers, changes in their support systems, and successfully navigating the American higher education system. A study by Lau et al. (2019) found that academic advising had the largest affect and was the most oft-cited campus service that contributed to international students' sense of belonging. There was also a noted increase when students used student services and interacted with academic advisors.

The results from the above studies indicate that quality advising and conversations with academic advisors positively influence students' sense of belonging in higher education. This theme may have implications for women in currently male-dominated academic environments

like engineering. However, minimal research has been undertaken to understand this group of students. Therefore, this study seeks to understand the extent to which conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering.

A few other academic advising factors were identified in the literature that may foster a sense of belonging. These include the different approaches to advising, as previously discussed, as well as the types of academic advisors. Because advising experiences can differ based on these factors, each must be investigated to determine which factors most influence a sense of belonging. The next section overviews distinct types of advisors.

Types of Academic Advisors

According to the BU College of Engineering website, academic advising for engineering students is identified as part of student success. Within the College of Engineering, academic advising is delivered in multiple ways. The following section describes the three primary advisor types: faculty academic advisors, primary-role advisors, and peer advisors.

Faculty Academic Advisors

Faculty advising is the most traditional form of advising and is often considered the standard approach at most institutions. Professors are usually assigned to students based on their academic majors. Indeed, professors are closest to the curriculum and have valuable knowledge about their departments' courses and programs, so they are aware of career opportunities and educational experiences that can support students by helping them make connections between their academic, career, and life goals (Patrick et al., 2022).

Faculty academic advisors in the College of Engineering have many responsibilities beyond academic advising. They are engaged in teaching and research, yet often, academic

advising is considered a portion of the service responsibilities for those on a tenure track.

According to an administrator at the College of Engineering, faculty advising is the primary way students receive academic advice. All upper-level engineering students receive academic advising through faculty in their respective departments. Students may be assigned to faculty members in smaller departments for their undergraduate study. However, in larger departments, advising first- and second-year students may be the responsibility of primary-role academic advisors (Dean, personal communication, November 2, 2020).

Primary-Role Academic Advisor

Even though faculty advising has been the dominant approach in higher education, the primary-role academic advising model has grown in popularity. One reason is that faculty responsibilities have steadily increased with additional pressure to teach, conduct research, publish findings, and obtain grant funding. Primary-role academic advisors offer essential advantages to student success since they are often trained in student development and are better equipped to address students' needs, ranging from mental and physical health issues, food insecurity, family dynamics, and other concerns that may impact their ability to be successful in college. Primary-role academic advisors are typically employed full-time and are not on the tenure track. However, some may hold instructor roles within an institution. Courses taught may include career exploration classes, first-year seminars, and employment preparation content (Clemons, 2022).

According to the College of Engineering Directory (2024), four primary-role academic advisors work with students. Two others have titles of instructor/advisor. Four are housed in Computer Science, one in Electrical and Computer Engineering, and one in Mechanical Engineering, which enrolls more significant numbers of undergraduate students. As indicated in

the previous section, engineering students may have their first advising appointments with primary-role academic advisors and then transition to faculty advising. In this shared approach, students may have valuable insight into how these unique conversations influence their sense of belonging. However, a third approach, peer advising, is discussed next.

Peer Advisor

Beyond faculty and primary-role advising is peer advising. Peer advisors are typically undergraduate students within a department or unit who have specialized training in academic rules and regulations. Thus, they can help with administrative functions like appointment scheduling, course selection and registration, guidance on university policies and deadlines, and discussions related to degree progression. They may provide tutoring and psychological support for academic and career development.

Indeed, peer advising is a valuable supplement to formal advising provided by faculty academic advisors and primary role academic advisors because they offer a unique perspective on being a college student. Peer advising can also provide insight into successful college student behaviors through modeling. Students often report that they value and even desire peer advice because they learn about opportunities for exploration and how they can engage in activities related to academics while discovering new ways for students to connect (Benard, 2022; Lawson et al., 2018; Lyles et al., 2022; Mann, 2020).

In the College of Engineering, peer advising conversations occur in multiple spaces through various experiences. For example, the Scholars Assisting Scholars program provides free tutoring services across core science, math, and computer science courses. The College of Engineering also offers the opportunity for involvement through multicultural engineering

support programs. These include summer programs focused on academic preparation and several student organizations.

Finally, the College of Engineering provides a unique place and voice for women in engineering. Through the Women in Engineering program, students can connect with mentoring services, social activities, professional societies focused on supporting women, and seminars and workshops. Upper-class women help guide first- and second-year students through the challenges of college. These programs provide a space for women to connect and converse about their experiences. Strayhorn (2019) noted that feelings of safety are essential to the development of a sense of belonging for students on college campuses. As such, conversations with academic advisors that influence a sense of belonging may be transformative for undergraduate women who exist in spaces still dominated by male traditions.

Indeed, shining a light on the experiences of this historically underrepresented student population is imperative, especially related to the importance of engineering occupations in the state. The examination of conversations with academic advisors and the extent to which they may impact feelings of belonging among women in undergraduate engineering programs is certainly warranted. Higher education personnel must give more attention to understanding how conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering. Conversations may play a role in underrepresented students' sense of belonging. However, little is known about how conversations contribute to feelings of belonging. In this study, I seek to fill this gap.

Summary

This chapter synthesized the relevant literature on sense of belonging and academic advising. First, the foundations of belonging were discussed, followed by an explanation of the

theoretical framework that will be employed in this study. The chapter then explored the impact of belonging among undergraduate women in engineering, highlighting the role that belonging plays in their academic and personal success. Additionally, different approaches to academic advising were examined, along with the types of academic advisors who interact with students.

The findings emphasize the importance of fostering a sense of belonging, particularly for women in engineering. This study specifically explores how conversations with academic advisors foster a sense of belonging for women in an undergraduate engineering program. The following chapter outlines the qualitative research design of the study, including the use of narrative methodology. Also included will be discussion of participant selection and recruitment followed by an explanation of the data collection. Other important elements of qualitative research are included.

Chapter 3 - Methodology

Qualitative research offers a unique lens through which to explore and interpret the complexities of the human experience. Qualitative research is often highly detailed and includes language that describes an individual's thoughts, feelings, and behaviors to understand the how and why of a phenomenon (Denzin et al., 2023). Qualitative methods are concerned with exploring the human experience and perspective to capture context and nuances often lost in numerical translation (Lim, 2024). Data gathering techniques are most often in-depth interviews, direct observations, focus groups, and journaling as ways to explore social behaviors and interactions. The following discussion involves narrative inquiry, which is the approach used in this study.

Narrative Inquiry

Narrative inquiry is a qualitative research methodology that focuses on understanding and interpreting the experiences of individuals through the stories they tell. It is based on the idea that people make sense of their lives and their identities by constructing narratives or personal stories. These stories are shaped by individual experiences and are also influenced by societal constructs, making narrative inquiry particularly meaningful and a useful method to explore how people experience and interpret feelings of belonging (Kim, 2015).

The primary differences between other types of qualitative research and the narrative approach are seen in the data analysis phase. For example, narrative inquiry asks participants to reflect on a particular experience. This approach differs because it attempts to access participants' life experiences to retell their stories. The narrative approach seeks to understand how research subjects construct meaning from a human experience (Kim, 2015).

Narrative inquiry is an especially valuable methodological approach for understanding the experiences of marginalized individuals. It seeks to reveal valuable insights and reflections (Kim, 2015). Women in undergraduate engineering programs fit these criteria. In this study, I explore the following research question: To what extent do conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering? The following sections describe participant selection and sampling, data collection, narrative interviewing, saturation, data analysis and interpretation, and confidentiality. My positionality statement and the limitations of this study conclude this chapter.

Participant Selection

This research study focused on undergraduate women enrolled in an engineering education program at BU, a large, land-grant public research institution in the Midwestern United States. The university enrolled 15,113 undergraduate students during the 2023–2024 academic year. The College of Engineering offered 14 undergraduate degree programs and enrolled 2,782 campus-based students during this period. Females comprised almost 18% ($n = 498$) of the overall undergraduate population (Office of Data, Assessment, and Institutional Research, 2024).

Participant Recruitment

Narrative inquiry focuses on the in-depth storytelling of individuals experiences. Therefore, care was taken in identifying suitable participants. I contacted the Office of Data, Assessment, and Institutional Research which provided the names and email addresses of potential participants who fit the criteria for this study. Participants in the research study were (a) undergraduate women, (b) enrolled in one of 14 engineering majors offered at the university, (c) who had accumulated over 30 credit hours, and who were (d) continuously enrolled in the

College of Engineering. This participant pool allowed for richness and a depth of understanding of these women's experiences during their multiple years within the engineering context. The following section describes the data collection process. After receiving permission to proceed with this study, I emailed a potential participant list of 288 women enrolled in the College of Engineering. Within 24 hours, 12 women responded, I forwarded each potential participant a link to an online screening tool and the consent form. Each participant completed an online demographic questionnaire, which asked for a pseudonym, major, academic standing, gender, and race. Upon receipt of both documents, individual interviews for a Zoom appointment were scheduled. I systematically worked through the list, beginning with the first respondent and continuing to the next based on when their messages were timestamped. Four participants either canceled or did not respond to the follow-up message to schedule an appointment. The final tally of participants was eight women. Kim (2015) suggested limiting their number because the interview process can be lengthy while uncovering the rich nuances of lived experiences. This study included eight participants aligned with other narrative studies (Geiger, 2023; Rupp, 2023).

All of the participants in this study were traditionally aged, white college women. Six of the women were in their fourth year with the remaining two in their third and second years, respectively. The participants represented a wide range of majors, including construction science and management, environmental engineering, biomedical engineering, mechanical engineering, cybersecurity, architectural engineering, and computer science.

At the start of each Zoom interview, I described the nature of the study, the criteria for participation, and the participants' expectations. I also overviewed the study and explained how I became interested in the topic. Participants were allowed to ask me questions for clarification and then asked to consent to participate in the study. In line with university policy, an email

response from the student's official .edu account was acceptable. One-on-one interviews were conducted over Zoom with a password-protected link for each research participant. Recording allowed me to focus more on the conversation at hand. The resulting audio files from these interviews were used to create a transcript. Interviews ranged from 45 to 60 minutes. Descriptive notes were also recorded during each interview.

Data Collection

According to Kim (2015), data are collected through a semi-structured interview process, which is the most common data collection method used in narrative inquiry. Interviews are conversations with participants to collect experiences and personal explanations. Interview questions are brief to allow participants to share their individual and personalized interpretations of their experiences, including thoughts, feelings, and learnings. Doing so allowed for in-depth exploration of academic advising and a sense of belonging.

Within narrative inquiry, researchers argue for the two-sentence format interview technique. The first sentence establishes the context of the question, while the second provides the structure for the interviewee to answer the question while leaving the opportunity for the responses to be detailed recollections. Following guidance by Kim (2015), open-ended and descriptive questions were developed to encourage personally meaningful responses. The semi-structured interviews consisted of prepared questions, which were used to guide the interview instead of following a list of required questions as common in other types of qualitative research.

The interview protocol consisted of ten questions that asked the participants to discuss conversations with individuals who served in an academic advising capacity related to feelings of belonging. The first several interview questions explored students' experiences as engineering students and feelings of belonging, while the second half examined conversations during

academic advising experiences. The initial discussion at the start of the interview focused on building rapport by sharing my background with the participants, followed by asking questions that allowed them to share their journeys of selecting engineering as their major.

The following interview questions were asked in this study:

- 1) I am interested in learning about your journey to selecting engineering as your major.
Would you share that with me?
- 2) Bennett University is one of three engineering programs in this state. Tell me about how you selected this school.
- 3) Think back to the time before you enrolled as a student. Can you describe how you envisioned yourself as an engineering student?
- 4) One of my areas of interest is feelings of belonging, which I reviewed a while ago during the introduction. As an undergraduate student in the College of Engineering, please describe a conversation that was especially important in influencing your sense of belonging, positive or negative.
- 5) In thinking about your feelings of belonging, could you share a story about a conversation that was especially important in influencing your sense of belonging, positive or negative?
- 6) Feelings of belonging are a topic that is a part of my dissertation research. Academic advising is also a topic that I am studying. Describe your most recent academic advising conversation for me.
- 7) Many students at BU have different types of advisors. Tell me a story about a person, or persons, whom you believe served in an advising role.

- 8) Thinking back to the definition of belonging, tell me a story about any conversation you may have had with your academic advisor that impacted your feelings of belonging, positive or negative.
- 9) I am curious about what you think about academic advising. In what ways could advisors help other women in engineering feel accepted, included, and supported?
- 10) Is there anything we still need to discuss, or would you like to share anything additional about your academic advising conversations and sense of belonging?

Data Saturation

Kim (2015) described data saturation as “a point when new interview data do not yield any new knowledge but merely confirm or are redundant with what has been found in the existing data, or when the interviewee has exhausted all the relevant stories that she or he wanted to share” (p. 161). Saturation should not be confused with completeness or with the idea that nothing new can occur. Instead, saturation occurs when the data are broad in depth and breadth.

After conducting eight interviews, I believe the results provided rich, thick data that reached saturation. The results were transcribed and reviewed between interviews to continually analyze the data. After the completion of interviews 7 and 8, three themes were consistently present in the data that provided insight into the extent to which conversations with academic advisors contributed to feelings of belonging among undergraduate women in engineering.

Data Analysis and Interpretation

As with other qualitative research, data analysis consists of “examining raw data, reducing them to themes through coding and recoding processes and representing the data in figures, tables, and narratives in a final research text” (Kim, 2015, p. 188). In narrative inquiry, data are gathered from participants. The researcher retells their stories using time, place, and

plot, which requires the researcher to “interpret meanings through an analysis of plotlines, thematic structures, and social and cultural referents. These meanings are to be analyzed and interpreted concurrently” (Kim, 2015, pp. 189–190).

The coding analysis process involves analyzing data consisting of actions, events, and happenings to explore themes and categories. The analysis seeks to describe the significance of the lived experience, how events unfolded in the way they did, and why the participants behaved in certain ways (Kim, 2015). Kim (2015) and Polkinghorne (1988) both reminded the researcher that the interpretation and meaning-making process is not straightforward. Data collected from interviews with participants are neither tangible nor static. Thus, the interpretation is solely based on the participants’ recollections. According to Polkinghorne (1988), “narrative meaning functions to give form to the understanding of a purpose to life and to join everyday action and events into episodic units, provides a framework for understanding the past events of one’s life and for planning future actions, and is the primary scheme by means of which human existence is rendered meaningful” (p. 11).

Following Kim’s (2015) guidelines, I read and reread each participant’s biographical information and transcribed data. All participants were asked to share their journeys in selecting engineering as their majors and their reasons for selecting BU. As described by Polkinghorne (1988), the purpose of having all participants describe their pasts was that it allowed them to reflect on previous events (i.e., here, the reason for selecting engineering), which then placed their current experiences as engineering students at the forefront of their thinking. This process allowed for continuity while creating narrative stories. The purpose of this study was to describe to what extent conversations with academic advisors contributed to feelings of belonging among undergraduate women in engineering.

Confidentiality and Trustworthiness

The research participants' privacy was protected to the greatest extent possible. The strategies used included using pseudonyms and removing identifying information. Participants were allowed to select their pseudonyms for use in the study. Member checking was conducted by returning transcribed data to the participants to check for the accuracy of the information and to confirm that all identifying information was removed (Kim, 2015). Enhancing trustworthiness in qualitative research refers to the confidence that can be placed in the truth of the research findings. It is important to note that the nature of qualitative research, and narrative inquiry specifically, is not to uncover universal truths. Rather the purpose is to reveal a person's unique reality. One method to ensure that the findings are shaped by participants' responses and not by researcher bias is an understanding of the researcher's positionality. This will be discussed in greater detail next.

Positionality Statement

Positionality considers an individual's worldview and refers to how a researcher is positioned personally and socially within a given study. Because the researcher's positionality influences how research is conducted, its outcomes, and ultimately, its results, the information must be visible (Hampton et al., 2021; Holmes, 2020). To that end, I am a 52-year-old, White, cisgender, heterosexual woman who has lived in the Midwestern United States for most of my life.

Prior to conducting research for this specific study, I worked as an academic advisor for health professions for almost 19 years. My experiences advising undergraduate students led to my interest in conducting qualitative research to learn more about the experiences of women in

engineering. Through my conversations with women who switched from an engineering degree to a health professions career, I heard stories about a lack of belonging.

I entered this research project in the hopes of collecting stories and perceptions among undergraduate women in engineering. My research interest also includes exploring perceptions of belonging as well as academic advising. I write from the perspective of an academic advisor with a counseling background. My academic training was in vocational rehabilitation counseling, and I worked with people with disabilities in California and Kansas for 6 years prior to working in higher education. In 2023, I left the university and returned to vocational rehabilitation where I help active duty soldiers with service-connected disabilities return to work after their military service.

My positions as advisor and counselor have drawn me to hearing stories. Therefore, I chose a qualitative research method because it fit well with my educational background. Additionally, I have a long-standing personal interest in the success of women. For over 25 years, I have been involved with professional organizations that support women, such as the Kansas League of Women Voters, Business and Professional Women, Stanislaus County Commission for Women, American Association of University Women, Girl Scouts of America, and Women for Kansas.

As the researcher in this study, my positionality influenced my decision to study this population. My own experiences and perspectives shaped my interest in understanding how academic advising conversations contribute to the sense of belonging among undergraduate women in engineering. However, it was crucial for me to remain aware of my assumptions and beliefs and how these perceptions could affect the research process and outcomes. Reflexivity played a critical role in this awareness. As a result, I kept a journal to record my thoughts,

feelings, and reactions to the stories shared by participants. By being reflexive, I recognized how the knowledge I have gained through my life experiences helped me understand the new knowledge produced through this study, particularly the experiences of women in engineering.

Summary

The purpose of this chapter was to provide a thorough overview of the research methodology and the narrative inquiry design. My positionality statement and the limitations of this research design were also included. This study generated rich and insightful data to explain the following research question: To what extent do conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering? The data are presented in the next chapter.

Chapter 4 - Findings

This chapter presents the findings from this research study that sought to answer the following research question: To what extent do conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering? The chapter begins with a brief introduction of each participant, followed by the findings, which include themes and direct quotes from the participants. The chapter concludes with a summary of the research findings.

Participants

Eight undergraduate women enrolled in the College of Engineering at BU participated in this study. The participants selected the following pseudonyms to maintain confidentiality: Anne, Ashley, Elizabeth, Mary, Megan, Peyton, Rowan, and Sophia. All were asked to share their journeys to selecting engineering as their major. Below is a summary of their responses.

Anne

Anne attended a magnet high school that offered education in skilled trades, which confirmed her interest in engineering. Anne felt that the university was serious about research and the investment it demonstrated toward the development of its students. After a tour of the campus and the encouragement of a close family friend, she decided to attend. As an out-of-state student, she received a scholarship, which positively influenced her decision.

Ashley

Ashley attended a high school that offered many career-focused classes. She took several engineering courses at the encouragement of a close friend. She had a strong personal commitment to one specific field within engineering, and she felt that BU offered a strong program. After a visit to the college, she commented on the friendliness of the campus community and how it felt like a place she fit.

Elizabeth

Elizabeth demonstrated strong aptitudes for math and science while in high school. A couple of her teachers encouraged her to consider engineering as a career. She selected her major because she was undecided between engineering and a career as a health care provider. The engineering degree would allow her to complete courses that overlapped with the other program under consideration. However, after taking several courses within her department, she was drawn toward engineering.

Mary

From a young age, Mary was involved in 4-H and completed many projects, including rocketry and electricity. She also grew up on a family farm and was involved with hands-on work with machinery and other activities that were involved in the success of such an enterprise. Math and physics were her strengths during high school. She was unique in that her siblings, parents, and grandparents all attended BU. All of her siblings earned engineering degrees.

Megan

Megan grew up interested in science, technology, engineering, and math. She was fascinated with how things worked and described building things in her garage with tools in her father's toolbox. She loved hands-on work. As a child, she played outside considerably and developed a fascination with nature. Originally, she was interested in being a healthcare provider because she had a strong desire to be of service to others and wanted to protect people. After taking a challenging chemistry course, she felt more drawn to helping others through engineering.

Peyton

Peyton loved math and science courses in high school. After encouragement from a teacher, she found that engineering was something she could be interested in because the career brought together all the concepts that she loved. Mechanics were a long-time interest of hers since she enjoyed challenges, and she liked problem solving.

Rowan

Rowan was in a gifted program in high school. Her mom worked in animal health care, so she felt drawn to the science and math fields. She initially selected engineering because she felt it made her sound intelligent. After completing a few engineering classes, she discovered that the career really fit her long-term career goals.

Sophia

Sophia grew up interested in technology and computers. Her father worked in engineering and pushed for her to become involved in engineering. He was a strong and early influence on her exposure to the profession. She described herself as creative and artistic, which she feels is a good mix for engineering.

These introductions reveal the motivations behind each participant's decision to pursue a career in engineering. Many of their stories highlighted notable achievements and a strong aptitude in STEM while emphasizing the important role of relationships with parents, siblings, or teachers. The following section describes each theme in more detail.

Themes

Three themes emerged from these interviews that provided insight into how conversations with academic advisors contributed to feelings of belonging among undergraduate women in engineering. The first theme was related to conversations with academic advisors that

offered personalized support and guidance. The second theme involved conversations with academic advisors who encouraged these students during and through challenging experiences. The third and final theme involved conversations with peer advisors. In the following section, I describe each of these three themes in greater detail.

Theme 1

Conversations with academic advisors who offer personalized support and guidance can enhance feelings of belonging.

Several women shared that consistent, empathetic, and holistic advising played a role in fostering their sense of belonging. Anne reported that her conversations with her advisor helped with her feelings of belonging because the advisor understood the context of her life. Not only did she have this person as a professor, but she also saw this advisor in an office setting where they spoke one-on-one about topics more personal in nature. She shared that she felt understood by this faculty member:

Having the same advisor for as long as I have had her has been really great because not only does she understand my academic capabilities, but she kind of understands my personal life, too. So, once you are, you know, together for so long, then, you start talking about, like, I worked multiple jobs, and I love my little brother. Just things like that that I don't really disclose to my other professors are, like, or someone who I've only known for a semester year. Just kind of it helps us be more realistic about what I can do in college and what I can do in my career, and it's made for some tough conversations. But, sometimes, those, you know, they need to happen. So, I definitely appreciate the longevity and not only her professional advising but also her, like, personal, like, advising. There's been a couple of semesters where she has sat me down and been like, "I

think we need to change this. I think you could handle this class on top of it.' That's been extremely beneficial, especially in my first couple of years when I didn't have many departmental connections, you know. I didn't have those friends kind of built into the system, so she has been definitely instrumental to that.

Ashley also discussed a faculty member who also served in an advising capacity with whom she had a conversation. The participant had this professor for a course, but she also sought out this person for personalized conversations on issues related to her success as an engineering student. Ashley felt this response expressed commitment to her, which positively influenced her sense of belonging.

There's a professor in the [specific] engineering department. When I had all my classes with her, she just she was such a great teacher and also seemed very personally invested in all of our success. It seemed like she just, she made an effort to get to know us; to make sure we were doing well, not just in her class but looking for internships and looking for jobs and clubs and things like that. Like, she was always pushing us to do good things. And I felt she was especially very kind and accepting to the girls in the class. And it's not that she wasn't as interested in the guys, but it just felt like all the girls had a good relationship with her because she was such a good role model. And she had that, just that, caring for us. Before class every day, she would, you know, just ask us how we were doing, how other classes were going. Just creating that space for us to, you know, share things with her—good or bad. This year I was in a pretty tough senior design project. And she wasn't really tied to that project very much. But, she allowed me and my group to go in and talk to her a lot, just about our struggles, and she gave us good advice.

Just kind of like being a good personal contact, even though she didn't really have an investment in the project itself.

When asked about a conversation with an advisor that influenced her feelings of belonging, Megan described a consistent feeling of support. She described "feeling" belonging during and after advising appointments. She stated that conversations with her primary-role academic advisor positively influenced feelings of belonging:

She's always gone out of her way to reiterate, just in general, she's always there for me if I was ever having any troubles as a woman. It's kind of been a consistent, you know, reiteration in every meeting. I can't think of one super impactful event that occurred. I would just say she's always been very sweet and made it known, you know, she's there for me if anything personal is going on. In terms of not fitting in or feeling like I didn't fit in with my peers, or if I needed any academic advice. I can't really think of a specific groundbreaking moment. So, she's just been a consistent feeling, this consistent sense of support for you. Like, you've never felt like you didn't have anybody to turn to. She just has always kind of been there, and she's just really sweet.

Mary shared similar sentiments about conversations with her academic advisor:

And that advisor was, she was really good. She was really helpful, and I was asking questions. She said, "If you ever need, if you ever have any questions, let me know if you ever need anything, then come in and talk to me." I do think that it's nice to have someone built in, especially like your first couple of years, that you know who you can talk to and ask questions about things if you need to. Like especially with electives, it's nice to have someone to talk to about that. There are so many different lectures you can

take, and if you don't really know where you want to go, it's nice to have someone to help you narrow it down.

Mary went on to describe the importance of conversations with her academic advisor and the impact they had on her feelings of belonging. Through the creation of a supportive environment where she felt comfortable seeking help and asking questions, this advisor enhanced Mary's feelings of belonging:

So, I feel whether it's faculty advisors or student advisors, women engineering mentors, I think the biggest thing is just knowing that or letting the [student] know that you're [the advisor] is there to talk to them and to help them. That your [advisors] door's always open if they need something, like please come in and talk. If they have any questions, please come in and talk, especially for new students. Not having a place that they belong yet or not feeling like they have a place that they belong to is really hard. I feel like that doesn't help with retention rates, obviously like if someone doesn't feel anyone is there to help them. So, I feel the most important thing in advising is just like letting them [students] know that they have someone to talk to. Yeah. If you feel your current advisors can't provide that or they say it, but they don't really mean it. Or if they say it, but you're not feeling it. I haven't really felt that yet from my current advisor anyway. But my past advisor, I definitely did feel that way. And I know that I have, like, other professors as well, like my past advisor, I would still feel comfortable going into to ask questions.

When asked about a conversation with her academic advisor that helped her feel a greater sense of belonging, Sophia replied that her advisor did more than just help her enroll. She emphasized the importance of talking with students to let them know that academic advisors are

available to help with other issues. Enrollment should not be the only time a student speaks with their advisor:

I think [advisors should] make sure that students know that they're not just there to help them enroll, that they're there to talk, regardless of what it's about. It really isn't the only time I talk to my advisor.

Sophia reported on a conversation with her advisor about electives and health issues. The advisor's response impacted her feelings of belonging. By discussing her academic and personal issues, her advisor demonstrated a holistic approach and supported her overall well-being, not just her academic issues. This response demonstrated to Sophia an empathic and comprehensive approach to advising, which positively influenced her sense of belonging:

There is one class or two that I needed for electives, but I wasn't exactly sure. She gave me some options, and I could choose. I really got a heart-to-heart with my advisor. I told her about how well I'd been doing that semester. Mentally, the semester before, I had actually failed all of my classes due to mental illness. Someone close to me died the night before, and I would, I felt like I couldn't ask my parents for help because a family member had passed two months before that. My advisor and I had a heart-to-heart about how much better I was doing and how I actually had friends. She was, she was, oh, very motherly. I think make sure that students know that they [advisors] are not just there to help them enroll. That they're there to talk to regardless of what it's about.

The previous section discussed the first of three themes that emerged from these interviews. The first theme was related to conversations with academic advisors that offered personalized support and guidance. The second theme will be discussed next and involved

conversations with academic advisors who encouraged these students during and through challenging experiences.

Theme 2

Conversations with academic advisors who provide encouragement during and through challenging experiences lead to an increase in feelings of belonging.

Conversations with academic advisors who actively listened to the concerns and experiences of these undergraduate women in engineering helped validate their feelings and provide the necessary support. Feeling understood and supported by an advisor provided a sense of security and normalcy. By providing encouragement, these academic advisors significantly enhanced feelings of belonging.

Anne reported that she struggled to get along with a particular faculty member. She failed the class in the prior semester and was retaking the course. She brought this up with her faculty advisor. The advisor described her own challenges with that person. The validation of her concerns, followed by practical advice, eased Anne's feelings of isolation and inadequacy. By normalizing these challenges, Anne's advisor positively contributed to an increase in feelings of a sense of belonging:

We had a conversation about just how your personalities don't have to match, but you have to figure out a way to be successful together. All it took was me going to his office like once a week. So, having that person [advisor], who kind of has experience with who he is and how he functions around another person, was extremely helpful to guide me through that semester. It kind of made me feel like he was singling me out. I felt like he was, you know, kind of like, 'Oh, she doesn't belong here.' I had that sense of 'he doesn't think I can do it,' but having someone point out that he just doesn't like some people. It

seems silly, but to me, I was taking it very seriously. You know, I was, I was 20 years old. That hurt, right? So, I think having that other person say, 'It's not you. Well, it's partially, but it's not just you.' It was great and made me feel better because I was talking to my other classmates, and it was like, 'Yeah, I don't really, like, hate him.' I was racking my brain. Uh, but having that guidance and that, you know, honest conversation was extremely beneficial, too.

When Peyton was struggling in classes, she had a conversation with an academic advisor, who helped normalize her fears. Her advisor's reassurance and encouragement helped her persevere despite her self-doubts about her capabilities. This specific conversation helped her feel an increase in her sense of belonging and eased some of her insecurities:

I really like engineering, but I was a little worried that it wasn't for me. I was a little worried I wasn't smart enough. I had those feelings. And I went to talk to my academic advisor about it, and she was like, 'No, just trust me.' She was like, 'Wait until the end of the semester, and you'll see.' And I was like, 'I don't know about that. I don't know if it's going to turn out like that.' She was like, 'No, I promise you. Just wait till you see at the end of the semester.' She was like, 'I know it seems really, really difficult right now, but you will see. Your hard work is going to show.' I think when you're [the student] really nervous, and you're having some insecurities about that, be willing to lean into [your advisor] because I think, for some people, you're just definitely too much in your own head. It [advising in the college] is perfect in my opinion because I don't think I've felt like I could my freshman year. But it wasn't like they're going to stop telling me about it [availability of advising] because they had not given up on me. This continued my sophomore year. They were like, 'Hey, you know that this is still open to you. You're

able to do this.' They don't just stop. 'We'll always let you know that it's there for you.'

So, they don't give up on you, which I really like.

However, there were a couple participants whose advising experiences negatively affected their sense of belonging. Rowan talked about her primary role academic advisor. She described him as "a little clueless" and she felt he did not try very hard to know her. This is how she described a conversation during an academic advising experience.

So I kind of avoid talking to my academic advisor if I can. I feel like he doesn't try that hard to really know what's going on with me and my schedule. So I have gone through and meticulously made my four year plan because I have a major secondary major and a minor so I've like gone through and meticulously made my four year plan using all of my flow charts and stuff. My academic advising appointments basically go, I get there 5 minutes early. I walk in, I show him the schedule I've made and he says, 'do you have any questions?' And I say no. And then I'm out. Before, I was actually supposed to be there.

Rowan continued:

I think if my advisor would take the time before a meeting to actually go through what I've planned out and give me real feedback. That would be really helpful because I trust myself to make my own schedule, but it would be nice to have a second opinion and feel like you actually cared about what I'm putting in my schedule. Like, my interests and how the classes I'm picking align with my interests. It would probably be helpful for me if my advisor was a woman.

Mary shared similar sentiments:

Sometimes I feel like the academic advisors, the actual professors that advise maybe don't care as much especially if they don't really know you because I never had any previous experience with this professor. I'd never had her in a class or anything so I never had a chance to go in and meet her before she was my advisor. So I don't feel as comfortable just going in and asking questions because I don't know her. I would probably go into a different professor and ask them for help before my [assigned] advisor.

Conversations with academic advisors who actively listened to the concerns and experiences of undergraduate women in engineering helped validate their feelings and provided the necessary support. Feeling understood and supported by an advisor provided a sense of security and normalcy. By providing encouragement, academic advisors significantly enhanced these students' feelings of belonging. Conversely, academic advisors who showed less interest in the student negatively impact their feelings of belonging.

Several women shared that consistent, empathetic, and holistic advising played a role in fostering their sense of belonging. The connections built during an advising conversation contributed positively to the success of the engineering curriculum during and through challenging experiences. The third theme involved conversations with peer advisors. In the following section, I describe the final theme in greater detail

Theme 3

Conversations with a peer advisor lead to feelings of belonging among undergraduate women in engineering.

The experiences of the following students highlighted the significant impact conversations with peer advisors had on feelings of belonging. Peer advisors were often more

relatable and accessible to students due to their similar experiences and provided valuable guidance and reassurance. The students discussed how important conversations with peer advisors were to their feelings of belonging.

Ashley shared a conversation with a senior who served as her peer advisor when she was a first-year student. She felt that connecting with someone who had accomplished the goal she had set for herself helped her feel a sense of belonging:

And it was my freshman year, and we sat down together for coffee one time, and I did not feel any sense of belonging because it was COVID year and it was really hard to meet people and classes were weird. So, I sat down with my [peer] advisor and she talked about her experiences in the college, and I talked about my experience so far, and it did feel like I belonged because there was someone like me. I guess so. So yeah, just having the ability to relate to her because she was a senior and I was a freshman and, like, seeing that she could, you know, advance through it and get through it and get a job. And she was very successful. I could relate to her so that definitely made me feel like I could belong.

Elizabeth also talked about conversations with a peer advisor. She described a more structured experience which contributed to her sense of belonging. This person provided her with support, guidance, and a sense of companionship, which reinforced her sense of belonging:

We had a structured mentoring program. It wasn't specifically for women in engineering, but I think they attempted to pair women together. And so I had it for a zero-credit class. We had to meet once a week and talk about school, not talk about school, and she was kind of a big sister to me at that point. I really, really appreciated having her on my side.

Walking through struggles and questions and things like that, even if it was just 30 minutes a week. It was really nice.

Rowan shared a conversation with an upper-class engineering student who served as a peer advisor. This experience highlighted the significant role that peer advisors can play in fostering a sense of belonging, especially when there is a natural connection and shared interests. Rowan felt welcomed and integrated into the engineering community—some of the feeling of belonging directly related to a conversation with an upper-class student who became her friend.

When I came in as a freshman, she was my mentor through Women in Engineering (a student organization). And so the program doesn't, like, always work out that well because you have to connect with each other, and there's not a lot of involvement from some of the people in charge. But me and my mentor, we just ended up being in, like, a lot of the same clubs and stuff. And we've become really, really good friends. And so she's just always made me feel like I belong because she's in my major. She's just very easy to relate to. She's always been willing to help me and like look at my schedule if I'm worried about something, and we've been on a lot of trips together because we're in a lot of the same clubs. She's just been a really good person in my life who has made me feel welcome.

Rowan's next response reinforced the importance of conversations with peer advisors in fostering feelings of belonging. This person provided practical advice on course selection and offered guidance that was more impactful than any other advice she had received. Rowan responded with the following peer advisor example:

The girl I talked about earlier, who was my mentor freshman year. She's always really helpful because I'd say here are these classes I'm taking and she's like, 'oh yeah, like this is a good class.' She's been more helpful as an advisor than anyone really.

During one conversation, Megan's advisor asked specifically about feelings of belonging. The student felt that her advisor's proactive approach to fostering a supportive environment and her concerted effort to connect her with peer advisors helped with her feelings of fitting in:

She brought up, you know, 'Do you see any women struggling? Do you see any women that need me, need help.' They [departmental personnel] typically go out of their way to do that because, I think, you know, all-female clubs or all-female meetups or anything like that are great. She's reached out to me a few times and to make sure that I personally, as a woman, that I'm good. And you know, if I've noticed any other female in the major struggling that she could possibly help with or help try to get them connected with other women.

Summary

Participants in this study shared the variety of conversations with academic advisors that contributed to their sense of belonging. As described above, three themes were identified. The first theme was related to conversations with academic advisors that offer personalized support and guidance. The second theme involved conversations with academic advisors who provided encouragement during and through challenging experiences. The third and final theme involved conversations with peer advisors. The next chapter includes a discussion of the research findings with the limitations of the study, implications for practice, and recommendations for future research.

Chapter 5 - Discussion, Implications, and Conclusion

The purpose of this chapter is to make meanings to the findings of this study in the context of the existing literature and the theoretical framework. Conversations within an advising context among undergraduate women in engineering enrolled at BU were presented in Chapter 4. A synthesis of the eight participants' experiences is explored in this chapter. Additionally, the implications for research and future practice follow, with the study's limitations and a summary.

Discussion

While the importance of academic advising and a sense of belonging has been documented by previous scholars (Abrica et al., 2022; Lau et al., 2019; Lawson et al., 2018; Ohrt, 2018; Yenney, 2020), academic advising's impact on the sense of belonging among undergraduate women in engineering is missing. These findings sought to fill a gap in the literature regarding the extent of conversations with academic advisors among this unique set of students. More importantly, these findings highlighted the current landscape of academic advising and a sense of belonging at BU by offering valuable insights.

The following discussion occurs through the sense of belonging perspective (Strayhorn, 2018) to illuminate how conversations with academic advisors contribute to a sense of belonging among undergraduate women in engineering. Strayhorn posited that feelings of belonging exist in a relational context and defined a sense of belonging as "students' perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff, and peer" (p. 4).

The study was guided by the following research question: To what extent do conversations with academic advisors contribute to a sense of belonging among undergraduate

women in engineering? Three themes emerged from the interviews that told a story of how conversations with academic advisors contributed to feelings of belonging. The first theme concerned conversations with academic advisors offering personalized support and guidance. The second theme involved conversations with academic advisors who encouraged students throughout challenging experiences. The third and final theme involved conversations with peer advisors who fostered a sense of belonging by providing relatable, supportive, and empowering guidance.

First, and unsurprisingly, research from this study aligns with previous research on the importance of both prescriptive and developmental advising. Second, this chapter discusses the value of strong communication skills for those who serve in more formal academic advising roles, as aligned with core competencies described by NACADA: The Global Community for Academic Advising (2017), and more specifically, relational competency. This discussion continues with implications for practice and future research as well as limitations of the research study. First, however, this discussion begins with the value of prescriptive advising.

Prescriptive Advising

Prescriptive advising conversations are often described as negative because they are focused almost solely on academic matters like program selection, course registration, and degree planning. However, prescriptive advising continues to be essential to the advising experience (Shryock, 2024). Participants in this study described conversations that often began with course selection. The students wanted and needed to know their degree requirements and thought that academic advisors should serve as informational resource providers. The students found comfort in knowing which courses remained, which allowed them to relax and move into a more developmental conversation.

For example, Sophia spoke with her advisor about elective courses required for her degree. Then, the conversation moved into more personal issues, specifically her mental health, after two people close to her passed away. Sophia said, “They [advisors] are not just there to help them [the student] enroll. They are there to talk to regardless of what it is about.” Thus, faculty and primary role advisors who created space for conversations to continue beyond prescriptive advising may increase feelings of belonging. Therefore, while prescriptive advising may continue to be viewed less favorably, it serves a valuable role in the success of students (Shryock, 2024).

Students need prescriptive advising, but developmental conversations can positively influence feelings of belonging. According to Crookston (1994), developmental academic advising “is concerned not only with a specific personal or vocational decision but also with facilitating the student's rational processes, environmental and interpersonal interactions, behavioral awareness, and problem-solving, decision-making, and evaluation skills” (p. 5). This is discussed further in the following section.

Developmental Advising

In this study, the students described conversations with academic advisors that extended beyond simply giving information and course selection. This included assistance with not only their educational journey but also their career and life plans. For example, Anne’s conversation with a faculty advisor about a professor with whom she was having challenges helped Anne understand that the issue was not with her alone. Anne felt singled out and challenged in class regularly. The negative experience affected her feelings of belonging. The faculty advisor with whom she spoke shared her own experiences with the challenging professor and guided Anne

through an honest conversation about different personalities and the importance of working together.

Below are three additional examples of how developmental advising conversations positively influenced students' feelings of belonging. Ashley's and Megan's experiences highlighted the significant impact regular and meaningful conversations with their advisors had on their sense of belonging. By consistently checking in and showing genuine concern for Ashley's well-being and academic progress, her academic advisor provided personalized support, which made her feel valued and understood. Megan also described the consistent support demonstrated by her advisor, and the experience positively influenced her feelings of belonging. Mary shared that her advisor created space for her to have a conversation, which allowed her to share her concerns and frustrations; as such, she felt the advisor listened with care.

Vocational and life planning are often part of a developmental advising conversation. As previously discussed in this study, Ashley, Megan, and Mary spoke about conversations they had with their academic advisors in which the advisors listened and offered guidance on internships, jobs, clubs, and class projects. Ashley discussed struggles and felt supported by her academic advisor. Megan and Mary had similar conversations with their academic advisors, who created a supportive environment where they felt comfortable seeking help and asking questions. Specific words they mentioned include listening, validating, encouraging, supporting, and the opportunity to converse with someone.

Rowan provided an example of a conversation that negatively influenced her feelings of belonging. After she spoke with her academic advisor, her feelings of belonging were drastically diminished. She sought hope in the conversation but felt discouraged and dismissed instead.

What frustrated her most from the conversation was the faculty advisor's unwillingness to listen and to understand her perspective.

This study reflects that students' lives are complex, and college does not protect them from life experiences. As such, academic advisors will likely be required to deal with complex life issues. For example, Sophia shared stories of sickness and health issues of close family members and friends in this study. Peyton also talked with an advisor who provided reassurance and encouragement when dealing with feelings of inadequacy.

Academic advisors who develop strong communication skills can play a critical role in supporting students during challenging times. According to Choompunuch et al. (2022), communication skills such as active listening, encouragement, validation, and fostering personal connections are particularly impactful on students' feelings of belonging. These skills allow advisors to offer brief interventions to address immediate student concerns and make referrals to appropriate support services when needed.

These communication skills align with NACADA's (2017) three core competencies for effective advising: conceptual, informational, and relational. While all three are essential, the relational component is most relevant to fostering a sense of belonging, as it focuses on creating meaningful relationships between advisors and students. Through relational competencies, advisors build trust, offer personalized support, and create inclusive communication that helps students feel valued and supported.

This study further highlights that the relational aspects of advising, including personalized attention and active listening, were key factors in promoting students' sense of belonging. By addressing the students' needs holistically and building strong, supportive connections, advisors can make a lasting impact on student well-being and success.

Core Competencies for Effective Advising

Strong communication skills are not new for the academic advising community. Women in this study placed significance on having someone with whom they could have a conversation as impactful to their feelings of belonging. Talking with someone about issues affecting their journeys beyond academics contributed to their sense of belonging. The conversations involved academic issues but were also about personal issues not normally considered within the expertise of academic advisors.

Honest conversations, consistent engagement, and the opportunity to talk are key components that foster a strong, supportive relationship. This notion underscores the importance of empathetic academic advisors who listen, communicate understanding, and provide personalized guidance. This developmental approach aligns with another recent study that found evidence of academic advising's effects on a sense of belonging (Yuan et al., 2024).

As previously discussed, NACADA: The Global Community for Academic Advising (2017) described three core competencies as foundational to effective advising.. These included conceptual, informational, and relational competencies. Of these, relational competency is important for fostering students' sense of belonging. When academic advisors foster solid and personal connections and offer continuous support, they play a crucial role in creating an inclusive and supportive academic environment. This support, in turn, enhances students' feelings of belonging and contributes to their overall success and well-being. Without this support, there may be a negative effect on students' sense of belonging (Noonan-Terry et al., 2019).

However, there is concern that academic advisors are often expected to handle issues for which they may not be trained (Sewell, 2024). While advisors should not act as counselors, they

must be able to facilitate conversations that help students think through challenges and refer the student to appropriate resources when necessary. Without this relational support, students' sense of belonging can suffer (Noonan-Terry et al., 2019). Therefore, continuous training in relational competencies is essential for academic advisors to fulfill their role in fostering students' well-being and belonging.

Women in this study described both formal and informal conversations consisting of rich, supportive interactions between themselves and their peers. Building strong, supportive social bonds with peer advisors helped them feel connected to their academic community. For example, talking with a peer advisor who successfully navigated similar challenges inspired them and boosted their feelings of belonging. In thinking about building community, the next section will discuss peer support. Advisors can encourage students to support one another, fostering a peer network that shares experiences and advice. Peer support can further normalize struggles and build a strong sense of community. The following section discusses this finding in greater detail.

Peer Advising

This study highlights the importance of meaningful conversations with peers, particularly those with shared identities, in fostering a sense of belonging among women in engineering. These conversations created a safe space for discussing challenges, celebrating successes, and navigating college life. Consistent with prior studies, such peer interactions normalize the difficulties students face and provide inspiration, especially for women in underrepresented fields like STEM (Buckley et al., 2023; Wu et al., 2022).

Peer advising relationships, in particular, were shown to be especially effective for women in promoting belonging. Women who engaged in these relationships reported higher levels of belonging and were more likely to persist in their fields. Elizabeth's story exemplifies

this, as her conversations with an older peer advisor during her freshman year provided reassurance and encouragement. These discussions, both academic and personal, made Elizabeth feel understood and supported, positively impacting her sense of belonging.

Similarly, Ashley and Rowan had comparable experiences. For Ashley, seeing her peer advisor succeed made her feel that she too could belong in engineering. Rowan developed a close connection with a peer advisor who helped her navigate academic decisions, further reinforcing her sense of belonging. Both of their experiences highlight how relatable and supportive peer interactions foster identity development and connection to the engineering community.

Overall, the study reinforces that peer advising and social support among women in engineering are essential in helping them feel more integrated and confident in their academic journey. Participants in this study talked about meaningful conversations with their peers with whom they shared an identity. These conversations provided a safe space for discussing challenges, celebrating successes, and navigating the complexities of college life. Previous studies have focused on women in STEM and confirmed that having a conversation with someone who shares similar experiences normalizes challenges and inspires (Saigo, 2024; Wofford et al., 2024).

Integration of Social Identity

The findings reinforce the importance of social identities in shaping students' experiences and feelings of belonging, confirming Strayhorn's (2019) assertion that belonging is not experienced equally by all individuals and can depend on factors like gender, race, class, and more. For women, particularly those from underrepresented groups, having academic advisors

who understand and acknowledge these identities can make them feel more valued, supported, and integrated within the academic community.

Furthermore, this research highlights the importance of personalized academic advising, where advisors take the time to understand a student's background, unique characteristics and life goals. Strayhorn (2019, 2023) identified this connection as a key element to fostering a sense of belonging. Studies by Rodriguez and Blaney (2021) further emphasize that identity validation, whether through faculty advisors, primary role advisors, or peer advisors, is critical for students to see themselves as part of the engineering field. Yuan et al. (2024) demonstrate that academic advisors who engage with students' identities and personal backgrounds contribute to a more profound sense of belonging, suggesting that relational and identity-centered advising is a powerful tool for fostering inclusivity and belonging in engineering. Lastly, peer support helps women in engineering redefine their understanding of who can be an engineer, enhancing their professional identity and reinforcing their sense of belonging.

For instance, Elizabeth's conversation with a peer advisor enhanced her feelings of belonging. The connection with a peer advisor who took the time to know her personally reinforced her engineering identity and sense of belonging. For Peyton, her peer advisor helped her apply for engineering internships, which helped her make greater connections to the engineering community. Both examples described above show how supportive relationships with peer advisors can enhance belonging by fostering both personal and professional growth.

These findings align with Strayhorn's (2019) theoretical claim that developing a professional identity supports a sense of belonging. By interacting with peers who have similar backgrounds or shared identities, students could better see themselves as part of the engineering community. In particular, the study highlights the role of peer advisors, whose relatable,

supportive, and empowering guidance helped undergraduate women in engineering feel more connected to their field and their academic community.

In summary, peer advisors can play an important role in fostering feelings of belonging among undergraduate women. Peer advisors can provide relatable, supportive, and empowering guidance that help other women navigate their academic journeys with greater confidence and connection to the engineering community. The next section will explore implications for practice for academic advising conversations. The second section will describe future research which will align with the findings of this study.

Implications for Practice

Based on the findings from this study, this section outlines recommendations for practice and suggestions for future research. The findings from this study highlight how conversations with academic advisors foster a sense of belonging among undergraduate women in engineering. These results offer valuable insights into improving advising practices.

This study highlighted the importance of conversations between students and their academic advisors in shaping student's feelings of belonging. Students often feel more comfortable when academic advisors allow extended discussions beyond course selection. Through the continual development of relational skills, academic advisors can better manage conversations that support students, which may foster a more inclusive and supportive academic environment (Yuan et al., 2024).

One recommendation is for academic advisors to join NACADA. Academic advisors who join this global professional organization can access impactful services and support, including professional development opportunities, networking and community, research and resources, leadership and career growth, and certification and credentialing opportunities. Doing

so helps advisors stay informed, connected, and engaged, and membership also supports personal growth and institutional impact, which empowers advisors to support students better.

However, a study on professional development found that relational learning opportunities were the lowest among the three components of academic advising and largely absent from advising training and professional development opportunities. The relational competency is most closely aligned with developmental advising in that they both emphasize the interactions between the academic advisor and the advisee (Snyder-Duch, 2018). A few examples of relational competencies include rapport building and communicating respectfully, as well as facilitating problem-solving and decision-making. Many participants in this study mentioned the importance of empathy and listening skills to their feelings of belonging. These results suggest there should be an emphasis on more opportunities for relational training to practice skills and techniques and on academic advisors' assessment of their own relational competencies. For example, through shadowing, the use of vignettes, role-playing, clinical observation, and cognitive apprenticeships, advisors can have the opportunity to bolster their relational skills and competencies (McGill et al., 2020a; McGill et al., 2020b).

Institutions should implement practices that encourage undergraduate women to engage actively with their academic advisors. According to feedback from several participants, academic advisors who provide empathetic and holistic support play a role in fostering their feelings of belonging. BU and other institutions may want to consider enhancing the hiring process of advising staff, by focusing on relational competencies during the search process. Additionally, ongoing training opportunities that continue to develop the relational competencies would be equally important. Together, these strategies may play an important role in positively influencing feelings of belonging among this student population.

A second implication for this study is to ensure that every undergraduate woman enrolled in the College of Engineering has access to peer advisors. Not all the participants in this study reported having interactions with a peer advisor and their value is clear in that talking with another women influenced feelings of belonging. Studies have shown that peer advising relationships are particularly effective for women in promoting a sense of belonging. For example, one study emphasized that women who engage in supportive peer advising relationships report higher levels of belonging and are more likely to persist in their chosen fields (Osunbunmi et al., 2024). This is particularly critical in environments where they may be underrepresented or where traditional support systems might not fully address their unique needs.

BU and other institutions should consider investing in the expansion of effective and meaningful peer advising programs. NACADA offers a number of free resources, including articles to inform and advance peer advising programs, instructional resources, training manuals, as well as a list of institutions with successful peer advising programs. Given the financial resources available to BU's College of Engineering, this would be a worthwhile investment of taxpayer dollars. Expanding the program could help address the shortage of engineers in the state while increasing cognitive diversity and building a skilled engineering workforce. A concern in the literature is the shift within engineering education toward reducing conversations with academic advisors. Engineering studies highlight the use of automated collection and reporting processes for academic advising (Hussain et al., 2024; Maphosa et al., 2024). There are several practical reasons for this. For instance, large advising caseloads and the potential for human error cost students thousands of dollars, resulting in additional time in school when they could be employed and earning an income (Maphosa et al., 2024). Rising tuition costs may

prevent students from attending engineering education programs (Sallai et al., 2023). Finally, advising systems that automate academic advising can be helpful in prescriptive advising but they reduce the opportunity for conversations that can support student belonging (Kuhail et al., 2022).

Another implication for practice includes normalizing struggles and setbacks, such as failing a class, as common rather than as indicators of their academic ability. Freedman (2023) found that resilience contributes not only to academic success but also to a stronger sense of belonging, as it reinforces that persistence is both valued and rewarded. Discussing shared challenges and insecurities allows students to see that others have also faced difficulties in engineering courses and succeeded. As Freedman notes, “A student who sees that others have had difficulty with engineering courses but have coped with those challenges and succeeded may be less likely to attribute their own difficulties to a lack of ability” (p. 13).

In another study, researchers found that presenting engineering as a field where failure is a natural part of the process contributes to a sense of belonging. Engineering education, as well as the practice itself, relies on trial and error rather than immediate mastery. By conveying consistent messages of resilience, educators helped students feel a stronger sense of belonging in their programs (Buckley et al., 2023). By validating experiences and normalizing challenges, academic advisors can help women feel understood, supported, and connected to their academic community. This increase in connecting with others sense of belonging can significantly impact students' overall academic experience and success.

Future Research

Future research may investigate why undergraduate women in engineering avoid conversations with their academic advisors. Some students in this study described conversations

with their academic advisors that negatively impacted their feelings of belonging. For instance, Rowan described a conversation with her academic advisor that negatively impacted her sense of belonging. She felt the advisor needed to be more encouraging and wanted to be offered more support. Rowan's advising experiences left her feeling unsupported and alone.

Similarly, Mary shared that she had been assigned to a faculty advisor whom she had never met. When it was time to enroll for the next term, she shared that she felt uncomfortable initiating a conversation with her academic advisor. Their limited communication contributed to her feeling of a lack of belonging. Mary said, "If you feel your current advisors can't provide [support], or they say it, but they don't really mean it. Or maybe they say it, but you're not feeling it. I haven't really felt that yet from my current advisor anyway. But my past advisor, I definitely did feel that way [less supported]." These findings describe how negative conversations with academic advisors can contribute to a reduction in a sense of belonging.

The design of this study has several limitations, which are discussed below. First, the sample primarily consisted of White women, limiting the generalizability to other student groups. Second, narrative inquiry typically involves multiple interviews with participants, but this was not possible with this study. Third, the COVID-19 pandemic impacted students' ability to have meaningful conversations with academic advisors. Lastly, some interview questions yielded results outside of the scope of this study.

Limitations of the Research Study

The following discussion includes limitations in the present study that may have affected the results. As with many other studies related to undergraduate women in engineering, this study was also skewed toward White women (Bloodhart et al., 2020; Verdin, 2021). Initially, in the fall of 2023, invitations to participate in this study were sent to undergraduate women of

color enrolled in the College of Engineering. Multiple attempts were made to engage this population, yet the effort yielded a zero-response rate. However, this is an essential avenue for future investigation because other student populations likely differ in how conversations with academic advisors contribute to their sense of belonging.

Second, conducting a single interview for narrative inquiry is a limitation which may have affected the depth of the narratives. Commonly, researchers conducting narrative studies guide participants during two separate interviews (Kim, 2015). This research study was originally designed with two interviews. However, after the zero response rate, and in order to move forward with the research, I redeveloped the recruitment material to request a single meeting. I also offered a gift card to a local coffee shop. As a result, the response rate during Spring 2024 increased from no one to 12, with eight participants ultimately participating in the interview process. One reason for two interviews is to build rapport with participants so that the participants feel comfortable sharing their experiences. With a skill set in counseling and advising, I took time before each interview to build rapport with each participant by sharing my background and my professional interest in the study. The participants were also allowed to turn off their cameras during the interview to increase trust and comfort.

Third, the COVID-19 pandemic likely influenced some participants' feelings of belonging. Some of the participants in this study mentioned COVID-19 and its negative impact on their sense of belonging. The global pandemic transformed all students' lives and educational experiences in higher education. There were notable disruptions during the pandemic, and the pivot to virtual learning and advising limited the opportunity to converse with academic advisors and peers. The opportunity to connect and build community was lost, and students felt isolated and alone (Barringer et al., 2023; DeAngelo et al., 2024).

Finally, a finding that emerged outside the primary scope of this study, yet deserves further investigation, is the experience of serving as a peer advisor. While the focus of this study was on how conversations with academic advisors influence undergraduate women's sense of belonging, several participants highlighted the impact of serving in peer advisor or teaching assistant roles on their own feelings of belonging. The following section will explore this valuable experience.

Mary shared that being asked to serve in a peer advising role had a positive impact on her sense of belonging. She received personal encouragement from her academic advisor which identified her as important in the College of Engineering. The recognition reinforced her feelings of value and belonging within the department. Anne was also encouraged by a faculty advisor to take on a leadership role. She felt this invitation helped her feel recognized as someone with valuable insights to offer. The encouragement helped Anne feel a greater sense of belonging by positioning her as a contributor and leader within the engineering program. Elizabeth served as both a peer advisor and as a teaching assistant to other women in the college and reported that both roles strengthened her connection with them. She felt she created a safe and supportive space for her peers.

These descriptions suggest that serving in a peer advising role can have a significant impact on the peer advisor herself. The experience as a peer advisor can contribute to their own sense of belonging through leadership, advocacy, and engagement with the engineering community. This aligns with the findings of Verdin and Castillo (2024), who also noted that taking on supportive or leadership roles strengthens connections within the university.

However, the impact of providing guidance and advice on the peer advisor has received less attention in literature. Most studies, as Clavijo (2024) noted, have focused on the benefits to

those receiving advice, not the advice givers. Future research should investigate the active ingredients that contribute to a peer advisor's sense of belonging. Exploring the emotional, social, and psychological benefits that come from giving advice and support to others will be key in understanding how these roles shape feelings of belong for women in engineering.

Summary

The desire to belong is a fundamental human experience, as highlighted by Maslow's (1943) hierarchy of needs, which emphasizes the importance of positive social connections for well-being. Strayhorn (2019) extended this concept to higher education, suggesting that many factors influencing student success are tied to whether students feel they belong. While previous research has often focused on individual characteristics (Ong et al., 2020) or barriers to belonging (McKoy, 2019), this study highlights the role that conversations with academic advisors can have in fostering a sense of belonging.

First, academic advisors should engage with students in conversations beyond course selection. Many women in the study reported that their feelings of belonging grew when they felt someone genuinely cared for them and when they had the opportunity to talk with someone. While quality prescriptive advising is essential to the success of students, academic advisors who provide the opportunity for students to discuss personal issues create a supportive environment where students feel heard and understood.

Second, this study emphasizes the role of belonging in helping undergraduate women develop their social identities as engineers. Social interactions, particularly engagement with peers, had a significant impact on feelings of belonging. Conversations with successful peers helped the women visualize themselves as engineers reinforcing their sense of identity within the engineering community at BU.

As higher education administrators seek to improve the advising experience for undergraduate women in engineering, they should consider the findings of this study. Meaningful conversations with faculty advisors, primary role advisors, and peer advisors can play a meaningful role in fostering a campus culture that emphasizes belonging. Academic advisors who develop the ability to engage students meaningfully may be able to address the projected shortage of engineering graduates by retaining more women at the undergraduate level. Ultimately, these graduates enter the work force and engineering careers contribute to economic stability and offer long-term opportunities, making it essential for academic advisors to invest in nurturing a sense of belonging among women in these programs.

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Appendix A – Recruitment Email

Dear Prospective Participant (Name of Possible Participant),

Hi! My name is Gayla Adams-Wright, and I am a Ph.D. Candidate in Student Affairs in Higher Education at Kansas State University. I am writing to ask if you would be interested in participating in my dissertation research on advising and belonging among undergraduate women in engineering. I am looking for participants who:

- a) identify as a female
- b) currently enrolled at Kansas State as an undergraduate student, and
- c) have completed more than one year (at least 30 hours) of academic coursework.

To actively participate within this study, I would ask you to do the following:

1. Complete a screening tool, which would take approximately 5 minutes to complete,
2. Participate in a Zoom interview at a date and time convenient for you.

As a prospective participant, you will be requested to read and sign a participant consent form, which will be the initial step of the study. At the conclusion of the interview, you will receive a \$10.00 gift card to a local coffee shop. Additionally, you will be entered into a raffle for a \$50.00 gift card for the university bookstore after all interviews are complete. In total, there will be 8-10 participants. These are pretty good odds.

The primary benefit of your participation will be to help inform higher education institutions about advising and belonging among undergraduate women in engineering. The information that you share will be confidential and all identifying information will be removed. The survey and the recordings will be destroyed after transcription.

If you are interested in participating in this study, and meet the criteria listed above, please contact me at gayla@k-state.edu or call/text me at 785-341-2637 (cell). You will be sent a screening tool by email to be complete within five days of receipt. If selected for the study, I will schedule a time for us to meet at your convenience. If you have additional questions, you may also contact my major professor, Dr. Christy Craft at ccraft@k-stae.edu or call 785-532-5941(office).

Thank you for your consideration of participating within this prospective study. I look forward to learning more about you and your experiences.

Sincerely,

Gayla Adams-Wright

Ph.D. Candidate

Appendix B – Informed Consent



Institutional Review Board (IRB) Informed Consent Template Form

comply@k-state.edu | 785-532-3224

PROJECT TITLE:

Advising and belonging among undergraduate women in engineering: A narrative approach

**PROJECT APPROVAL
DATE:**

12/6/2023

**PROJECT EXPIRATION
DATE:**

5/17/2024

**LENGTH OF
STUDY:**

10-15
hours

PRINCIPAL INVESTIGATOR:

Christy Craft

CO-INVESTIGATOR(S):

Gayla Adams-Wright

CONTACT DETAILS FOR PROBLEMS/QUESTIONS:

Professor Christy Craft 785-532-5940 ccraft@k-state.edu

IRB CHAIR CONTACT INFORMATION:

Dr. Lisa Rubin, IRB Chair 785-532-3224 rubin@k-state.edu

PROJECT SPONSOR:

Unfunded research performed as part of a dissertation

PURPOSE OF THE RESEARCH:

I am interviewing undergraduate women about their academic advising experiences to learn about how those experiences affected sense of belonging.

PROCEDURES OR METHODS TO BE USED:

I am asking for one zoom interview. The interview will consist of ten interview questions. I will ask you general questions about your college experiences within the College of Engineering, your academic advising experiences as well as your feelings about fitting in. With your permission, the interview will be recorded, and I may take notes. However, you may turn off your camera, which will allow for audio recording.

RISKS OR DISCOMFORTS ANTICIPATED:

There are minimal social risks involved in this study related to confidentiality. All recordings will be saved in a password-protected file at my home, and electronically destroyed once the transcription is completed. Additionally, you are not required to respond to any questions that may be uncomfortable to you. Your time and an interview with me are the maximum expectation but if you find the topics we discuss distressing, you are free to pause the interview at any time. Just to be clear, participation in this study will have no influence on your standing in the College of Engineering, including grades.

BENEFITS ANTICIPATED:

While you may not directly benefit from participating in this study, your insight will contribute to our understanding about how conversations with academic advisors contribute to sense of belonging among females. Your contributions

may benefit others in the future. If you would like to read the final results of this study, I am happy to provide you with a link to the completed dissertation.

EXTENT OF CONFIDENTIALITY:

As previously mentioned, your privacy and confidentiality will be protected to the extent of the law. I will not ask you to provide any specific or directly identifying information during our interview, and any distinguishing information will be removed during the transcription process. Your responses to the interview questions will not be used by other researchers now nor any time in the future and will only be used for this specific study. If information from this study is selected for publication or used for presentations at conferences, all identifying information will be removed.

IS COMPENSATION OR MEDICAL TREATMENT AVAILABLE IF INJURY OCCURS? ☐ Yes ☒ No

Terms of participation: I understand this project is research, and that my participation is voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

(Remember that it is a requirement for the P.I. to maintain a signed and dated copy of the same consent form signed and kept by the participant).

PARTICIPANT NAME:

PARTICIPANT SIGNATURE:

**WITNESS TO SIGNATURE:
(PROJECT STAFF)**

DATE:

DATE:

Appendix C – Interview Protocol

1. I am interested in learning about your journey to selecting engineering as your major.
Would you share that with me?
2. Bennett University is one of three engineering programs in this state. Tell me about how you selected this school.
3. Think back to the time before you enrolled as a student. Can you describe how you envisioned yourself as an engineering student?
4. One of my areas of interest is feelings of belonging, which I reviewed a while ago during the introduction. As an undergraduate student in the College of Engineering, please describe a conversation that was especially important in influencing your sense of belonging, positive or negative.
5. In thinking about your feelings of belonging, could you share a story about a conversation that was especially important in influencing your sense of belonging, positive or negative?
6. Feelings of belonging are a topic that is a part of my dissertation research. Academic advising is also a topic that I am studying. Describe for me your most recent academic advising conversation.
7. Many students at K-State have different types of advisors. Tell me a story about a person, or persons, whom you believe served in an advising role.
8. Thinking back to the definition of belonging, tell me a story about any conversation you may have had with your academic advisor that impacted your feelings of belonging, positive or negative.

9. I am curious about what you think about academic advising. In what ways could advisors help other women in engineering feel accepted, included, and supported?
10. Is there anything we still need to discuss, or would you like to share anything additional about your academic advising conversations and sense of belonging?