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Certain That I Belong in Science, Technology, Engineering, and Math (STEM):
Women's Authentic Belonging and Men's Inclusion Actions Through Job Crafting

By

Cecelia Corson

Claremont Graduate University

2023

Approval of the Dissertation Committee

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Cecelia Corson as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy in Psychology with a concentration in Positive Organizational Psychology.

Dr. Gloria González-Morales, Chair
Claremont Graduate University
Associate Professor, Division of Behavioral & Organizational Science & Director of Center for Academic & Faculty Excellence

Dr. Michelle Bligh
Claremont Graduate University
Interim Executive Vice President and Provost

Dr. Cindi Gilliland
Claremont Graduate University
Clinical Full Professor

Abstract

Certain That I Belong in Science, Technology, Engineering, and Math (STEM):

Women's Authentic Belonging and Men's Inclusion Actions Through Job Crafting

By

Cecelia Corson

Claremont Graduate University, 2023

As of 2022, the total number of Nobel Prizes granted in Science, Technology, Engineering, Math, and Medicine (STEM) fields was roughly 614 and of those, only 24 have been awarded to women. STEM fields have historically excluded women at all levels with increasing impact at the higher levels of the career ladder (NSF, 2010). To address the stark gender gap in many organizational spaces including STEM, organizations have turned to diversity training with undetermined effectiveness (Devine & Ash, 2022). This dissertation research seeks to understand women's authentic belonging in STEM fields and to develop an intervention to aid men in including women in these spaces, removing the burden of inclusion off women. Through the first qualitative study, I uncovered the similarities around the three primary ways that both men and women conceptualized authentic belonging in these spaces – through feeling heard and contributing, through representation, and through feeling safe to take risks. I also identified differences in the ways the men and women conceptualized authentic belonging, such as women's stronger leadership orientation, greater pull toward connection, and more negative mindsets around their inclusion in STEM spaces, and men's strong orientation toward merit and performance and more positive mindsets about women's authentic belonging in STEM fields. Through the second qualitative study, I uncovered the impact that leaders had on women's experiences of belonging, the specific ways that connecting with others led to women's experiences of belonging, and the behaviors that led to women's experiences of belonging. Taking the results of the two studies together, I developed a Job Crafting for Inclusion Activity, answering the call for more behavior-based, long-term interventions around inclusion that can serve to facilitate women's authentic belonging in STEM.

Keywords: gender, STEM, qualitative, inclusion, belonging, job crafting

Dedication

To the brave and brilliant scientists, technologists, engineers, mathematicians, and physicians who have ever wondered if they authentically belong.

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All have contributed to my own sense of authentic belonging during this process.

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Dissertation Overview

As of 2022, the total number of Nobel Prizes granted in Science, Technology, Engineering, Math, and Medicine (STEM) fields was roughly 614 and of those, only 24 have been awarded to women. Research has shown that the disparity in Nobel Prize recipients is not accounted for by the lower representation of women in STEM in general (Lunnemanna, 2018). STEM fields have historically excluded women at all levels with increasing impact at the higher levels of the career ladder (NSF, 2010). Despite increases in public awareness of the gender disparity in STEM fields and other occupational sectors, the World Economic Forum estimates that at the current rate of change, gender parity will not be achieved for at least another 130 years (Crotti et al., 2021). The longstanding issue of the gender disparity in STEM requires urgent attention, rigorous research, and novel and creative ways of thinking about remedies of this issue to rapidly increase the number of women in all levels of STEM spaces.

To address the stark gender gap in many organizational spaces including STEM, organizations have turned to diversity training with undetermined effectiveness (Devine & Ash, 2022). Diversity trainings have dramatically increased in popularity in organizations since the early 2000s, yet there is a longstanding problem of inconclusive and inconsistent evidence about their effectiveness (Devine & Ash, 2022, Bezrukova et al., 2016, Kalinoski et al., 2013, Bezrukova, Jehn, & Spell, 2012). In a recently published review paper, Devine and Ash (2022) call for more rigorous research investigating the mechanisms through which diversity trainings operate that render them successful or unsuccessful, for more behavior-based diversity trainings, and for more appropriate measures of diversity training outcomes that reflect the true goals of the programs. One way to reimagine diversity trainings is to shift their focus toward inclusion –

teaching people to enact inclusive behaviors, or to “include others,” which should facilitate the belonging of non-majority organizational members.

At the heart of the gender disparity issue in STEM is the commonly acknowledged view that women have not been included in STEM spaces, and therefore, women do not belong in STEM. In a widely cited article, Baumeister and Leary (1995) emphasized the universal importance of belonging to the human condition. They broke the need for belonging into two distinct components – first, the need for frequent, positive interactions with others, and second that these positive interactions take place in a social framework where interactions will continue, and where interactions will include concern for another person – or “frequent interactions with persistent caring” (p. 497). Given men’s historical overrepresentation in STEM fields, their need to belong has been long satisfied and there is less urgency to communicate their belonging. Men and women have vastly different experiences of belonging in STEM fields and investigating these differences might shed light on the salience and significance of the experience of belonging in STEM.

As explained by Optimal Distinctiveness Theory, for women to truly feel they belong in STEM fields, majority-group members should enact inclusion behaviors and strategies that demonstrate to women that they value their uniqueness and that they belong within the group and within the organization (Brewer, 1991). STEM organizations would greatly benefit from implementing behavior-based, long-term initiatives where participants are given autonomy to design their own ways of including women, where they can develop competence in their inclusive acts, and where they can direct their interpersonal behaviors and practices at including women.

My dissertation consists of two distinct and complimentary research projects that lead to a deeper understanding of the crucial experience of authentic belonging for women's persistence, engagement, and thriving in STEM fields in which there is currently a stark and longstanding gender disparity (Crotti et al., 2021). My first dissertation research study provides a better understanding of the similarities and differences between men and women in STEM in the experience and impact of authentic belonging. The second study serves as a practical guide to the inclusion behaviors that lead to women's authentic belonging in STEM fields. I conclude with a proposed activity - Job Crafting for Inclusion Behaviors - synthesizing findings from my two studies and empirically supported research concepts, to serve as a guide for includers seeking to contribute to women's authentic belonging in STEM.

Theories, Concepts and Definitions

Inclusion

Inclusion was first conceptualized following the introduction of Tajfel's Social Identity Theory (1974), which distinguished the three processes of social categorization, social identification, and social comparison, and Brewer's (1991) Optimal Distinctiveness Theory (ODT). According to ODT, there are two distinct yet equally important components of social identity – the opposing needs to assimilate (belonging) and to differentiate (distinctiveness). Important work by Roberson (2006) was among the first to disentangle the difference between diversity and inclusion in organizations, noting the differences between identity conscious and identity blind organizational initiatives. Further refining the definition of inclusion in organizations, Shore et al. (2011) took the ODT definition and developed a framework for inclusion along the dimensions of belonging, related to the need to assimilate, and value in uniqueness, related to the need to differentiate. They noted that the four categories of the

inclusion framework were exclusion (low belongingness and low value in uniqueness), assimilation (high belongingness and low value in uniqueness), differentiation (low belongingness and high value in uniqueness), and inclusion (high belongingness and high value in uniqueness). They highlighted the idea that a person's expression of uniqueness alone did not encompass a person's experience of inclusion, but rather whether the person's expression of uniqueness was valued by the group led to their experience of inclusion.

Since the inclusion literature has developed over the last 10 years, researchers have focused on investigating the subjective experiences of inclusion among workers. Shore et al. (2018) identified six major themes around this body of research focused on encompassing the subjective experiences inclusion. The themes identified were feeling safe, being involved in the work group, feeling respected and valued, having influence over decision making, authenticity, and recognizing, honoring, and advancing diversity. While this research did not originate in STEM fields around women's inclusion, it might provide guidance to men seeking to include women in these spaces. In addition to the six themes from this research, feelings of trust and belonging have been shown to be integral to women's inclusion in STEM fields (Moss-Racusin, 2018).

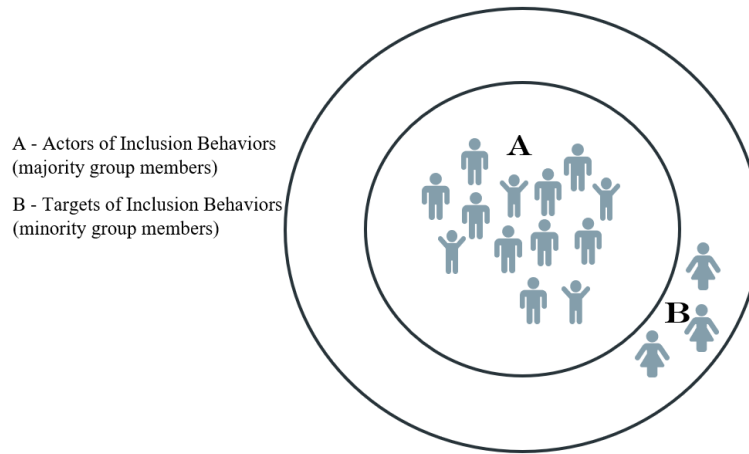
Where Inclusion Occurs: Inclusion Behaviors Versus Authentic Belonging

While inclusion is conceptualized in the Diversity, Equity, Inclusion, and Belonging (DEIB) literature as a broad psychological construct, there are nuances to the concept that need to be fully developed. As depicted in Figure 1, different actors have distinct social group identities that indicate the degree to which a person might *enact inclusion behaviors (A)*, and the degree to which a person might experience a lack of *feelings of inclusion (B)*. Put another way, there are majority-group actors that enact *behaviors to include others (A)* and there are targets

that majority-group members should strive to *include*, which are measured by target member's *subjective experience of inclusion (B)*. In the context of inclusion in STEM, this definition of experienced inclusion would be represented by women feeling that they belonged and that their uniqueness was valued by the group. We label this experience *authentic belonging* to differentiate it from the idea of inclusion behaviors, such as behaviors and practices that must be enacted by the organization and the majority-group members. Therefore, inclusion is an action, and it is the responsibility of majority-group members; while authentic belonging is an experience and represents the lived experience of belonging and uniqueness of minority-group members. In the present dissertation, I will refer to the subjective experience of inclusion as *authentic belonging*, to clearly distinguish between the concepts and actors involved. It is important to note that authentic belonging should be the goal for all minority-group members and not just women, given that multiple intersecting identities influence the experience of authentic belonging in the organizational context.

Figure 1

Landscape and Location of Inclusion



Note. Depiction of inclusion landscape capturing two distinct groups of inclusion: A – actors of inclusion behaviors such as majority-group members, B – targets of inclusion behaviors such as minority-group members.

Authentic Belonging in STEM

It is important to better understand the similarities and differences between men and women in their experience of authentic belonging in STEM. Additionally important is the understanding of the concept of belonging uncertainty - the experience of members of socially stigmatized groups feeling uncertain about whether they belong (Walton & Cohen, 2011). Because belonging uncertainty is more prevalent among women, their belonging experience is a stronger predictor of their persistence in STEM when compared to men's in the STEM domain (Lewis, 2017). Men in STEM do not experience belonging uncertainty, and for this reason, their sense of belonging does not strongly predict their persistence in STEM.

In addition to predicting persistence in STEM for women, it is important to further explore the impact of authentic belonging on both women and men in STEM. I next discuss the

existing research on women's authentic belonging in STEM, followed by a discussion of stereotype threat, the damaging negative consequence created in the absence of authentic belonging.

Women's Historical and Current Lack of Authentic Belonging in STEM Fields

The importance of inclusion and authentic belonging is seen starkly in the STEM fields in which women are drastically underrepresented when compared to men. Women are just as productive as men in STEM publication productivity year by year, but they drop out of the STEM career trajectory earlier and more frequently than men (Huang et al., 2020). If women truly and authentically belonged in the STEM space, they would be far more likely to remain and continue to produce. In fact, there has been extensive research around the gender disparity in STEM that points to the importance of women feeling authentic belonging as an important indicator of women's engagement and retention in the fields (Cheryan et al., 2009, Moss-Racusin et al., 2018). I next discuss the positive outcomes of women's authentic belonging in STEM fields.

Positive Outcomes of Women's Authentic Belonging in STEM

Buffering Against Workplace Sexism

Workplace sexism against women is assumed to be more prevalent in male-dominated workplaces such as STEM fields due to women's minority status, their counterstereotypicality, the lower social support and integration that they are afforded, and their lower social status (Berdahl, 2007; TUC & The Everyday Sexism Project, 2016). One example of the positive impact of women's sense of belonging in STEM is seen in research by Rubin et al. (2019). This research suggested a moderating effect of women's sense of belonging on the relationship

between workplace sexism, and mental health and job satisfaction, and on interpersonal sexism and mental health. Rubin et al. (2019) found that women in a context with a high degree of sexism, such as the male-dominated fields of STEM, experienced greater mental health, and job satisfaction when they also felt a sense of belonging, when compared with women who did not feel a sense of belonging.

Negative Outcomes of Women's Lack of Authentic Belonging in STEM

Lack of Engagement and Positive Attitudes

Women's lack of sense of belonging in STEM environments have also been shown to have powerful negative effects on women in these spaces. Trust and belonging have been shown to mediate the relationship between becoming aware of gender bias and being engaged and holding positive attitudes about their work in STEM (Moss-Racusin et al., 2018). Thus, the lack of sense of belonging that women felt in the context of STEM had a mediating effect on their engagement in, positive attitudes about, and trust and comfort in STEM fields. Because the experience of women's belonging in STEM has been widely studied, it is also important to explore the phenomena that exist in the absence of women's belonging in STEM - the experience of stereotype threat.

Stereotype Threat

First introduced by Steele (1998), stereotype threat is a widely studied social psychological phenomenon that is experienced by an individual when they feel at risk of being associated with the demeaning stereotypes of their identity group such as race and gender. Experimental studies have shown the negative effects of stereotype threat on the performance of difficult tasks in a domain that hold negative stereotypes for certain groups, such as a woman

feeling the threat of being negatively judged because she is a woman in a male-dominated field and thereby suffering performance consequences (Nguyen & Ryan, 2008). This phenomenon has been researched in conjunction with its effects on lowered task performance across a multitude of domains including older adults' memory (Hess, Auman, Colcombe & Rahhal, 2003), white males' athletics (Stone, Lynch, Sjomeling & Darley, 1999), and African Americans' academics (Steele & Aronson, 1995). A widely used diversity training aimed at increasing gender bias literacy in STEM has been shown to lead to stereotype threat among attendees (Steele, 1998), and the effects of stereotype threat are also shown to be greater in women than in men (Pietri et al., 2019).

In more recent years, scholars have begun to look at potential spillover effects that extend beyond merely performance effects of stereotype threat (Casad & Bryant, 2016). One major spillover effect of stereotype threat that has been investigated is reduced domain identification, whereby an individual disidentifies with the domain in which they are negatively stereotyped such as a woman identifying as a woman in a male-dominated workspace (Steele & Aronson, 1995). Additional spillover effects of stereotype threat include reduced openness to and utilization of feedback (Roberson et al., 2003), reduced engagement (Major & Schmader, 1998), and reduced or changed career aspiration (Kalokerinos, VonHippel, & Zacher, 2014). There is an urgent need to develop initiatives to decrease stereotype threat among women in STEM given the implications they might have for women entering and remaining in STEM fields. Not surprisingly, the recommendations made by expert scholars Walton, Murphy, & Ryan (2015) for behaviors that lead to decreasing stereotype threat (e.g., incorporate diverse, inclusive images and nonstereotypical objects in the physical environment, develop clear and consistent policies of consequences of incivility and negative nonverbal treatment) are also behaviors that might be

associated with women's experience of authentic belonging in STEM fields. The area of women's authentic belonging in STEM is ripe for investigation and can be greatly enhanced with the incorporation of positive psychology scholarship driving new interventions.

The Role of Positive Organizational Psychology: Broaden and Build Theory

One of the seminal concepts of positive psychology, Barbara Frederickson's Broaden and Build Theory of Positive Emotions (2004), postulates that experiencing positive emotions can lead to a more robust thought-action repertoire, which in turn leads to more creativity and better functioning. The theory stems from the widely accepted idea that negative emotions lead to narrow action tendencies (e.g. if a person feels fear, they are moved to flee or fight with a narrow focus on the threat), but positive emotions do not have such a strong tie to action tendencies. As Frijda (1986) describes, positive emotions are tied more to the "free activation" that moves a person toward experimentation and exploration. According to Fredrickson (2004), the action tendencies incited by positive emotions can be more cognitive in nature and can lead to a wider array of actions that serve to build resources that can be used in the longer term. According to this theory, positive emotions can also undo the narrowing impact on thought-action repertoire that negative emotions can induce.

Applying Broaden and Build Theory to DEIB Work with Appreciative Inquiry

Given the evidence that suggests that STEM environments might incite stereotype threat in women (Pietri et al., 2017), it is important to investigate potential ways to mitigate these threatening reactions and to inspire people to think more positively and generatively about gender diversity and women's authentic belonging.

A unique intervention that supports the foundational concepts of the Broaden and Build Theory of Positive Emotions is the practice of an appreciative inquiry framework. Introduced in

1986 by Cooperrider and Srivastva, this framework was offered as an alternative approach to organizational development that shifted the focus on deficit-based problem solving to a more positive psychology-based approach of uncovering what is best about an organization and what are the strengths of the organization (Cooperrider, 1986, Cooperrider & Srivastva, 1987). The use of appreciative inquiry typically involves the asking/inquiring of questions about an organization's strengths and bright spots that focus on the positives. This generative method expands the person or organization's mind and therefore the possibilities available to a person. The appreciative inquiry methodology typically follows what is referred to as the 4D Cycle of Appreciative Inquiry: discover (discovering what is working and what is going well), dream (envisioning processes that would work well in the future), design (planning processes for the future), and destiny (implementing the proposed new process).

Appreciative inquiry can be used at both the organizational and at the individual level. At the organizational level, an appreciative inquiry summit is held, and a facilitator guides a group or organization through the 4D cycle to uncover the positive core of the organization. At the individual level, appreciative inquiry can be used to aid a person to reframe a problem toward an opportunity or possibility using the naming, flipping, and framing techniques outlined by Whitney et al. (2010). The AI framework can also aid a person to discover the positive core of a system or circumstance, remain curious and non-judgmental about various scenarios, and meet the future with realistic optimism. As explained by Armstrong et al. (2020), using an appreciative inquiry approach can ultimately help an individual foster more relational energy, high quality relationships, improve emotional and mental health, and contribute to the wellbeing of oneself and others. Appreciative inquiry might enhance the DEIB literature by shifting the

focus onto the positive, ideal outcomes and states in this often-discouraging field of research and practice.

Appreciative inquiry principles can be used to inquire into the experience of authentic belonging in STEM to incite positive emotions and expand participant's thought-action repertoire. In administering an online appreciative inquiry reflection interview, participants should be more creative and positive in their thinking around authentic belonging given the greater access they will have to potential solutions, and they should reveal a truly ideal and aspirational reflection of the experience of authentic belonging.

I next outline and discuss the two studies I have conducted to investigate women's belonging in STEM spaces.

Chapter 1

Study 1: Investigating Women's and Men's Authentic Belonging in STEM

Research Goals and Questions

The first study sought to uncover the differences between men and women in the experience and impact of authentic belonging in STEM. It is important to better understand patterns of thought and behavior around the experience of authentic belonging in STEM, given men's historical belonging in STEM and women's historical exclusion from these spaces. I analyzed qualitative responses from 39 participants that responded to appreciative inquiry (Cooperrider, 1986) style questions that investigated the experience of authentic belonging in STEM.

The research questions that guided this study were:

1. How do women conceptualize authentic belonging in STEM spaces?
2. How do men conceptualize authentic belonging in STEM spaces?
3. How do men and women in STEM differ in their hopes and aspirations for authentic belonging in STEM?
4. What are the similarities and differences between men and women in STEM in their experience and interpretation of authentic belonging?

This study involved a qualitative phenomenological analysis that explored the concept of authentic belonging in STEM. The study uncovered themes across participant responses that denoted the experience of authentic belonging and how it impacts men and women similarly and differently. The purpose of this proposed study was to better understand what, if any, similarities and differences might exist between men's and women's experiences and need for and satisfaction of authentic belonging in STEM fields, given the stark gender disparity in these

fields and the masculine nature of the fields. The purpose of the proposed phenomenological study as defined by Creswell et al. (2007) was to seek to understand the essence of the phenomenon of authentic belonging in STEM.

Methods

Participants

Participants were recruited from the Prolific system and indicated that they currently worked in a STEM field ($N = 39$). Participants were split between female ($N = 19$) and male ($N = 20$), were mostly white, mostly heterosexual, and had completed some college education. More complete participant demographic information is included in Table 1.1. Given the phenomenological nature of the study, I pursued data saturation as a means of determining the sample size. Given the heterogenous nature of the STEM population, we achieved data saturation at the end of 20 participant online structured interviews, but we continued to analyze data to build confidence in our emergent findings.

Table 1.1.*Participant Demographic Information*

Participant Demographic Information	Frequency
Gender	
Male	20
Female	19
Ethnicity	
White or Caucasian	22
Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino, etc.)	5
Black/African/Caribbean	5
South Asian (East Indian, Sri Lankan, etc.)	3
Latin American (Costa Rican, Guatemalan, Brazilian, Colombian, etc.)	2
Arab (Saudi Arabian, Palestinian, Iraqi, etc.)	1
American Indian/Native American	1
Education	
Bachelor's Degree (4 Year Degree)	17
Some college but no degree	10
Graduate Degree (Masters, Ph.D., JD, MD, etc.)	6
High school diploma or equivalent (e.g., GED)	3
Associate Degree (2 Year Degree)	3
Hours Worked Per Week	
0-15	6
20-30	9
31-39	3
40+	21

Procedure

Given our aim of exploring the experiences of authentic belonging of men and women in STEM, I conducted online structured interviews that were administered using the Prolific system. Participants had previously viewed two educational videos about the gender disparity in STEM, the Video Intervention for Diversity in STEM (VIDS, Pietri, 2017). The videos entailed a woman interviewing a male scientist on the gender disparity in STEM and the factors that

contribute to its persistence. Participants were then asked questions about their experiences of authentic belonging in STEM using the Appreciative Inquiry framework of focusing on their positive, ideal experiences with belonging at work (Cooperrider, 1986). The structured interview protocol was designed specifically for this study using multiple rounds of pilot interviewing to determine the most impactful questions for the study. The questions of the interview protocol can be found in Table 1.2.

Table 1.2.

Appreciative Inquiry Interview Protocol

Section Heading	Question
Opening	<p>We want to hear your thoughts on belonging and inclusion in organizations. The best organizations create an inviting and welcoming space for all employees to feel included. Inclusion is achieved in an organization when people feel that they can be their true and unique selves while also feeling like they belong.</p> <p>Think about an ideal organization in which people can behave authentically and feel like they are truly a part of the organization. At this organization, people feel they can be their true selves and they are appreciated for their uniqueness. Each team member can bring their authentic self to work, and they can thrive because they feel that they belong to the team. As you answer the following questions, think about an inspiring outcome for creating a sense of belonging among all team members.</p>
Discover Question	Describe a time when you were part of a collaborative team that brought out the best in you and made you feel like you truly belonged.
Dream Question	Please discuss/share your dreams and aspirations for a workplace where every single person feels a sense of belonging and that they can behave authentically.
Design & Deliver Question	What does the ideal scenario look like where all people feel a deep sense of belonging in their workplace? What are a few things you might do to make your workplace a culture of belonging with more inclusion of all people?

Thematic Analysis

I conducted a thematic analysis, a common qualitative data analysis approach used to describe a phenomenon when existing theory is limited (Hsieh & Shannon, 2011). I systematically sorted, summarized, and compared qualitative information while extracting the major themes that arose so I could obtain an understanding of the experiences of authentic belonging of STEM professionals most effectively and efficiently. I included data from all participant interviews. Given the variety in content and format of the data corpus, it was important to use a qualitative data analysis approach that allowed for rich description, that was flexible in the face of emergent findings, and that relied on a systematic classification procedure to identify the emergent themes.

To begin my thematic analysis, I conducted open, inductive coding on the full sample of interviews collected from March through April 2022. There was no a priori coding scheme in place at the start of my coding process, as I wanted to let the data guide my thematic analysis. I created my own coding categories according to the available information and emergent themes in the interview transcriptions. I spent sufficient time with each data source and familiarized myself with the themes present. I gained a holistic understanding of each interview transcript, and I captured key concepts from each conversation, as recommended by Kondracki & Wellman (2002). Next, I summarized my initial impressions and analyses by creating a series of codes that I then sorted into higher-order categories while more themes emerged. I then decided upon a final set of coding categories through mutual agreement and input with select CGU colleagues. This coding approach and process led to valid findings that were grounded in the data of each participant's unique perspectives (Hsieh & Shannon, 2011).

I complemented my thematic analysis with a quantitative coding strategy of some basic descriptive demographic information. Interview participants reviewed and signed a consent form (see Appendix A) and completed a brief demographic questionnaire (see Appendix B) that included information such as race, gender, sexual orientation, country of residence, and number of years working.

Enhancing Validity

Qualitative research is only useful to the extent that it generates valid findings. With that in mind, I considered potential threats to validity, and I took steps to address each one of them. The first threat to validity I identified was my own personal biases and assumptions that I brought to this study. I acknowledge that I came to this study with expectations about the findings that I would discover. As suggested by Maxwell (2013) and with this in mind, I sought to uncover the discrepant and negative cases that opposed the main themes of my study to ensure that I was not ignoring the data that did not fit my predictions and assumptions. Additionally, I compared the outcomes of the two groups I sought to understand.

A second threat to validity was related to my recruitment process for STEM professionals, which was based in the Prolific system, and which included professional survey takers. As a result of the varied nature of STEM professionals, it was possible that other experiences exist. While my findings offer useful insight into many of the experiences STEM professionals have with authentic belonging, they may not offer insight into *all* the experiences STEM professionals have in this area. However, I collected data past the point that I reached data saturation, and this at least minimized this potential threat to validity.

Findings

We learned from this study that there are some similarities and many differences between the ways in which men and women in STEM experience and approach authentic belonging. We present here the ways in which men and women define or have experienced authentic belonging, and we describe several themes that illustrate similarities and differences in the ways that the two groups conceptualize authentic belonging. Through the collection and analysis of all response transcripts, the findings were compiled and organized around the predominant themes that emerged. The description of the findings below further details each theme with supporting quotations to highlight exemplar representations of the themes. In the following section, any reference to men or women refers to those who participated in the study.

Differences in Men's and Women's Themes of Authentic Belonging

The four major themes that were identified among the differences between men's and women's responses were organized around merit and denial of gender disparity, leadership orientation, mindset about belonging in STEM, and tangible resources. Table 1.3 illustrates the differences that emerged around these themes and are further expanded in the text.

Table 1.3.

Major Differences Themes from Analysis

Theme	Definition	Example Quote	Count
MERIT			
MEN: Importance of Merit	Described the importance of people making contributions to a group, having performance successes, and the benefits of belonging to this.	I think workplaces should 100% be decided by merit. Gender, race, or any other trait of the human being should never matter. Inclusiveness in a workplace should specifically be regarding "including those whose merit dictates that they be there". Whether it's all women and one man, or all men and one woman, it doesn't matter. They are there to do a job, not worry about how everyone prefers to label themselves. (P9)	16
	Subtheme: Denial of Existence of Gender Issues	I just find the study heavily biased towards women and I feel that the evidence presented wasn't really compelling at all. For instance, "expert" in the first video spoke of video that measured fear responses in viewers. My question is...what was the response for men? Did any male students watch a video where males were grossly outnumbered by their female peers? If so, what was their fear response? (P1)	2
WOMEN: Lack of Mention of Merit			0
LEADERSHIP			
MEN: Lack of Orientation Towards Leadership for Belonging	Not mentioning the importance or role of leadership or doing so independently from creating a sense of belonging.	I think establishing a sense of vulnerability is extremely important, particularly for leaders. The knowledge gap between trainee and mentor, particularly in STEM fields such as medicine or research, is typically seen to be fairly massive, which can be intimidating and prevent people from speaking their mind. By showing that our leaders are fallible or at the very least approachable, it normalizes failure and allows for growth in the workplace. (P18)	5
WOMEN: Orientation Towards Leadership for Belonging	Mentioned the role of leadership in achieving belonging.	Leadership should also inspire workplace culture adjustments so that people who are disillusioned know that change is in process. A sense of belong should be felt from the top of the ladder to the bottom. (P11)	9

Table 1.3, cont.

Theme	Definition	Example Quote	Count
POSITIVE VS NEGATIVE MINDSET			
MEN: Hopes and Aspirations for Belonging for All	Positive mindset about possibility for belonging in STEM.	I want everyone to feel a sense of belonging at all points in the workplace, I don't want anyone to feel left out, I don't want anyone to be made fun of for who they are. They should be able to feel safe and secure in the workplace. They should be able to go to work and just be able to act like themselves and get rewarded for it. They should be able to work as hard as they can and not get judged if they are female or male or others. (P7)	11
WOMEN: Pessimism About Belonging, Has Not Experienced Belonging	Expressed pessimism about the possibility of belonging in STEM, or had not ever experienced belonging in STEM	This is a really hard question. Mainly because, in my eyes, it seems so unachievable. (P13)	6
TANGIBLE RESOURCES			
MEN: Lack of Mention of Resources for Belonging			0
WOMEN: Resources for Belonging	Suggestion of tangible resources to create belonging	A day care should be provided for people with kids. The option to work from home should be available. Paid leave for parents of newborns should be allowed for up to 3 months minimum. Vacation time should be at least a month for all people (P5)	6

Men’s Focus on Merit/Performance

One of the most predominant themes that emerged through the study was the incorporation of an element of merit or performance in experiences and examples of men’s belonging in STEM, but the far lesser focus on merit or performance among the women. Over two-thirds of the men claimed to have felt belonging at work, and they could identify these circumstances when there was praise toward the work they had contributed, or tangible success

attributed to the teams that they were on. One man (P. 15) noted that in the context of feeling belonging, a person will bring “their best work to the table” and that belonging would lead to an “environment [that] will facilitate a health working environment where everyone, including the bottom line, profits, grow and feels good about the work that is being done.” Another man (P. 14) noted that a person not “feeling that they belonged would lead to subpar results, and nobody wants that.” This finding highlights the idea that men’s experiences of belonging are strongly tied to their performance in a group, and woman’s experiences of belonging are not as strongly tied to their performance in the group.

Subtheme: Men’s Concern About Focus of Belonging Leading to Lower Performance

A sub-theme that emerged under the theme of merit and performance was that a large group of men noted that belonging was a goal to aim for, but not at the expense of merit and performance. A man (P. 9) clearly stated that the workplace should be fully merit-based:

I think workplaces should 100% be decided by merit. Gender, race, or any other trait of the human being should never matter. Inclusiveness in a workplace should specifically be regarding "including those whose merit dictates that they be there". Whether it's all women and one man, or all men and one woman, it doesn't matter. They are there to do a job, not worry about how everyone prefers to label themselves.

In the context of the men’s specific suggestions for increasing belonging at work, the concept of merit remained important. One man (P. 1) noted, “Advertisements towards diversity

of race and gender are also helpful in producing a welcoming environment for the sake of trying to pull in talent from many different walks of life. However, it shouldn't come at the expense of employee merit.”

It appears many men felt that if an organization prioritized making all group members feel they authentically belonged there, there would be some inherent lack of focus on merit, and the performance of the group would diminish. It is important to note this in the context of implementing any sort of belonging intervention – there is a need to reinforce the merit and performance benefits of diversity and inclusion efforts, given the focus of this outcome for so many of the men in this study. Further, it is important to note there are no known differences in performance and ability of men and women in STEM (Halpern et al., 2007, Spelke, 2005), and interventions should call into question the gender disparity in these areas given that there are no such gender differences in performance and ability.

Sub-theme: Men’s Denial of Issue of Gender Disparity, Stereotype Threat in STEM

Another sub-theme of the merit and performance theme that emerged was that a small number of men questioned the idea that women did not feel they belonged in STEM, while no women made such rebuttals. Of the 20 men, 2 questioned the content of the educational videos they viewed about gender bias, indicating that they did not believe that gender bias existed. One man (P. 9) questioned the validity of the study, claiming he did not agree with the assertion that being underrepresented in a group led to less belonging in that group:

I don't agree with the assertion that just because there are less of a gender, the gender with less feels threatened...I think there are many scenarios

where there is only one or two people of a certain gender and because of that they feel a sense of uniqueness and importance with the job that they wouldn't get if they were just another woman, or just another man there to make everything equal.

This sub-theme supports the notion that a large group of men felt that merit was important in the hiring and promoting of people in STEM, and that if there were fewer women represented in these spaces, it was due to their lack of merit, and not due to other structural factors. This is further evidence that interventions around women's belonging in STEM should emphasize the structural and interpersonal factors of bias that impact women's success in these fields, and not their lack of merit and performance in these fields.

Men and Women's Orientation Toward Leadership

Another major and predominant theme that emerged throughout the analysis was the difference in men's and women's awareness of and orientation toward leadership and the role that leadership should and could play in the creation of belonging for women in STEM. Specifically, far more women noted the importance of leadership in the context of belonging than did men.

Women's Orientation Toward Leadership for Belonging

Many of the women felt that one solution to the lack of belonging in STEM would be to include more women in leadership, have leadership create a space of sharing and non-judgement, and take an active role in creating more representation of all underrepresented groups. About

half of the women cited the important role that leadership could and should play in the creation of a sense of belonging for women in STEM. In describing her ideal workplace where all people felt a sense of belonging, one woman (P. 2) shared, “I dream of a workplace where people want to work and are glad to come to work each day. All are treated equally and fairly no matter what job they perform. All are respected and valued. Leadership recognizes our value and we are compensated accordingly. There is a sense of belonging and accomplishment.” Another woman (P. 19) spoke of her hopes for leaders taking an active role in creating more representation of diverse teams and listen to feedback from their workers, “I hope that more and more leaders take initiative to hire more diverse teams. I hope that they also make an effort to actively listen to their workers - I think merely showing up in numbers is nothing if the workers don't feel supported.”

In speaking about the role leaders could play in creating belonging for women, another woman (P. 1) spoke of the way leaders “should always be available to help with difficult cases and don't judge if someone makes a mistake or doesn't know what to do.” Finally, a woman (P. 11) noted that women “need to be included in decision making committees and should participate in leadership roles.”

Perhaps the women were more oriented toward leadership because their belonging was in question, or rather they experienced belonging uncertainty (Lewis, 2019), and they were looking for ways to rectify this issue or cope with their lack of inherent belonging. The role of leadership is an important element to consider when creating belonging interventions, given the greater impact an inclusive leader might have on people that do not automatically experience belonging

than on people that do – in the current context, leaders in STEM might have a greater impact on women’s sense of belonging.

Men’s Lack of Orientation Toward Leadership for Belonging

Interestingly, a far smaller number of men made any mention of the role leaders and leadership teams could and should play in the creation of belonging for women in STEM. Of the 20 men, only 4 mentioned the role that leadership played or should play in the support and encouragement of belonging for all employees. Of this small number of men, there was a focus on the importance of a low power distance between the leader and lower-level employees. One man (P. 1) shared, “It helps if there's leadership but that it's not so pronounced as to belittle a subordinate's worth to the workplace. In other words, it's better if colleagues have a more widely distributed sense of democracy, or rather, equality among each other.” The men that did cite the importance of leadership felt that a leader with a high power distance would inherently stifle a sense of belonging for women in STEM. This sentiment supported the men’s idea of a flat organization being the best for fostering belonging in the workplace, which is interestingly not the status quo for many STEM environments.

While the mention of leadership was minimal among the men, one man (P. 18) did speak of a scenario where everyone on the team felt belonging and worked well together, and they noted that it was the leader that played an important role in this experience, “It started with the leaders on the team as well - my senior resident was incredibly knowledgeable, nice, and socially aware.”

It is important to further investigate this phenomenon of women's more pronounced orientation toward leadership in the context of their belonging in a male-dominated industry when compared to men's, and the important role that leaders might play in facilitating women's belonging in STEM. In implementing interventions to increase belonging among women in STEM, attention should be paid to the role that leaders play in setting the stage for belonging, communicating goals, giving voice, and modeling the behaviors that can lead to the desired outcomes of belonging for women in these spaces.

Mindset About Belonging in STEM

Another major difference between the themes around men's and women's belonging was in the mindsets that participants held toward the potential for women's belonging in STEM fields. Namely, the men expressed a great deal of hope and optimism for a STEM space where all people feel they belong, while many women expressed pessimism toward the belonging outcome, or that they could not recall a time when they had experienced belonging.

Men's Positive Mindsets About Belonging in STEM

Over half of the men shared their hopes and aspirations of all employees feeling a sense of belonging at work. One man (P. 7) discussed his hope for belonging at work:

I want everyone to feel a sense of belonging at all points in the workplace, I don't want anyone to feel left out, I don't want anyone to be made fun of for who they are. They should be able to feel safe and secure in the workplace. They should be able to go to work and just be able to act like themselves and get rewarded for it.

They should be able to work as hard as they can and not get judged if they are female or male or other.

Another man (P. 11) spoke with great enthusiasm for all people feeling a sense of belonging at work, stating, “I think it would be fantastic if most people felt a genuine sense of belonging at work and felt free to be their true selves. We spend such a large chunk of our lives at work, so I think it's a shame that this time has to be a source of constant stress for many people.”

The men felt a strong sense of hope and optimism about a future in STEM where men and women feel they belong, and they expressed that sentiment throughout the study. Perhaps this hope and optimism can be harnessed in creating interventions around women's belonging in STEM – noting that men feel this optimism more naturally and inherently than women, and perhaps this will lead more men to feel motivated to implement belonging behaviors and strategies for the goal of women's belonging in these spaces where women are discouraged and less optimistic about feeling belonging.

Women's Negative Mindsets about Belonging in STEM/Had Not Experienced Belonging

About one third of the women shared a negative attitude about or lack of hope for achieving belonging for women in STEM. One woman (P. 11) noted the challenges in creating belonging for women that are specific to the academic STEM environment, stating, “In a STEM workplace there tends to be hierarchy and also ego which prevents significant changes from occurring. It would need to be addressed which can be difficult for an organization since older researchers tend to have many research grants. In a university setting, I think it would be more

difficult to create inclusion. It seems that it would be more achievable in the private sector.”

Another woman (P. 19) had heard many stories of women being dissuaded from continuing with their STEM careers, stating “I know there are many horror stories out there of women being dismissed and discouraged from pursuing their dreams in STEM careers.”

A group of women shared pessimistic views of their hopes for belonging for women in STEM. One woman (P. 7) plainly noted, “Inclusivity as the goal for most workplaces, may never be fully achieved. Unfortunately, we cannot eradicate all bias and prejudices in the world.” Another woman (P. 13) could not think of many examples where she had experienced belonging in her STEM field, stating, “I don’t have many examples of this, unfortunately.”

Finally, a woman (P. 16) had experienced being ostracized and had learned how to not recreate that environment for others in her future roles, “I have learned from past jobs about what it feels like to be left out or mistreated, and I hope from those experiences I can make sure not to do that in my own setting.”

In implementing interventions aimed at creating belonging for women in STEM space, it is important to note that the men might have more hope and optimism for the desired outcome than women. Perhaps this is an area to harness in men – creating a positive vision of belonging for all people in STEM. With men as the main targets of these interventions, their motivation for implementing these interventions might be necessary and helpful in successfully creating these spaces.

Women's Focus on Increasing Tangible Resources for Women

Another interesting finding from the study was the difference in the specific suggestions offered for ways to create a space of belonging for women in STEM. In particular, the women were far more likely to suggest the addition or incorporation of tangible resources to be shared with or distributed to women, while none of the men made such suggestions.

Women's Tangible Resource-Based Suggestions for Creating Belonging for Women in STEM

About one third of the women made suggestions for resources and tangible items such as budgeting and funding, training and education programs, and hiring practices, that would help women increase their experiences of belonging at work, whereas no men made such suggestions. Men's suggestions for belonging at work were more focused on relationship building and adding in more diversity at work.

One woman (P. 2) spoke of the importance of equal distribution of resources:

We have a modern and well-equipped work environment. All staff receive training when needed. It has a culture which encourages staff to continue their education and the ability to climb the corporate ladder. New ideas are encouraged, and knowledge is not [stagnant]. We are constantly innovating and looking to the future. We are not hindered by budgetary constraints and have full administrative backing.

Another woman (P. 7) spoke of the importance of fair promotions, raises, and other policies:

A required panel of employees with variety in pay, background & experience collaborating together when questions of employment advancement, raises and

changes of policy need to be determined. Doing so would help decrease the amount of unfair promotions, nepotism & passing over qualified employees for personal reasons.

The focus women placed on increasing tangible resources points to an awareness the women had about their deficits in these areas, and a lack of awareness the men had about these deficits. This is important to consider when designing interventions aimed at increasing women's belonging in STEM – doing an initial inventory of the resources that are distributed across teams and departments and bringing to light any disparity or lack of disparity in the distributions of these resources. Additionally, it is important to inquire about what resources the women working in STEM environments desire, as resources will vary across environments.

The four major themes around the differences between men's and women's responses focused on merit and denial of the gender disparity, leadership orientation with belonging, mindset about belonging in STEM, and tangible resources for belonging. While there were some stark differences in the ways that the men and women approached these themes, there were also some significant similarities in the ways that the men and women approached belonging. In the next section I describe the findings in terms of the similarities between men's and women's themes around belonging.

Similarities in Men's and Women's Themes of Belonging: Experience and Conceptualization of Belonging Between Men and Women

The most pronounced similarities in the themes that emerged between men and women were the ways in which the men and women conceptualized belonging. Among both the male and female participants, three major themes emerged that captured their predominant experiences

of belonging – first, when they contributed and felt heard, second, when there was representation of non-majority group members, and third, when there was psychological safety and non-judgement of failure. In addition to these three major themes that encapsulated both men’s and women’s experiences of belonging, the women’s group included additional themes around the experience of connection, support, and getting to know their teammates, and their experiences of belonging occurring only in groups of all women. These themes were not present among the men and were some of the strongest themes of the women. Themes around these similarities are represented in Table 1.4 and are further expanded upon in the text.

Table 1.4.

Similarities Between Men's and Women's Themes - Experience and Conceptualization of Belonging

Men's Experience of Belonging			
Theme	Definition	Example Quote	Count
Contributed and Felt Heard	Felt belonging when they made contributions and shared thoughts, and they were appreciated and felt heard by sharing their thoughts.	I have participated in a collaborative team at my place of work that made me feel true belonging. We were working on a specific project and were asked to give our thoughts on what should be done to complete it. All members were able to share their responses and then we brainstormed as a group to meld these ideas together and make the ultimate solution. (P14)	8
Representation	Described experiences or groups with belonging as being diverse or having representation from many groups.	An environment where all backgrounds are hired. People of color, different economic backgrounds, felons and [people from] all walks of lives. I want to see a bit of everything. This truly allows for diversity in ideas and will contribute to different projects off of experiences that are always valuable to our organization. This allows all of us to feel like we belong and that we are equal. (P17)	7
Safety, Non-Judgement of Failure	Felt belonging when the group allowed failure, they could take risks, and they wouldn't be shamed or punished.	It does not matter if we get questions wrong when quizzing each other because we feel a sense of belonging and then further learn from our mistakes after they are explained more fruitfully as a whole. I could not be more proud doing this and I only wish I learned it sooner in life. (P20)	4

Table 1.4, cont.

Women's Experience of Belonging			
Theme	Definition	Example Quote	Count
Contributed and Felt Heard	Felt belonging when they could share ideas and feel heard, when their contributions were valued and respected.	I currently work in an organization where I feel like my coworkers can behave authentically. My workplace does a great job of making sure everyone is heard and provides their input into how things are ran. (P1)	6
Representation	Described experiences or groups with belonging as being diverse or having representation from many groups.	I think a workplace in which everyone feels a sense of belonging and that they can act as themselves must mirror the real external world. There needs to be equal representation for women, men, and people of color within the work environment. Only then can people truly feel they belong. Being one of a few women or a few black employees is incredibly isolating and stressful. A diverse and open workplace is crucial to maintaining this sense of belonging. (P12)	9
Safety, Non-Judgement of Failure	Felt belonging when they felt safe to share ideas and did not hear being judged.	This environment and this team have really motivated me to continue with my own undergraduate thesis. This is because I know that I can ask for help and will not be judged, and I know that when it's all said and done, I will have people in my corner no matter what. (P10)	9
Unique Women's Experience of Belonging			
Relational Connection	Experienced belonging when people were open, supportive, connected on a human level.	I find that folks are open, talkative, and supportive. When we have a free moment, we all go out of our way to help another staff member. When we are both not busy, we often will chat and get to know each other better. It makes coming into work a lot more positive and easier than jobs in my past. (P16)	9
Felt Belonging on a Team of Women	Could recall a time they felt they belonged when they had been on a team of only women.	Throughout high school I worked in an engineering lab which was run by and made up of mostly women. I worked on a team with three other women, some graduate students and some post doctoral fellows. I really felt that I belonged in that environment and felt happy in my role as a student in STEM. It was really important for me to have that experience before starting college and majoring in an engineering field. Now, my classes are predominantly made up of men and I feel less like I belong in these programs. (P12)	3

Men's Conceptualization and Experience of Belonging

Men had varied ways of defining belonging and describing their own experiences of belonging. Men described real and hypothetical instances when they had experienced belonging, and several sub-themes emerged around these descriptions. When asked to speak of their personal experiences of belonging and their understanding of belonging, the most prominent themes that emerged were around times the men had contributed value to a group or team and felt heard (8 participants), when the group was diverse (7 participants), and when it felt ok to fail at tasks or take risks and be wrong (4 participants). I expand upon each of these themes in the following sections.

Contributed and Felt Heard

Almost half of the men (8 out of 20) experienced belonging when they had added value to a group and been recognized for it, and when they had felt heard by other members of the group. When speaking of adding value to his group, one man (P. 15) noted, "I was part of a collaborative team last week. We were brainstorming ideas for a client's business website. We were trying to design something that would be innovative, fresh and engaging. I was inspired by my teammates and felt compelled to share my thoughts. I made important contributions to the project, all of which were championed by the team. The team all told me at the end of the session how much they valued my input and insights throughout the session." This theme was further evidence of the merit and performance theme that emerged throughout the study – men experienced belonging in a team when they contributed to the performance of the team.

When speaking of an experience where he had felt heard in his group, one man (P. 16) stated that, “one of the best moments for me that made me feel included was just having my questions answered and feeling the need to be heard. My manager took the time to sit down and listen to any concerns and attempt to address them. the fact that she took time to just listen to me meant a lot.” The element of listening was important to the experience of having felt heard, and was a prominent theme in these discussions.

Representation

When speaking of the need to create belonging in the STEM environment, just over one third of the men (7 out of 20) noted that having more diversity on a team would automatically lead to a sense of belonging among team members. One man (P. 5) noted, “For me, an ideal scenario of a workplace where everyone feels a sense of belonging consists of (roughly) equal amounts of every gender, race, or other factors of one's identities.” Another man (P. 12) echoed a similar sentiment in stating that “this workplace would be, again, very diverse.” A more thorough response (P. 13) included a man mention of multiple areas of demographic diversity in laying the foundation for a sense of belonging among team members:

I think it would be best if we have people from different backgrounds as in race, cultures, genders, religions and if we have a mixed cultures then everyone would feel confident and no one would feel singled out and only then everyone can feel included. In the STEM work place this is a bit hard to manage because of women being in minority when it comes to STEM but i think if a company sets a goal for that then they will eventually find people of all backgrounds and if they are not

then i am sure there are alot of managers that are female and that is what our company mostly has.

Safety, Non-Judgement of Failure

Another common theme among about a quarter of men describing the belonging they had experienced in the workplace was rooted in the idea that they could fail and not feel shame or embarrassment – a sentiment closely aligned with the construct of psychological safety. One man (P. 18) described his ideal place for belonging as, “a safe-space for failure, and an environment that even encouraged it and thought about it as an opportunity for learning.” Another (P. 3) man described the experience he had with belonging, “It means they are safe in their skin and going to provide the best effort without the fear of being judged.” A final man (P. 14) noted that people share their best ideas when people do not have “fear of being shamed for their thoughts.”

The idea that men felt belonging in the context of feeling safe psychologically is ripe for further investigation given the known importance of this concept in the context of team work and leadership research.

Women’s Conceptualization and Experience of Belonging

Women had varied ways of defining belonging and describing their own experiences of belonging. Women described real and hypothetical instances when they had experienced belonging, and several sub-themes emerged around these descriptions – contributing and feeling heard (6 out of 19 women), in the presence of representation of multiple demographic groups (9 out of 19 women), in feeling safe and not being judged for failure (9 out of 19 women), and in relational connection and support (9 out of 19 women). Additionally, a small number of women

(3 out of 19) cited the times that they felt a true sense of belonging taking place when they were on a team of only women. I expand upon each of these themes in the following sections.

Contributed and Felt Heard

When describing their experiences with belonging, almost half of the women (6 out of 19) discussed the ways they had felt belonging being tied to their sharing their opinions, contributing to the group, and feeling that their input had been valued and taken seriously. One woman (P. 4) spoke of the way she anticipated not feeling heard at a new role she was entering into in a male dominated field:

I personally am going into a field that is heavily dominated by men. I am pursuing to work in the field of stem. So I know the challenges that will be ahead of me when it comes to feeling intimidated or feeling like my voice isn't heard. My aspiration is to work for a company that listens and values everyone's opinions and values my input especially since I am a woman...A time I felt a sense of unity is when working with a group of people for an assignment and there was about a relatively equal amount of work for me and women. We all had the same amounts of workload. And all of our opinions were heard collectively and were held at the same value.

Another woman (P. 11) spoke of feeling belonging at a time that when her thoughts and ideas were heard and respected, citing the importance of these experiences in a collaborative setting, "At work I felt like I truly belonged in a team when my thoughts and ideas were respected. Being able to share my perspective and expertise is very important to me in a

collaborative setting. Also, seeing that my team members listened and did not talk over me was very helpful in boosting my confidence.”

The themes of feeling heard, sharing voice, and being respected were all prominent and should be considered in designing interventions around women’s belonging in STEM spaces. Further, perhaps leadership and other trainings should incorporate these elements given the powerful impact they can have on all people’s sense of belonging in the work environment.

Representation

When describing their experiences with belonging, almost half of the women (9 out of 19) used verbiage about equality and diversity. Many made note that men and women in leadership roles should be equal, resources should be evenly distributed, workload should be equal, and that there should be people from multiple groups represented to create a sense of belonging for others. One woman (P. 11) plainly captured the sentiment of equality and diversity in stating, “I believe that a workplace should have equality and diversity in order to make the best decisions.” Another woman (P. 4) noted:

A time I felt a sense of unity is when working with a group of people for an assignment and there was about a relatively the same about of men and women. We all had the same amounts of workload. And all of our opinions were heard collectively and were held at the same value. I felt safe to make comments about our project and knew that my voice would not be overheard and my options would’ve be heard. It was nice to be able to all share our ideas for our assignment and not one person or individuals have more power over the other.

Another woman (P. 5) noted, “I believe that every place needs to be equal for everyone, and everyone should feel welcomed. First, there should feel a sense of community among all people.” And then later shared that “workplace should be a place where all people can be relaxed and feel welcomed. there should be an equal amount of men and women. Everyone should feel that they are included in the conversations. more projects and tasks should be distributed and equally tough for men and women. there should be charts and team activities so that everyone feels welcomed no matter what they do.”

A woman (P. 15) shared a specific way that equality can be demonstrated to employees through equal representation in leadership, “I would love for everyone to be respected and treated equally. I believe having equal men & women in leadership roles would help show some equality.”

Safety, Non-Judgement of Failure

When describing their experiences with belonging, almost half of the women (9 out of 19) discussed the safety that they had felt in taking risks and not being punished for being wrong or making errors. The sentiment of these responses also centered around the idea of non-judgement, citing that leaders and others that were open to ideas and did not judge people for making mistakes helped create their sense of belonging. Again, concepts that closely align with the construct of psychological safety. The experience of psychological safety characterizing belonging is important given the vast amount of research that has centered around the connection between psychological safety and employee performance, voice, teamwork, team learning, and organizational learning (Edmondson & Lei, 2014).

One woman (P. 1) noted, “I would like to see a diverse and representative work team, where everyone feels as if they can speak their minds without being judged negatively for doing do. Another woman (P. 9) noted the importance of not judging someone if they needed extra help, “coworkers should be able to lend a hand and reach out when they see others struggling and not judge them if someone needs the extra help.” Another woman (19) spoke about the safety they should ideally feel in a space where they belonged, “The ideal scenario is where the worker feels 100% safe and supported to speak their mind on any topic.”

The sentiment of safety and non-judgement should be incorporated into designing interventions for women’s belonging in STEM given the importance they place on these feelings for their own experiences of belonging.

Relational Connection

Almost half of the women (9 out of 19) expressed that they had felt belonging when others had made connections with them, when there was a friendly atmosphere, and when they worked closely in collaboration with others on their team. One woman (P. 16) specifically said, “I think creating human connections between each other is the best way to make people feel included.” Another woman (P. 13) described her ideal experience of belonging as “It would look cohesive and concrete with open communication and friendship.” Interestingly, this theme was not present among the male participants, though all other sub-themes in this area were like the men’s responses. For this reason, it is important to incorporate relational elements into male-majority teams when seeking to create belonging for women.

Felt Belonging on a Team of Women

A small number of women described an example of a time they had felt belonging when they were on a team of only women. One woman (P. 15) discussed the way that being a member of an all-woman team was especially helpful in the context of a sport that is viewed as more masculine. She also discussed the ways she had been less included on mixed teams of men and women. She noted, “When I was on a sports team with all women. Usually, sports are seen as a manly thing so I really liked being on all girl basketball team. I did not feel intimidated by my teammates or competitors. I felt comfortable playing with them. I felt like we worked better than being on a co-ed team. When I played on a co-ed team, the girls weren't included as much.”

The experiences of women feeling belonging only when they were on a team of all women brings to light the idea that men in STEM might experience belonging more when they are on a team of all men, and they might therefore take the concept of belonging for granted given that many STEM spaces are far more populated by men than by women. This is an important concept to incorporate into interventions around belonging for women in STEM – highlighting the idea that many men might take for granted the belonging they have felt due to the current makeup of most STEM environments including majority men.

Discussion

Through the qualitative analysis of responses in this study, several important concepts emerged that should be taken into consideration when conducting further research and designing interventions with the aim of increasing women’s belonging in STEM fields. First, it is notable that while there were several similarities in the ways men and women conceptualized belonging – through contributing and feeling heard, through the representation of multiple identities, and

through feeling psychologically safe – there were important differences as well. This is not surprising given the traditionally male-dominated context in which the different experiences that men and women have when belonging is inherently granted and experienced (for men), and when it is lacking (for women).

An important outcome of the study was the focus that men placed on merit in both defining and explaining their experiences with belonging in STEM, and in seeking to address the lack of belonging for women. In designing interventions and messages around women's belonging in STEM, it is incredibly important to emphasize that women's performance is not lower than men's (e.g., Halpern et al., 2007, Spelke, 2005), and that increasing the number of women in STEM will not decrease the quality of STEM outcomes.

Another important outcome of the study was the greater focus that women place on leadership in creating spaces of belonging for women. This is not surprising given that women likely experience more belonging uncertainty (Lewis, 2019) and are more inclined to seek group members that can influence their own belonging in these spaces. For these reasons, it is important to place a greater emphasis on leadership training around the influence that leaders have over follower's sense of belonging, and for groups that might not experience belonging automatically because of their group minority status, leaders can play an important role in increasing their belonging.

Another important outcome of the study was the vast difference between men's and women's mindset about women's belonging – that men were far more optimistic around this outcome, and women were far more pessimistic. This is crucial to address in any intervention designed for increasing women's belonging in STEM fields – that men can harness their optimism, and women's pessimism should be acknowledged and managed.

Lastly, it is important to note that many of the comments around the current STEM environment represented elements of Berdahl's Masculinity Contest Culture (Berdahl et al., 2018) that is characterized by a work culture that encourages a hyper competitive environment (a winner-take-all competition), where the winners are those who endorse stereotypical toxic masculinity through ruthlessness, stamina, and emotional toughness. Women spoke of the ego and hierarchy that was present in their environments, which contributed to their pessimism around the achievement of women's belonging in STEM. Further, the men who felt optimism around creating belonging for women in these spaces also placed a great importance on merit and performance, which is representative of a Masculinity Contest Culture, and which is inconsistent with the ideas of the flat hierarchy that they desired. For men to create spaces where women feel that they belong, it is important to understand the cultural elements that lead to women's lack of belonging, and to address and change those elements to be more relational in nature. For a few women, being on a team of all women was the only way they felt authentic belonging. It is important to incorporate elements of relational practice (Fletcher, 1998) - preserving the life and well-being of the project, mutual empowerment of self and another, achieving goals, and creating teams - into interventions aimed at increasing women's belonging to combat the Masculinity Contest Cultures that exist, and to infuse them with elements of relational practice that are so important for women's belonging.

Implications

The findings of this study will guide future research in uncovering the ways in which individuals conceptualize authentic belonging when they have already experienced it and might not recognize its importance to their persistence and success in the fields in which they work. The findings of this study should also help researchers and practitioners design interventions

aimed at increasing women's authentic belonging in STEM, incorporating both women and men's experiences. For example, in fields where men are predominant, the experience of authentic belonging might not be recognized as important for men who already experience it regularly, and the focus on women's merit should increase men's openness to such interventions. The designing of interventions that illuminate this point and bring to men's attention these concepts are important given that men are likely to be in leadership and powerful positions in these fields. Practitioners should recognize that the audience and focus for interventions aimed at increasing women's authentic belonging in STEM will be majority men and addressing their own experiences, mindset, and justifications of authentic belonging in these fields is an important point to make early on in interventions.

Limitations and Areas for Future Research

While the current study provides a better understanding of the similarities and differences between men's and women's experience of authentic belonging, it was not without limitations. First, the close-ended nature of the online survey study questions did not allow for follow-up questions or further investigating topics beyond initial reactions. For this reason, the second study of this dissertation will pose interview questions to follow-up on responses to uncover issues more deeply around these topics. Next, while the current study offers an informative view of the experiences of authentic belonging in STEM fields, the experience of working in these fields is varied across disciplines and across institutions. More research is needed to explore the conditions under which women in STEM thrive.

Given the nature of the STEM career trajectory and the existing environmental conditions, the STEM population should be given further resources, support, and consideration around research and development of issues of authentic belonging. Specifically, future research

should continue to focus on DEIB efforts in STEM fields, noting the importance of developing interventions that teach behaviors that lead to these outcomes. Further, additional practices and interventions from positive organizational scholarship should continue to be pulled into DEIB research to continue to investigate ways that initiatives can be both effective, generating, and minimally harmful to all attendees.

Based on the results of this study, I have crafted questions in the second study of my dissertation that will seek to further investigate the men's focus on merit and performance around belonging in STEM, given that this was a major theme that emerged. Questions that I will include in the second study are:

1. Have you ever had any conversations that have led you to understand the idea that the field is not leveled between men and women?
2. Do you have any insights into how others at work understand that the fewer number of women are not due to their lack of merit and performance?

Conclusion

Through this study, I have developed a deeper understanding of the similarities and differences between men's and women's aspirations and experiences of authentic belonging in STEM. Given the differing impact this experience has on men's and women's outcomes in STEM, this study has led to important findings around the development of authentic belonging in STEM and how it is conceptualized by groups that experience it differently. By gaining a better understanding of these important differences, organizations should be able to better design interventions that encourage women's authentic belonging in STEM fields based on the aspirations held by women in these fields.

Chapter 3

Study 2: A Qualitative Study of Belonging to Highlight Includers and Their Behaviors

The second study sought to uncover the behaviors, experiences, conversations, and other experiences associated with women's authentic belonging in STEM. This study is based on the concept of job crafting for inclusion and the mechanisms that might render job crafting a fruitful area of research to add to the DEIB research. I next reintroduce the existing research on inclusion in STEM, followed by a discussion of the job crafting framework that might aid in the crafting of inclusion behaviors to facilitate women's authentic belonging in STEM.

The focus of this study is on job crafting and inclusion, and the ways that these important concepts can be paired together to help organizational scholars and practitioners investigate the mechanisms that develop and drive inclusive workplaces where women can fulfill their need for authentic belonging. This study is focused on the importance of researching inclusive behaviors that lead people to feel authentic belonging in organizational spaces such as STEM fields. I introduce job crafting as a powerful framework for men in STEM to shape inclusive behaviors throughout their workspaces and work lives, thus creating authentic belonging for women in STEM spaces. This study aims to inspire research and practice that facilitates the authentic belonging of women in STEM through the development of inclusion-focused job crafting programs. I propose that an inclusion-focused job crafting program is a useful way to motivate men to enact inclusion behaviors over the long term and therefore to create authentic belonging for women in STEM fields.

Past research on inclusion has focused on defining the subjective experience of inclusion of non-majority group members (Shore, 2011, 2018). This research has not yet begun to identify inclusion behaviors that majority group members enact that might lead to the subjective

experience of inclusion for non-majority group members. Further, recent reviews of diversity trainings note that there is a dearth of a behavioral focus in many diversity trainings (Devine & Ash, 2022). Research is needed to outline the specific behaviors that, when enacted by majority-group members, lead to feelings of authentic belonging for women in STEM. I propose a job crafting framework as a guide for developing inclusive behaviors, further harnessing additional motivational mechanisms that might help men enact meaningful inclusion for women's authentic belonging in STEM.

Job Crafting

Wrzesniewski and Dutton (2001) originally defined this flexible and powerful construct as “the actions employees take to shape, mold, and redefine their jobs” (p. 180). A popular framework based in positive organizational scholarship that could motivate and guide majority-group members autonomously designing inclusion, job crafting takes place in three forms: an employee changing the relational boundaries of the job (who they interact with and how they interact), an employee changing their job tasks (altering tasks or the time devoted to tasks), and an employee changing their cognitive boundaries (how they think about their job). Given the known flexibility of the construct (i.e., job crafting has been studied in relation to job performance (Berg et al., 2008), job satisfaction (Dubbelt et al., 2019), engagement (van Wingerden et al., 2017), wellbeing (Slemp & Vella-Brodrick, 2014), and other outcomes), there is an opportunity to further explore how job crafting might be used in the context of DEIB programs to increase the enactment of inclusion behaviors in STEM spaces. An inclusion-focused job crafting initiative would empower majority groups (e.g., cisgender white men) to autonomously find a job-crafting strategy for creating an inclusive workspace that would lead to women's and other minority-groups' true belonging in STEM in the long term.

Job Crafting Outcomes

While there has been a fast-growing interest in conducting research on job crafting in the last 20 years, there are a variety of target outcomes for which job crafting is used and intended. The study of job crafting has been linked across disciplines to job performance, job satisfaction, engagement, and thriving, among other concepts (Berg et al., 2008) and to increases in work performance both at the in-role and extra-role levels (Dubbel et al., 2019; van Wingerden et al., 2017). Bakker et al. (2012) and Petrou et al. (2012) both found that job crafting has been associated with increased work engagement. Tims et al. (2012) found that resource crafting led to increases in resources two months later, and that job crafting led to increases in engagement, job satisfaction, decreased burnout, and wellbeing. Job crafting has been linked to better performance (Caldwell & O'Reilly, 1990), intrinsic motivation, and employee engagement (Dubbel et al., 2019, Halbesleben, 2010). Given these diverse and impactful outcomes, it is necessary to investigate the motivational mechanisms of job crafting, which will be a focus of the concluding chapter of this dissertation.

The extensive and growing body of research on job crafting demonstrates its flexibility in multiple work scenarios. Job crafting for women's authentic belonging in STEM is a key area to investigate. Given that job crafting toward inclusion is a new concept, it is important to take each of the three elements of job crafting and uncover examples of enacting inclusion behaviors through each job crafting domain. I next discuss the three elements of job crafting independently – task, cognitive, and relational crafting - to develop a starting point for men seeking to enact inclusion behaviors to create women's sense of authentic belonging in STEM fields.

Relational Crafting for Inclusion

While relational crafting for inclusion, an employee would seek to develop new and better relationships across groups and identities that are not currently represented – in the context of STEM, it would mean men reaching across to develop new relationships with women in these spaces. A vast amount of research has pointed to the importance of women being represented in STEM spaces, and the impact that women's representation has on women's sense of authentic belonging in these fields. Items from the relational crafting portion of the job crafting questionnaire capture the main ways to relationally craft: making an effort to get to know people well at work, organizing or attending work related social functions, organizing special events in the workplace, choosing to mentor new employees (officially or unofficially), and making friends with people at work who have similar skills or interests. (Slemp & Vella Brodrick, 2013). Relational crafting toward inclusive behaviors would capture these items and position them toward thinking of inclusion in STEM spaces. For example, men could reflect on the work-related social functions that could offer more connection opportunities, or proactively collaborating with more women in their STEM space.

Task Crafting for Inclusion

Tasks are the set of work activities a person regularly performs during a typical workday, and they are the basic building blocks upon which jobs are created (Griffin, 1987). Wrzesniewski & Dutton (2001) defined task crafting as altering the form or number of tasks on the job. For men in STEM seeking to task craft for inclusion of women, they could consider adding into their daily and weekly tasks activities that demonstrate their efforts and intentions toward inclusion. Items from the task crafting portion of the job crafting questionnaire capture the main ways to task craft: the introduction of new approaches to work, changing the scope or

types of tasks at work, introducing, and giving preference to new tasks that better suit the person's skills or interests, and taking on additional tasks (Slemp & Vella Brodrick, 2013). Task crafting inclusive behaviors would incorporate these tasks into one's regular work activities in a way that fit their individual skills and preferences.

Cognitive Crafting for Inclusion

Cognitive crafting encompasses the ways an employee thinks about their job. Items from the cognitive crafting portion of the job crafting questionnaire capture the main ways to cognitively craft: asking employees to think about how their job gives them meaning, what significance their job has for the organization and the broader community, how their job positively impacts their life, and how their job impacts their overall wellbeing (Slemp & Vella Brodrick, 2013). Cognitive crafting for inclusion would connect a person to the meaning, significance, and impact that inclusion behaviors could have in their work life. For example, men in STEM might reflect on the current climate of inclusion in their STEM space, how they might have a positive impact on their organization through the enactment of inclusion behaviors, and whether they wish to be an actor of inclusion behaviors.

Research Goals and Questions

The second study introduces the concept of job crafting (Wrzesniewski & Dutton, 2001) for inclusion – uncovering the inclusion relationships, tasks, and ways of thinking that are effective in leading to the experience of authentic belonging for women in STEM using the job crafting framework. Using open-ended semi-structured interview questions based in the appreciative inquiry framework (Cooperrider, 1986), I qualitatively investigated the specific behaviors that women participants experienced as related to their belonging in STEM, using the job crafting framework to shape my questions. I focused the interview questions on the three

elements of job crafting – relational, task, and cognitive crafting – and the ways in which people enacted behaviors under these categories that led women participants to experience authentic belonging in STEM. The 25 participants in this study were women ($N=23$) and non-binary assigned female at birth (AFAB, $N=2$) individuals actively working or studying in STEM fields who have felt a sense of authentic belonging in their field.

The research questions that guided this study were:

1. What are the relationships, tasks, cognitions, and other specific behaviors that lead women to experience belonging in STEM fields?
 - a. How do key relationships in STEM lead women to feel they authentically belong there? How are these relationships formed? How are they sustained? What elements of the relationships lead to women's authentic belonging?
 - b. What tasks and activities do includers implement into their work that leads women to feel they authentically belong in STEM?
 - c. What conversations and interactions with includers have led women to understand their thinking around their inclusion behaviors?
2. How do conversations evolve the idea that the field is not leveled between men and women? How is underrepresentation of women in the field understood in relation to merit and performance?

Methods

Participants

This study included women ($N=23$) and non-binary AFAB persons ($N=2$) currently based in a STEM field ($N = 25$). Participants were all women or non-binary, mostly white, who volunteered to participate from across the country. Participants worked in multiple STEM fields

including astronomy, biology, biomedical engineering, chemistry, materials science, ecology, computer/software engineering, engineering, mechanical/aerospace engineering, fisheries, forestry, marine science, planetary science, psychological and brain science, quality engineering, science operations, and robotics/AI. More complete participant demographic information is included in Table 2.1. Given the phenomenological nature of the study, I pursued data saturation as a means of determining my final sample size given the heterogenous nature of the STEM population. I achieved data saturation at the end of 14 interviews, but I continued to recruit participants and conduct interviews to build confidence in the emergent findings.

Table 2.1.

Participant Demographic Information

Participant Demographic Information	Frequency
Gender	
Women	23
Non-binary AFAB	2
Ethnicity	
White or Caucasian	15
Asian	5
Hispanic or LatinX	2
Hispanic or LatinX, White or Caucasian	1
White or Caucasian, Other	1
Other	1
Years Working in STEM	
0-5	11
6-10	6
11-15	4
20+	4
Age	
21-29	11
30-39	11
40-49	0
50+	3

To recruit the participants, I reached directly out to my network of STEM professionals and requested a 30-45-minute interview. Participants were compensated with a \$10 TisBest charity gift card for their participation in the study. Interviews were recorded using Zoom software and then transcribed using the Otter.ai software. Any identifying information was eliminated. I then uploaded all interview transcripts to the MAXQDA qualitative research software. I scanned each transcript for identifying information and removed such information immediately.

Interview Protocol

Given our aim of exploring the incidents and activities that lead to women's experience of authentic belonging in STEM, I conducted semi-structured interviews. The semi-structured interview protocol was designed specifically for this study. Interview questions were categorized using the three sections of the job crafting framework. There were questions about relational, task, and cognitive behaviors that have led to participant's experiences of authentic belonging in their field. The main sections of the interview protocol, along with sample questions from each, can be found in Table 2.2.

Table 2.2.

Interview Protocol

Section Heading	Sample Questions
Opening	Define authentic belonging for participants – how would you describe the authentic belonging you’ve experienced as a STEM professional? Do you believe authentic belonging is important in your work? Why or why not? What is the best thing you like about your work?
Relational Crafting	Who at work has made you feel you authentically belonged there? What was it about these people that made you feel you authentically belonged? How did these relationships initially form? How did they evolve?
Cognitive Crafting	What conversations have you had with your leaders or teammates that helped you understand their drive for including you at work? Have you had direct conversations about women’s belonging in STEM? Have you discussed the idea that women do not have a level playing field in STEM?
Task Crafting	What specific behaviors have you encountered at work that led you to feel authentic belonging? What tasks or activities have your leaders or colleagues performed that led you to feel you authentically belonged at work?
Closing Questions	If you were asked to design an intervention to train people to better include women in STEM, what would that entail? Is there anything I didn’t ask, but you think I should have?

Thematic Analysis

I conducted a thematic analysis, a common qualitative data analysis approach used to describe a phenomenon when existing theory is limited (Hsieh & Shannon, 2011). I systematically sorted, summarized, and compared qualitative information while extracting the major themes that arose so I could obtain an understanding of the behaviors and actions that led to women’s authentic belonging in STEM most effectively and efficiently. I included data from all participant interviews.

To begin my thematic analysis, I conducted open, inductive coding on the full sample of interviews collected in December 2022 through February 2023. There was no a priori coding scheme in place at the start of my coding process, as I wanted to let the data guide my thematic

analysis. I created my own coding categories according to the available information and emergent themes in the interview transcriptions. I spent sufficient time with each data source and familiarized myself with the themes present. I gained a holistic understanding of each interview transcript, and I captured key concepts from each conversation, as recommended by Kondracki & Wellman (2002). Next, I summarized my initial impressions and analyses by creating a series of codes that I then sorted into higher-order categories while more themes emerged. I then decided upon a final set of coding categories through mutual agreement and input with select colleagues. This coding approach and process led to valid findings that were grounded in the data of each participant's unique perspectives (Hsieh & Shannon, 2011).

I also complement my thematic analysis with a quantitative coding strategy of some basic descriptive demographic information. Interview participants reviewed and signed a consent form (see Appendix C) and completed a brief demographic questionnaire (see Appendix D) that included information such as race, gender, age, department or division, and number of years working.

Enhancing Validity

Qualitative research is impactful in that it allows the researcher to gather rich contextual insights into the experience of authentic belonging for women in STEM. I have considered potential threats to validity and have put in place a process to mitigate each threat to the best of my ability. One threat to validity in this study is the self-report nature of the semi-structured interview format and the potential for bias. To eliminate as much self-report bias as possible, I have taken the recommended steps outlined by Creswell and Poth (2018) for my interview protocol, constructing questions that are open-ended, short, and concise.

Another potential threat to validity is from my own research bias and experience in the topic of authentic belonging in STEM. To minimize this threat to validity, all the interviews were recorded and transcribed for analysis, and each section of the interviews was analyzed. I did not cherry-pick portions of interview transcripts that I found most interesting or relevant to my own research interests. This helped to eliminate some of the bias through minimizing the potential of me only capturing the data that fit my existing theory, goals, or preconceptions, or the data that stood out to me (Maxwell, 2003).

Lastly, upon completion of the interviews and analysis, I held a member check meeting to share the initial findings with participants to ensure I appropriately represented their voice. Of the 25 participants who were invited, 10 expressed interest and 6 were able to attend. Participant reactions were discussed, and items were followed-up on based on participants' input. For example, one participant (P. 9) inquired about the relationship themes not including staff, "Where would staff fit in?" I reviewed my analysis to ensure I had not left this theme out. Overall, reactions to this member check meeting were positive and supportive of the findings I presented, including participants noting that they "felt included," and they "could identify with the results." One participant shared that she "could already imagine sending the paper to my colleagues for them to act upon."

Findings

Throughout the coding and analysis of the interview transcripts, several important themes emerged that shed light onto the relationships, the behaviors, and the ways of thinking about belonging that led to women's experiences of belonging in their STEM spaces. Table 2.3 illustrates the major themes that emerged around these topics and Figure 2.1 captures the

include themes and behaviors in a thematic map. I will expand on each of these areas in the following sections.

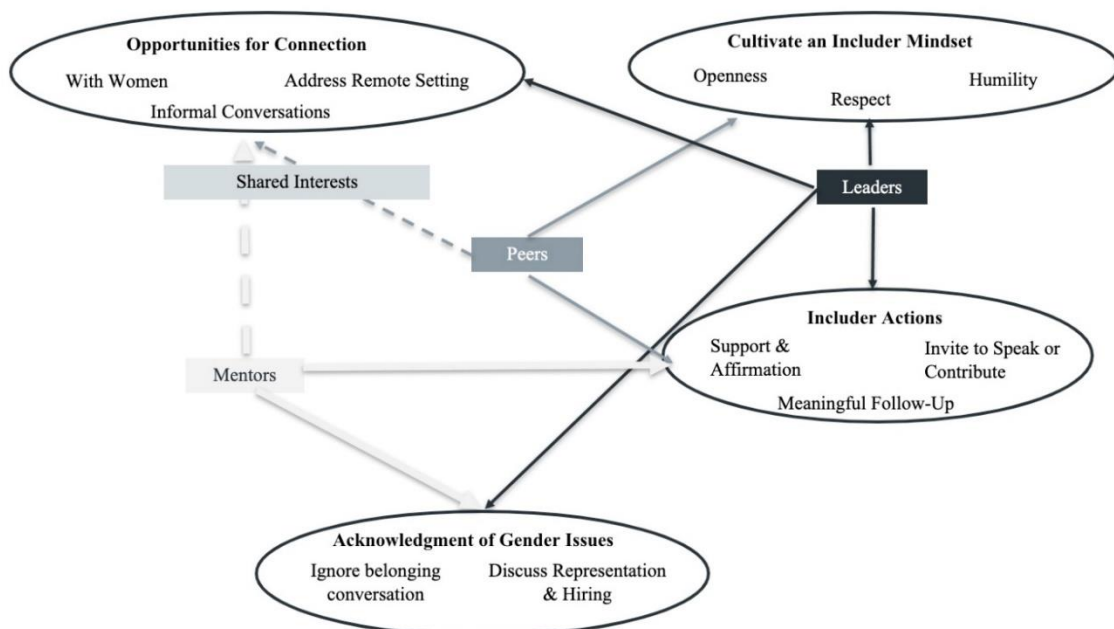
Table 2.3.

Major Themes of Includers, Includer Behaviors, and Expanding Concepts of Inclusion

MAJOR THEMES	
Theme	Definition
Who are the Includers?	Which people, groups, and relationships led to participant's feelings of belonging?
Effective Includer Behaviors	Specific behaviors and ways of interacting that led to participant's feelings of belonging.
Expanding Concepts of Inclusion	New and nuanced ways that participant's experienced and conceptualized their own belonging.

Figure 2.1.

Thematic Map of Includers and Includer Behaviors



Who Are the Includers?

The major themes that emerged around participant relationships were the four predominant types of relationships that led to participant's feelings of belonging in their environment – participant's leaders, peers, those with whom they shared interests, and their mentors. Table 2.4 captures these major themes, and I will expand on each of them in the following section.

Table 2.4.

Who Are the Includers?

Theme	Definition	Example Quote	Participant Count
INCLUDERS			
Leadership	Leader contributed to their feelings of belonging.	"I would say my manager, honestly, he has a really good way of like, just including everybody and asking everybody's opinion on things." (P4)	20
Peers	People at similar career stages/with similar identities contributed to their feelings of belonging.	"I would say that...the person that I am usually, mostly with - people who are close to me in terms of like career stage...In terms of sort of feeling like I can express my true, authentic self. I think I feel that most strongly when I'm talking to people who are in a similar age and career stage. So either people who are graduate students or who are who are postdocs right now, or who are very early career scientists." (P9)	17
Shared Interests	Felt belonging with people with shared interests.	"And with my other friend [NAME], it was more like we are kind of sporty. So we were literally the only ones to want to go hike. So I used to send an email [asking if] someone wants to go hike, and she was literally the only one." (P10)	10
Mentors	Mentors contributed to their feelings of belonging.	"I have my work mentor who's been there for me since day one. And he's basically like, the senior version of my position. So he's been a mentor for me, like, professionally, but then also, we've gotten to know each other personally. So he's become, like, an emotional mentor for me as well. Yeah. So he's definitely helped made me feel like I belong, just because I trust him." (P13)	9

Leadership

The most prominent theme that emerged on the topic of the relationships that led to feelings of belonging was the impact their leaders had on participant's belonging – 20 out of 25 participants noted that their leaders had contributed to their feelings of belonging. More specifically, principal investigators (PIs), managers, and faculty instructors were among the most cited relationships that had contributed to participant's feelings of belonging.

One participant (P. 14) in chemistry described in detail the immense impact her supervisor/PI had on her developing a passion for their field and for her strong sense of belonging in the field:

Before, I didn't know that I belonged in chemistry, because like I said, I didn't have any interest or any passion at all. But right now, I'm for sure, 100 percent (certain) that I belong to the chemistry major (field)...I love it. I realized that I love it more every day - I love it more, I gain more interest, I gain more passion and motivation every day, because I learn new things from my supervisor...my PI... so I got inspired by her. Because watching her do a lot of things that contribute to the society, to human development - that inspires me a lot. That's the reason she's one of my role models.

Another participant (P. 5) in astronomy gave an example of the way that her supervisor facilitated her feelings of belonging when she was new to the company. He had asked her to give a talk at a conference and he ensured she was taken care of and that her voice was heard throughout the day, "But he actually emailed me and asked me last minute, like if I could give a talk. So I decided to give a talk. And then and you know, most of the [other] conference organizers ignored me, but he really took care of me

throughout the whole day and made sure that my voice was heard.” These participants were greatly impacted by the relationships they had with their leaders and the way their leaders had fostered their sense of belonging in their work environment.

Another participant (P. 3) in computer/software engineering pointed out the important concept that supervisors in general had more of an ability to help foster a sense of belonging for their employees because they are the most aware of the work that their employees do, and they can provide assurances in the face of self-doubt, “I think in one aspect, the easy answer is to say like the supervisors who encourage you and tell you that all the time, right, because...they're aware of my position and it's possible that they're going out of their way to reassure me of that, because they might feel insecure about how I'm feeling in that position.”

Lastly, a participant (P. 12) in mechanical/aerospace engineering that had shared that her PI was a main source of her feelings of belonging gave a powerful example of how he had expressed that he wanted to hear her unique perspective because he valued it, “He said, ‘Well, this is your research. I want you to take the direction you're taking because nobody else is exactly like [NAME] and even like us...Nobody is exactly like [NAME]. I might think something else, but your way and your perspective and your past experiences could take us down a route that I would have never thought about before.’ ” This participant spoke about how the use of her name and the way her PI conveyed that he truly wanted her to contribute her perspective made her feel that she belonged, and she could be successful in their work environment.

It is important for leaders to understand the powerful and unique impact they can have on their women and underrepresented direct reports that do not automatically experience belonging

in STEM spaces. Leaders are uniquely positioned to have an enormous impact on a woman's sense of belonging in the STEM fields through their actions and through role modeling, and leaders should be aware that they can take actions to facilitate belonging for the women in their spaces.

Peers

Another major theme that emerged among 17 participants, on the topic of the relationships that led to feelings of belonging, was around the idea that the relationships that made participants most feel they belonged in their environments were with people that were at a shared career stage as them, or people they considered their peers. More typically, participants shared that people that had started at the same time as them, or the presence of people who were similarly early in their career made them feel that they belonged in their environments. Additionally, the people with whom they had regular, day-to-day interactions also fostered their feelings of belonging.

One participant (P. 7) in engineering noted that her sense of belonging as an engineer at her company was “because of the young people that I was with, the people that went to schools like me, and probably because there was one other female engineer who I befriended.” Another participant (P. 5) in astronomy noted that with her peers, she felt belonging because “we share some identities and have really, you know, good understandings about some of those things. So, I...think I feel like...[my] peers. So, we get together and, you know, [can] be ourselves.”

When asked about the types of relationships that made her most feel she belonged, one participant (P. 1) in biomedical engineering explained in more detail the idea that people that held her same position were the source of her sense of belonging:

Honestly, people of my same position, there's not many of us. But we're a large lab. My group was in a separate building for over a year. And so, I was the only research technician over there. And then once we moved to the [main] building, where our entire lab was, every single research technician has been incredibly friendly. Just felt very friendly. And I was worried about moving to the new building and not knowing anyone and they just, it was the research techs that made me feel welcome.

Another participant (P. 9) in planetary science described the idea that one of her strongest relationships was with another person who had started at the same time as her, "As for friends, the person who I'm thinking of the most I just, when we were both being sort of inducted as postdocs at the same time, we have similar interests."

It is important to note for people who are not in leadership positions and do not know what type of influence they can have on women's sense of belonging in STEM that many women experienced a sense of belonging through their peers, and for this reason, everyone in STEM fields can aim to facilitate the sense of belonging for women in these fields. As such, interventions aimed at increasing women's belonging should be aimed at all employees, and not just at leaders, mentors, and other more formalized relationships.

Shared Interests

Related to the theme of peer relationships and belonging, one-third of participants (10 in total) spoke of the relationships that made them feel they belonged had often developed because of a shared interest between the two parties – and interests ranged across the board from joining sports teams, enjoying board games, cooking, and being involved with social issues. These shared interests served as a foundational starting point for developing relationships with the

people with which they ultimately felt they belonged with. A participant (P. 20) in software engineering and AI robotics spoke of a colleague with whom she felt belonging that shared in her learning differences and sexual orientation, “we both have some learning differences that are similar. We have some we have some unique qualities that and we're also both queer,” and the way she was able to connect with this colleague over reactions to comments and other scenarios.

Another participant (P. 13) in biology spoke of an experience where she truly felt she belonged centering around a group’s shared interest in conservation and the community that was built around that interest. She had been doing field work with a larger group and they had extra time to fill, so they began to collect trash together, and they bonded over their shared interest of their work and the environment they were helping:

So there was like one day out in the field where we were all talking. And we were all collecting trash and picking up trash while we were waiting for sea turtles to come into the net and stuff. And like that definitely felt like one of those days where I felt like I belong, like I was in the right place that I needed to be. And it's like, it's that sense of community that helped add to that sense of belonging, like knowing that I have other people around me in my corner. Yeah, feeling the same passion having the same interests as me.

Another participant (P. 7) in engineering spoke of a time during her male-dominated STEM education when she found belonging with a group of women soccer players. She noted that the university was comprised of only 10% women and one woman had told her, “You don't get through engineering school all by yourself.” Another participant (P. 9) in planetary science shared that she had a colleague that helped facilitate her feelings of belonging, and they had connected because in her introductory biography she had noted that she liked board games, and

her colleague had reached out to her about that. Seemingly simple aspects of daily life served as a starting point for the important relationships that led to women's experiences of belonging in their work environments.

It is crucial to note that when people can find common interests with their colleagues, they are more likely to experience feelings of belonging. For this reason, it behooves organizations and individuals to create spaces and opportunities for employees to explore their interests with each other to foster the sense of belonging that is so needed in these spaces. Further, organizations should place high importance on employees sharing their interests with wider groups and creating spaces of connection and personal growth to foster these interests.

Mentors

Another theme on the topic of the relationships that led to feelings of belonging was that the mentorship relationships contributed to feelings of belonging for 9 participants. The mentorship relationships were described as both formal and informal, and they provided a great deal of support to the participants that mentioned mentors in the study. A participant (P. 22) in fisheries spoke of a mentorship program that she created and highlighted the importance of fostering both professional and personal connections among others in the program to foster belonging, "It's just creating a connection between two people to connect on a professional level, but also on a personal level, too. And I think that's important and feeling belonging... whether it's formal or informal, I think being able to connect on a personal level and beyond the professional level..."

A participant (P. 12) in mechanical/aerospace engineering spoke about how she had felt supported by her mentor, and the support she received enabled her to provide support to others in her group, "I feel like it's mostly my mentors that have supported that. And I feel like from there,

it's me being supportive to everybody else.” Another participant (P. 11) in psychological and brain sciences spoke about the way that being a mentor herself had facilitated her sense of belonging because she had created a reciprocal relationship of learning:

“I've actually learned so much just from my mentees alone. So I'd say that's also important..... And so, I think what helps is really having that mentorship relationship for the work that we're doing, but then also trying to build a friendship simultaneously. I think that's something I really try to instill within the relationship building is not just, ‘Hey, we have this work relationship,’ but, ‘Hey, I also want to know how you're doing, make sure you're okay, check in with you.’ So that's also important.”

Another participant (P. 9) in planetary science spoke of several mentors she had been assigned throughout her career in STEM – all began as more formal and developed into more informal relationships – and ultimately led to her feelings of belonging in the space. One mentor reached out to her because of their shared interest in her area of research, and the other mentors were assigned to her as a part of a summer educational program. The mentor program was designated as a 10-week program, and she spoke of the way that the relationship had time to develop over that longer period.

Mentorship relationships in the STEM environment can greatly contribute to women’s feelings of belonging in these fields, and they can impact women acting as mentors, mentees, and co-mentors or reciprocal mentors. This is important for organizations to consider if they do not have current mentoring programs established for women and other underrepresented groups. It is also important for mentors to know the impact they can have on their protégés’ sense of belonging and should be added to the goals and aspirations of mentors for women in STEM

fields. Lastly, it is important to note that several participants were able to develop feelings of belonging through being mentors themselves – thus further highlighting the potential impact these programs can have on not only proteges, but also on the mentors themselves.

Effective Includer Behaviors

Participants spoke of the specific behaviors and activities that fostered their sense of belonging in their STEM spaces. Themes emerged around the opportunities to connect with others, the direct acknowledgement of issues that women in STEM face, the perceived mindsets of includers, the casual and informal conversational styles that fostered belonging, providing acknowledgement of work and support, inviting participants to speak and contribute, and following-up with participants in a meaningful way. Table 2.5 illustrates the major includer behavior themes and I expand upon each in the following section.

Table 2.5.

Effective Includer Behaviors

EFFECTIVE INCLUDER BEHAVIORS			
Theme	Definition	Example Quote	Count
Create Opportunities to Connect with Others	Being given opportunities to connect with others led to their feelings of belonging.	"It's integral to kind of step back and allow community to develop under you. And that is what creates the idea that even if you are not a part of that community, you are facilitating it and your understanding of it." (P18)	19
<i>Sub-Theme: Create Opportunities to Connect with Women</i>	Being given opportunities to connect with women led to their feelings of belonging.	"There was going to be an undergrad research experience program. And he emailed me and said, 'You seem to be interested in making [things] equitable to different students of underrepresented groups...there will be two women undergrads, would you like to...mentor them?' It seemed like he's not only aware of this...and [the] unequal environment of opportunities. He was sensitive [to] the idea that I am sensitive on this issue, and he helped me." (P2)	9

Table 2.5, cont.

EFFECTIVE INCLUDER BEHAVIORS			
Theme	Definition	Example Quote	Count
<i>Sub-Theme: Remote Work and Belonging</i>	Discussed how remote work had impacted their feelings of belonging.	"There was a huge...lack of belonging initially, because I'm a generally social person. And I thrive off of relationships and joining a new workforce without having that personal face to face interactions, like really hindered me a lot. Because... it was hard for me to build rapport with people virtually." (P13)	6
Casual/Informal Conversations	Felt belonging through casual, informal conversations.	"It was casual introductions made by others, and then running into him in the hallway. And then that turns into, you know, briefly talking about whatever's going on or what we're doing or how your day is going...It was casual conversation, joking, being lighthearted. Not discussing work or, you know, turning something into a joke." (P1)	12
Cultivate an Includer Mindset	Spoke of includers adopting a mindset of openness, respect, and humility to foster belonging.	"He is by nature [an] extremely good listener. He's open minded. And so I think...naturally he's very respectful to everything in any anything kind of." (P8)	12
Acknowledgement of Gender Issues	Felt belonging when discussions about women in STEM was directly addressed.	"Sometimes we interact with like relatively senior people in the field and they would bring up... those stories of like, 'Oh, we had a female student before, she was treated horribly in a department...' And then that that thing is more of a signal that this person ...is aware of the things..." (P5)	8
<i>Sub Theme: Ignore Belonging in STEM</i>	Topic of women's belonging in STEM was not directly addressed or acknowledged.	"No, [we don't have] specific conversations about women specifically, but conversations about trainees in the workplace. So it wasn't like gender specific." (P12)	10
<i>Sub-Theme: Inclusion and Belonging Conversations Replaced with Representation and Hiring</i>	Belonging was discussed in the context of representation and hiring practices to increase number of women.	"I think most of the conversations are acknowledging that the representation isn't there. And then women aren't pursuing those jobs. Like a lot of the conversations I have with men who are like, 'We need to change things' or like 'We need to be doing things so people in school and little girls see women in those positions.' which is true through...And more typically, the conversations or acknowledgement are of the disproportion of the demographic." (P3)	8

Table 2.5, cont.

EFFECTIVE INCLUDER BEHAVIORS			
Theme	Definition	Example Quote	Count
Support & Affirmation	Felt belonging when they were given affirmations about their work, support.	"And so when people reach out to me...it's the words of affirmation. It's like, it's a little bit of like acts of service to have someone going out of their way to be like, 'Hey, you're doing good.' And just like people showing me support." (p13)	7
Invite to Speak or Contribute	Felt belonging when they were asked to speak at a conference or contribute in a meeting.	"I think getting invited to make a contribution is a big thing. On some level, it's kind of, it's almost kind of superficial because usually when someone makes an invitation, for example, to come give a seminar at their department or to give a talk at a meeting, they don't say explicitly why. It's the action of being invited. It sort of implies a lot of things about how valued I am... but sort of being invited into conversations with senior scientists who I really respect, because, you know, they have questions that they want to answer. And my research is relevant to that. So they want me to be part of the conversation." (P9)	6
Meaningful Follow-up	Felt belonging when someone followed-up with them in a meaningful way.	"One thing that I noticed - I just mentioned something very, very small, and it was not, like, a very positive thing, and people would just, like, immediately follow up. And then they show that they really care about you. And they really [care] about what you mean, [those] conversations. " (P5)	3

Creating Opportunities to Connect with Others

Being presented with opportunities to connect with others was a main mechanism that led to over three-quarters (19 out of 25) of participant's feelings of belonging. Participants provided examples of the opportunities they were presented that allowed them to connect with their

colleagues such as etiquette groups for engineers, women's leadership development training opportunities, potlucks at lunch, and even a Toastmasters group within the company. One participant (P. 10) in biology spoke of a 'Teatime' that her PI called for every day, "she has this kind of special moment in the day that you need to literally stop and just go get a tea and coffee with people in the lab. So it's called Tea Time, and you just go there and just sit there. And even if you're awkward, you just talk, right? So, when you talk about that, like you will start like finding similarities with people." The opportunities for connection were integral in participants connecting with their colleagues, peers, supervisors, and more.

Sub-Theme: Opportunities to Connect with Women

Of the 19 participants that spoke of opportunities to connect with others, 9 participants spoke of these opportunities being created specifically for women. Participants spoke of groups such as Women in Science, a women's Slack channel, and women's athletic groups. One participant (P. 3) in computer/software engineering also spoke of a time that a director had asked her if she had been connected with other women engineers in the company:

One of his [The director of engineering] very first questions to me was, which opened the door to the conversation was, have you been connected to some of the other female engineers down here yet? Like, has someone introduced you? And have you been able to create that community, which told me that he recognized that I maybe didn't have that, and it was him saying, 'Look, I noticed that this maybe isn't the case here as much.' And so that was an example where with him that opened the door, and I was able to say, 'Yeah, I did notice that there aren't as many female engineers'...and kind of then opened that door for that back and forth and to hear his perspective on it and their desire to change things.

Another participant (P. 17) in biology spoke of the impact women's support groups had on her sense of belonging, "I found that forming women's groups really helped to have support and...I do those often. So we can talk about sharing the experiences we've had and how others have dealt with it, or they can give you suggestions on how to deal with, you know, people that are hard to work with a lot of times. I mean, support groups are great for women."

A participant (P. 22) in fisheries spoke of the way her exposure to the women in her field had served as a great source of inspiration and role modeling that had inspired her to want to continue in her field, "I've only ever had female advisors, academically, and even bosses. I've only ever had female bosses...So I've always worked with women. And I think I learned a lot about that, because I have kind of understood their lived experiences. And it's older women and then some younger ones, as well. So I had had the opportunity to learn from all of them...So I think I feel a sense of belonging in my field because I've been surrounded by smart, mostly nice women."

Having shared experiences with other women in their field led many participants to experience belonging. Further, being able to connect with other women provided important opportunities for connection, relationship-building, and role modeling that led to many women's desires to remain in their fields. Organizations, leaders, and employees in STEM environments should note the major impact these women connecting experiences can have on women's experiences in STEM and should seek to create these experiences for all women in these fields.

Sub-Theme: Remote Work and Belonging

Though none of the interview questions centered around the topic of remote work, a quarter of participants (6 in total) discussed the ways in which the remote setting had impacted their experiences of belonging. Participants shared varying ways that they were impacted by the

remote environment – some felt their experiences of belonging were positively impacted by the remote setting, and others felt their experiences of belonging were negatively impacted by the remote setting. One participant (P. 4) in astronomy noted the way that the remote setting had changed her sense of belonging and had allowed her to be more of her authentic self, because she did not have to navigate the nuances of male/female dynamics:

Belonging, it's kind of difficult because like, we're all remote. So like, there's a different kind of sense of belonging in that regard...I would say it's almost easier to just like, be, like, whoever you are...because when you're in a space, with like, a man and a woman, it can kind of like, I don't know, there's some energy that might be offered, like weird, or maybe not at all. But like, when you're just remote, you're just talking to a laptop. So, all of that kind of just like dissipates into, okay, it's just a person on a screen...So I would say it's been easier. It's nicer. And like, I don't have to worry about like, my shorts, or like, My skirt is too short. Like, my crossing my legs, like, my positioning is. Yeah, so it's actually nice.

Another participant (P. 11) in psychological and brain sciences also spoke about the benefits the remote setting had on her experiences of belonging, noting that the remote setting can force more intentional connection and encouraging employees to show vulnerabilities. She shared that she had felt far less of a sense of belonging in the in-person environment.

In contrast to the participants that had benefited from the remote setting, some participants also spoke of the ways that the in-person setting far better supported their sense of belonging. One participant (P. 9) in planetary science spoke of the way in-person visits allowed her to have more of a sense of her authentic self, “And then, especially when I got to visit a place in person, that's really the only situation where there's sort of a sense of that authentic self.

Right? Because when I do a seminar remotely, all you're getting is the scientific presentation. Yeah, that's not an even professionally, that's like not everything that I have to sort of offer.”

For organizations and leaders invested in creating opportunities for women to experience belonging in their fields, it is important to consider the ways that work is now organized, and the greater prevalence of remote working options in STEM environments. Leaders and organizations should pay greater attention to women’s experiences of belonging in the context of remote work given the positive and negative impacts this new setting can foster for women. Creating more opportunities for connection, and for connecting with other women, should be a priority in the remote setting.

Having an Includer Mindset: Openness, Respect & Humility

About half of participants (12 in total) noted that they believed the “includers” in their work environments held attitudes of openness, respect, and humility about the sciences and people’s ideas in general. One participant (P. 18) in biology spoke of the idea that having a mindset of humility and curiosity was important for people who were seeking to include others, “The other thing that like, is really helpful in terms of the includer mindset is this idea of (and this is especially important for authority figures, anyone in a leadership capacity) humility. It's that idea of humility and privilege.”

Another participant (P. 10) in biology compared the styles of two PIs she had worked with over her career – one being more of an includer, and the other not being an includer. She described the differences in the ways each PI viewed their lab. The includer saw “herself [as] the cheerleader of her people, right? Like she's there to encourage them and to make them believe in themselves.” She spoke of the non-includer PI as saying, “I'm the boss, you need to do whatever I want you to do, and I really don't care what you need.” She concluded that the way each PI

expressed themselves “made people feel belonging or known in a different way. So I will say that in a lab, in particular, a lot of ...the way [your PI] communicates towards you, is important for belonging.”

Another participant (P. 20) in software engineering and AI robotics noted that she felt the inkluders tended to be people who had a difference in their identity or way of being that was non-normative and that these elements helped them take the perspective of others in the workplace, “I feel like those people also have something else that they've had to overcome or like, have a sense of, you know, they're different in some way. And I think once you experience that, really, to any significant level, it's hard to ignore...I feel like people who've made me feel the most included tend to have some significant difference that would maybe make them feel like they did in the past.”

It is important for those seeking to become inkluders to note that the ways they interact with the women and underrepresented groups in their areas can have a great impact on their sense of belonging. Specifically, it is important for inkluders to pay attention to the ways they foster a mindset of humility, respect, and openness in their interactions with their teams, as the lack of these mindsets can lead to the exclusion of these groups.

Holding Casual/Informal Conversations

Almost half of participants (12 in total) described the types of conversations that led to their belonging as having more casual and informal characteristics. Many participants spoke of these conversations taking place around non-work topics and in non-work settings. Participants felt belonging when they were included in their colleagues' personal lives, and when they were able to share their own personal lives and stories.

One participant (P. 5) in astronomy spoke of a casual conversation she had about her upbringing that led her colleague to develop a deeper understanding of her, “So we were talking about our experience growing up, you know, to become interested in physics. And I was telling her that when I was growing up, like, you know, I don't know what physics was about. My, my school was not particularly encouraging. So, and I think that that made her realize that you know, that I have a totally different, like, environment growing up.” Another participant (P. 4) in astronomy spoke of being invited out to drinks with colleagues and telling jokes with colleagues as a way she experienced belonging in her team, “Getting invited out to, like, drinks after work, for instance. Or kind of like, telling jokes to each other before, like we start a meeting... I guess when they like, go from talking, just like business style to like, more casual style, when they kind of break into that then it makes me feel more like I belong.”

Another participant (P. 18) in biology spoke of the way that the use of informal language can make STEM spaces more accessible to people, “But I think just the way faculty talk, younger faculty are able to kind of converse with I think, with the advent of social media with like, younger students in a way that feels more approachable and can feel more relaxed. But even older faculty, I think, and this is something I tried to do as like now someone who like works within academia as a TA - just converse informally.”

Several participants also spoke to the way that humor and casual joking being used in their environment led them to feel they belonged there. One participant (P. 24) in ecology spoke of the way “being able to chuckle at the absurdity that we run into” was a primary factor that contributed to her sense of belonging. A participant (P. 22) in fisheries spoke of the way that incorporating humor and casual interactions fostered her sense of belonging and the ability to be herself, “When there's like a little bit of levity, and humor, you know, in a relationship...where I

feel like I'm comfortable to joke around a little bit, it really helps encourage more of a feeling of belonging, because if the humor is reciprocated...just the ability to laugh and express more than just one emotion beyond this formal, like scientific conversation that we have, is really important.”

The casual and informal opportunities to connect with colleagues proved to be a fruitful medium for women to foster belonging, and using more informal and casual language can have a positive impact on women’s belonging in these spaces. Leaders and employees seeking to create feelings of belonging in their STEM spaces might seek opportunities to include more informal language, humor, and casual interactions to help foster these feelings.

Direct Acknowledgement of Gender Issues

Another theme that emerged among 8 participants was around the specific behaviors and actions that led to their feelings of belonging were the times when women’s belonging in STEM was directly addressed, and not ignored or masked with a related topic. Participants noted instances where a colleague or supervisor had directly addressed their identity as a woman and the ways that their identities might impact their experiences at work, and participants found this to be validating and to serve as a signal that they were in a safe space.

One participant (P. 3) in computer/software engineering spoke of a time when she had discussed with her manager that her identity as a woman (and as younger and newer to the organization) would cause people to ask about her, “And he's, he acknowledged he's like, well, I wouldn't think about it too much....there aren't a lot of women working [on the] engineering side of things here and you're new, and you are a woman, and you're younger...so people are going to ask about you. That's just part of it.”

Another participant (P. 15) in mechanical engineering spoke of the way she felt the topic of women's belonging in STEM had been far more prominent in more recent work discussions, "especially in the last two or three years, I feel like there has been a little bit of a, I guess, explosion, I'd say of discussions of diversity and what felt like more meaningful, meaningful steps, actions, discussion about how we can make this better, and where we're going and what it means to be a woman in engineering."

Another participant (P. 16) in engineering spoke of a powerful example of a male colleague reaching out to her directly after the Roe v Wade (1973) ruling had been overturned. She did not have a pre-existing close relationship with this colleague, and the interaction had a great impact on her sense of belonging and feeling he was a safe person she could talk to about women's issues, "One really good example was back when the Roe v. Wade thing was overturned. Yeah, I had a coworker reach out to me and say, hey, it's a tough day. I'm having a tough day, you you're probably having a much more tough day. I am here please like, let me know. And that was huge. Because ...my team is all men, except for me. So I honestly did not expect anything. Because that was really nice. [It] made me feel [like] ok so I can actually talk to you about kind of any of the crap that I probably go through."

Lastly, a participant (P. 7) in engineering spoke of the way the dean of her school had led a group discussion in a Society of Woman Engineers gathering and directly stated, "that's where we did address...the gender stereotypes." And the messaging or the words that I remember her saying is that 'You're an engineer, it doesn't matter what your gender is... you're gonna go out and save the world' kind of thing."

The direct acknowledgement that women have different experiences than men in STEM fields can serve as a foundation for women to experience belonging in these spaces. It is also

important to encourage employees and leaders to directly acknowledge the gender disparity in their environments head-on to signal to women that they understand the climate in which they are operating.

Sub-Theme: Belonging in STEM Not Directly Addressed, Ignored

While almost half of participants (10 in total) could not recall incidents where the topic of women's belonging in STEM had been directly addressed or acknowledged with their colleagues or leaders at work, some participants more often spoke about how they sensed that people in their group or department were aware of the issues more indirectly.

In responding to a question about whether the topic of women's belonging was discussed in the group setting, one participant (P. 1) in biomedical engineering simply stated that it was not mentioned at the group level unless she brought it up, "No, as a collective group? No. As individuals? Yes. I know that one of the postdocs received a fellowship for diversity, equity, and inclusion. So all of his work is trying to understand how to be a better person surrounding that. I know that I myself try and work very hard on that. But there hasn't been group discussions..... Not unless I brought it up." Another participant (P. 10) in biology similarly responded that the topic of belonging as a woman in STEM had not been discussed at work, "No, it has not come up in the context that you're a woman and so you're going to struggle or something like that." A participant (P. 9) in planetary science also spoke of the idea that conversations about women's belonging had never come up at work, which was perplexing given she was in a field with about 20% women, "I gotta say that I haven't [had conversations about women's belonging in STEM]. And this is...something that's been interesting to me for a while, because I think the number that people quote for physics is that about 20% of the field is women."

Another participant (P. 11) in psychological and brain sciences spoke of the ways that the topic of belonging specifically did not receive attention in her work environment, but that instead related topics were discussed in the context of people's work satisfaction, fit with their role, and work fulfillment, "I don't think they always use the term belonging. But some other terms that frequently come up are like, do you feel satisfied? Do you feel like, you know, everything is a good fit for you right now? Do you feel fulfilled? And I think really focusing on like, the emotional aspects of that sense of belonging?"

This finding is important to consider in designing interventions and programs that aim to increase women's belonging in STEM spaces –it might be important to directly acknowledge the experiences that women have in STEM spaces, and that the interventions and initiatives are aimed at increasing women's belonging in these spaces, as opposed to indirectly addressing these issues or ignoring them completely. Further, more education and attention should be placed on the concept of belonging, and the ways that women are often not afforded this experience when compared with men, and the negative impact that can have on women in these fields.

Sub-Theme: Representation and Hiring

In place of the topic of women's belonging being discussed in a direct manner, 8 participants spoke of conversations around women in STEM centering around ideas of women's lower representation in the workplace, and the hiring practices that could be implemented to increase the number of women in these spaces.

One participant (P. 4) in astronomy spoke of the way the topic of belonging was not directly discussed, but the topic of hiring more women on their team was discussed regularly, "It's not like directly talked about, but I do, like I have discussed with another coworker, about like, hiring more women on our team, because it's made up of mostly men right now... I have

talked to other people like, hey, let's put in let's get this person to apply for this job.” And in discussing this topic further, the participant shared that her male colleague was in agreement about the need to increase the number of women on their team, “He completely agreed with me. He was like, yeah, like, there should be more women, like, here in our group.”

Another participant (P. 12) in mechanical/aerospace engineering spoke of the impact that greater representation of women had on attracting people to their group and the way that the women in her group made her feel she belonged there. She also noted that the creation of the group of women felt intentional, though it was never directly stated:

But also the fact that there are a lot of women attracts more women to the group.

And so, I think that was an intentional decision that was made early on, it just continues for generations, because I guess, over the years, when we go to conferences we meet with the academic family, all the previous generations of lab members. And most of the older generations that I've met were women. Which kind of was like, wow, I feel like I belong here. Yeah. I want to be around this.

Like, I don't want to feel like I'm the odd duck.

Another participant (P. 15) in mechanical engineering spoke of the way belonging had been more of a focus of her role since she had been moved into a managerial position and was on hiring committees. She and others also spoke of the ways that increasing the number of women on teams only happened when there was a concerted effort to do so, and that it did not happen naturally, “And now that I'm on the hiring side of things, where can we specifically, you know, put a lot more effort into going to places where women might be rather than just going, you know, anywhere. And hoping, crossing fingers. So

more concerted efforts around kind of hiring and increasing representation and things like that.”

It is important to note that while important, hiring more women and increasing their representation in STEM fields is not the only goal of these initiatives, but that women truly feeling that they belong in these spaces should be the goal of these efforts. Many participants noted that the conversations they had around their belonging and lack of representation in STEM spaces centered around conversations around hiring, and the topics were not further explored or addressed. Organizations seeking to increase women’s belonging should be aware that the burying of these conversations under conversations about hiring and representation do not directly address the true issue of women’s lack of belonging in STEM fields. Representation or increasing numbers without including those who are there or who will be added, will not increase the experience of belonging, neither will it help with retention of women on those spaces, perpetuating the representation problem. The direct conversations on the topic of women’s belonging in STEM need to happen, along with the actions that provide opportunities to belong, as exemplified in the next set of themes.

Includer Actions

Themes emerged around the specific ways that their leaders and teams had acted that led to their experiences of belonging – in showing support and providing affirmations, in inviting them to speak, and in following-up with them in a meaningful way.

Providing Positive Affirmations and Support

Many participants (7 in total) expressed that they had felt belonging when they were given affirmations about their work, and general support of the work they were doing. One participant (P. 11) in psychological and brain sciences reflected this sentiment in describing the

way the co-founders of her company did this, “Whenever the co-founder schedules one on ones and says, hey, the work that you're doing is really helping us out and we value and appreciate you. Those direct conversations are just so meaningful to me, and I'm sure to other people as well.” Another participant (P. 2) in chemistry and materials science described the way her supervisor expressed his appreciation for her and others’ work, “Any small accomplishments is celebrated...and then before the holidays, he sends an email saying, ‘Thank you for your hard work. You deserve time to rest, and [time] for yourself, so please rest.’”

Another participant (P. 16) in engineering spoke of the way her manager had been supportive of her from the beginning of her time at the organization, “And it started with having a manager that was really supportive. Just right off the bat coming into the job, it felt like every single thing I did that, you know, to me felt small and insignificant, to him was like, great job. This is awesome. And like I couldn't do wrong...So that in itself was a huge component.”

Another participant (P. 15) in mechanical engineering spoke of the scenarios in which she experienced belonging being rooted in the positive feedback that she had received, stating, “...specific to my job, it ends up being, you know, just positive, positive feedback...that I'm doing well, that that's something that was done well...”

For individuals seeking to include others in their work environment, providing positive affirmations and support can have a great impact on a woman’s sense of belonging in these spaces. Incorporating regular expressions of these sentiments is one small way a person can become an includer and increase women’s sense of belonging in STEM fields.

Inviting to Speak or Contribute

Several participants (6 in total) spoke of the times that they felt belonging were when they were asked to speak at a conference and share their expertise, or times they were invited to

contribute to a discussion among peers, seniors, and others. One participant (P. 12) in mechanical and aerospace engineering spoke of the way she felt belonging in a professional setting when she was asked to make a contribution and her response was listened to and heard, “I think mostly like...in the professional settings, I feel like, whenever I'm asked a question, either about my research or about something else, my answer is actually listened to and taken into account.”

Another participant (P. 1) in biomedical engineering described the times she felt belonging as being directly tied to her being invited to have discussions in the lab setting:

You know, what a really big one was, for me was being included in conversations about lab discussions. And feeling like my opinion was valued. And, you know, ‘Hey, we have a question about this. Do you have an answer? We don't know what to do. What do you do?’...I think once people started asking me questions, I started to feel more of a sense of belonging, specifically when it came to the actual science of things...’This isn't working, do you know why?’

A participant (P. 25) in marine science spoke of the way her supervisor was asking for her input and contributions led to her experiences of belonging, “she asks my opinion on things all the time and when we're making a plan for the week, or we're checking in, she always asks if I have anything to add, or anything that I want to bring up. Sometimes she puts me in a position of leading a meeting. So she gives me responsibility.”

Again, for individuals seeking to include others in their work environment, inviting women and members of underrepresented groups to speak in meetings and at conferences can have a great impact on a woman's sense of belonging in these spaces. Incorporating regular

invitations to contribute is another small way a person can become an includer and increase women's sense of belonging in STEM fields.

Following Up Meaningfully

Another set of behaviors that led to participant's experiences of belonging was when someone followed-up with them in a meaningful way. The idea of meaningful follow-up emerged in discussions around specific actions that others took to lead 3 participants to feel they belonged. One participant (P. 3) in computer and software engineering provided a specific example of a time when she had made a casual comment about something, and people took the time to follow-up on her comment days later:

And then for instance, following up on it in a meaningful way that's helped me feel belonging. An example of that is, I know that my administrative supervisor, they're hiring right now. And they're really struggling to...get quality applicants. They want to expand, they want to diversify their applicant pool. And I had a conversation with him about that. And instead of that conversation just being a conversation and not going anywhere, he followed up and even just this morning, we had a meeting that it was an intentional directed meeting about things I had mentioned him before in passing where he said, 'I want to hear about that. Let's expand on that based on your experience. Like, where should we be applying what things should we that we be doing?' And that made me feel valued, which helps me feel belonged.

Another participant (P.12) in mechanical and aerospace engineering gave an example of a time she had expressed limitations around the specific methods and dataset used in a paper's dataset they were discussing to use for their own research. Her PI initially thought the dataset

would be worth it to try, and then he followed up with an email the following day and said, “I’ve had the night to think about it. And I think that you’re absolutely right, I just needed time to process it. And it probably will be a limitation that we shouldn’t waste our time on.” This participant felt belonging in this interaction because her input had been heard, taken into account, and directly acknowledged the following day.

Lastly, for individuals seeking to include others in their work environment, actively seeking to follow-up with women and members of underrepresented groups in a meaningful way can have a great impact on a woman’s sense of belonging in these spaces. Incorporating regular follow-up is another small way a person can become an includer and increase women’s sense of belonging in STEM fields.

Expanding Concepts of Inclusion

Participants had varying ways of conceptualizing their own belonging and the ways that those around them conceptualized belonging. Themes emerged around the different domains of belonging participants experienced – personal, scientific, group-level, organization-level, and field-level, the ways that participant’s different identities intersected and influenced the experiences they had with belonging, and the negative experiences that participants experienced around belonging. Table 2.6 illustrates these main themes and I expand upon each of them in the following section.

Table 2.6.

Themes of Expanding Concepts of Inclusion

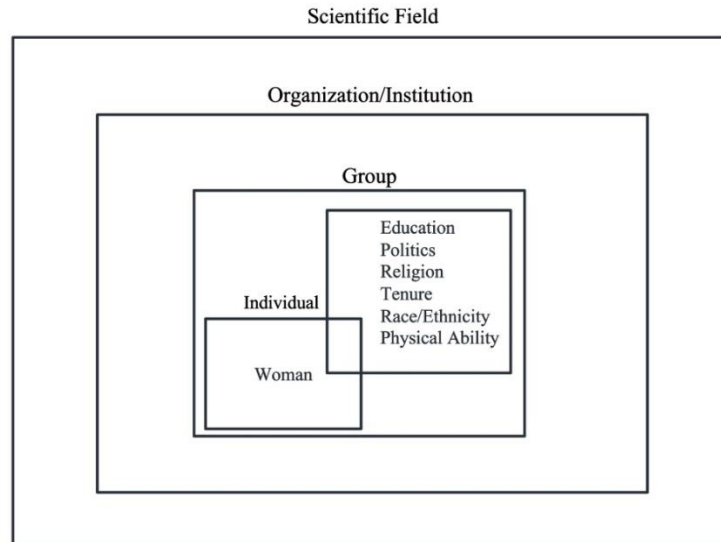
Theme	Definition	Participant Count
CONCEPTUAL THEMES		
Different Domains of Belonging	Participants related their experiences of belonging to differing domains and levels.	11
Intersectionality	Participants discussed the ways their multiple identities impacted their experiences of belonging.	6
Negative Experiences of Belonging	Participants spoke of their negative experiences of belonging.	15

Different Domains of Belonging

When describing the belonging that they had experienced in their respective STEM fields, 11 participants spoke of their belonging taking place in different domains – at the individual level, the group level, the organizational level, and the greater scientific field level. Participants had varying ways that they conceptualized their own belonging, and many felt belonging in one domain within which they worked, but not others. Figure 2.2 depicts the varying domains in which participants spoke of their experiences of belonging and the multiple identities that influenced their belonging.

Figure 2.2.

Different Domains of Belonging



Individual Domain Differences. One participant (P. 10) in biology explained the way she conceptualized belonging in differing ways, and the notion that she valued belonging more for her sciences and less for her relationships, "Now, I think that there are people that maybe personal or multicultural belonging is more important for them. But for me, I believe that science belonging is more important... Through that, am I addressing a question that I believe is important. It's people respecting my ideas on science. So that that will be for me the most important part." Another participant (P. 19) in fisheries noted the way that they experienced belonging was in "very particular locations and spaces," further explaining the areas that they felt belonging (presenting at conferences among peers, individual conversations with professors) and the areas that they did not.

Organizational Belonging. One participant (P. 13) in biology spoke of the importance of belonging and understanding the big picture at the organizational level, and the way that

understanding your place and other's place in the organization contributed to feelings of belonging "If you're part of an organization, that helps to know what the big picture is, and a part of that involves seeing what everyone's role is in that picture. If we're all working towards the same [thing], usually you're working for an organization or a company, there's some kind of mission/vision statement/goals of the company, or group. And so, because of that, everyone has their own roles and, and needs ...and if you don't have that sense of belonging for yourself, you kind of need to know, like, where everyone else belongs, it's hard to figure that out for yourself."

Another participant (P.21) in forestry spoke of the way the company values also fostered her sense of belonging, "And then even just their company values, I mean, they really sought to make sure that each employee, you know, had all of the things that they needed to succeed and kind of went above and beyond to help them like, not even in the workplace, but even like, in personal lives. And I found that really beneficial and kind of like, okay, they have my back with anything I need. And I'm not just an employee, I'm actually like a member of their place. And so it's kind of a different relationship there."

Greater Field. A participant (P. 4) in astronomy noted that even within the different fields of STEM there were different cultures and ways of operating and approaching inclusion and belonging, "...[the male] scientists [in my lab] are kind of, I think, different than some other guys. Like they're not computer scientists either. They're astronomers, specifically astronomy. People are kind of more... I feel like they're more inclusive...computer science people might be a little bit more bro-y."

It is important to note that STEM is a broad category of disciplines that operate in different ways, and can influence different levels of influence on a woman's experience of belonging. Often women may feel a sense of belonging in one domain, but not in others.

Organizational leaders and field leaders are once again positioned to have a positive impact on women's belonging in their domains, and it is in their hands to address this issue at the broader levels.

Individual Identity: Intersectionality

About one-quarter of participants spoke of their own multiple identities impacting their feelings of belonging in their STEM spaces, and the ways their multiple identities impacted their experiences of belonging in these spaces. Participants noted their race, age, gender, years of experience, mental health, physical ability, religion, language, and more, as identities that impacted their sense of belonging. Participants spoke of the ways their multiple identities caused them to question the treatment they received in their STEM environments, noting that sometimes it was not clear if they were being treated a certain way because of one identity over another.

One participant (P. 3) spoke about the way that her gender, her age, and her tenure on her team impacted her belonging:

There are certain implications, obviously, being a female working on a team of men, that I'm very acutely aware of that I've had to navigate, especially being a young female engineer, and the closest person to my age on my team is 10 years older than me. So not only am I battling being a female on a male dominated team, but I am incredibly younger than everyone. And that is another thing where it's like, hard to decipher, is it about me being a woman? Or is it about me being young? Is it about me being new, I just look very different here.

Another participant (P. 5) in astronomy spoke of her experiences being an Asian woman and the stereotypes she had to break down:

But once I started going to conferences, I realized that a lot of people would view you in a certain way, like, you know, I'm an Asian, a woman. So, a lot of people have some certain stereotypes for you and view it in certain way. And it's very hard to break out of those stereotypes. And also, there's just not a lot of representation. So once, you know, you feel like people already have an opinion of you before you even speak before you even see [us]. And then you don't see any other people like you.

Another participant (P. 18) who identified as non-binary AFAB spoke of the way their gender or sexuality was not the primary identity that came to mind when thinking of the topic of belonging, but rather their mental and disability status was their primary identity in the context of belonging, “So for me when I say sense of belonging, like, I don't necessarily mean in regards to my gender or my sexuality, I mean versus my disability status, which is hugely impactful for my life, I have a chronic condition and a mental illness.”

It is important to note that fostering a sense of belonging in STEM is important for people with diverse identities, and not just for people that identify as women. Further, many participants that identified as women also had identities that were more salient in different contexts, and any intervention that is designed with the aim of increasing belonging should acknowledge and invite individuals who have other identities.

Negative Experiences with Belonging

It is also important to shed light on the numerous negative experiences of belonging that over half of participants (15 in total) expressed. This was an important and unexpected theme to emerge given that none of the interview questions inquired about negative questions, and in fact all interview questions focused on the more positive aspects of the work environment that had

led to experiences of belonging. Participants spoke of instances of blatant general harassment, sexual harassment, not being respected as a supervisor, being bullied during conference presentations, and more. One participant (P. 1) in biomedical engineering spoke of not feeling welcomed by her group and being talked down to, “I think that sometimes there's, like, a twinge of...more than a twinge a lot of...condescending tone or speaking down to or just general like, blissful ignorance.”

One more tenured participant (P. 7) with 30 years of experience in engineering spoke of multiple negative instances with belonging that had occurred throughout her career, including having a female faculty member question her decision to attend an engineering school because she “wouldn’t find a husband there,” being told she was hired into a position “because she was the only female in the applicant pool,” and having a male direct report that did not respect her because she was a woman. She spoke of the ways that her negative experiences with belonging were easier to recall than the positive ones, and that they planted the seeds of self-doubt throughout her career.

Many participants also spoke of the ways they noticed that their current work environment created a positive space for belonging, which was observable to them because they had the contrast of previous negative experiences with belonging. One participant (P. 11) in psychological and brain sciences spoke of the way belonging was important to her and how she had previously lacked it, “...sense of belonging is very crucial for me. And it's really crazy to think about it because just a year ago, I actually felt the exact opposite of that sense of belonging.” Another participant (P. 16) in engineering spoke of her current positive experiences with belonging, and the way that it was a major shift from her previous environment, “...which was a complete 180 from my previous job, where it was less than I was talked down to for

anything, but more like our manager had pretty much no idea what we were doing most of the time...we were self-managing and then he was getting credit for it, and then also refusing to pay.”

Because so many participants spoke of negative experiences with belonging in their environments, it is important for organizations and leaders to understand that belonging is not something that is automatically afforded to women in these spaces, and that the negative experiences leave a mark on the women in these spaces. Additionally, we can learn from these examples the behaviors that led to women’s exclusion, or lack of belonging, in these spaces. For individuals seeking to include women and underrepresented groups in their STEM spaces, it is important to understand the negative impact certain behaviors can have on this desired outcome.

Discussion

Through the qualitative analysis of responses in this study, several important themes emerged that should be taken into consideration when conducting further research and designing interventions with the aim of increasing women’s belonging in STEM fields. First, organizations should seek to create opportunities for connection among all workers and among women specifically, to uncover shared interests and interact in casual and informal settings. Examples of this type of connection opportunity could be hosting events about non-work-related topics, implementing employee resource groups, or opening meetings with dedicated time for personal connection. Additional examples are offered in the final chapter of this dissertation. The theme of the importance of connection and shared experiences had an immense impact on women in these areas. The women’s experiences of belonging were often tied to a sense of similarity, a shared connection, or the tie to a community of others with shared identities. For this reason, it is imperative that organizations identify areas where they can create these shared spaces for

connection and for uncovering shared interests and identities for people in these spaces that are not part of the dominant culture.

Another important concept that emerged throughout the study was the great impact that leaders can have on their group member's sense of belonging. The vast majority of women spoke of the importance their leaders played in their experiencing a sense of belonging, and the specific examples of behaviors, actions, and conversations with their leaders that led to their belonging.

Combining these two major concepts, the scholarly area of relational leadership (Uhl-Bien, 2011) should be further explored in the context of the STEM environment which has historically operated under a more hierarchical and Masculinity Context Culture (MCC, Berdahl et al., 2018) environment. Scholars of relational leadership, with its foundational concepts rooted in the idea that leadership is a relationship-based process of influence and change whereby the leader and follower grow through connection with each other and empower one another (Fletcher, 2007), acknowledge that the relationality of leadership is becoming more widely accepted. In the STEM environment and in leadership studies more generally, a positivist approach has traditionally been taken, and has led to inadequately capturing the complexities of social relationships in the STEM workplace. Incorporating more relational leadership discourse into research on women's experiences of belonging in STEM is an important step to better understand how to shape inclusive STEM cultures.

Another important notable concept related to the study are the power dynamics that influence relationality – namely that those in powerful positions (leaders, men in STEM) are marked by the entitlement of having others anticipate your needs and response to them, whereas those in less powerful positions (women in STEM) are required to anticipate and accommodate

needs with no expectation of reciprocity (Fletcher, 2007). In systems such as the STEM environment that hold unequal power distributions based on sex, those with less power (women) must operate a nonmutual relational stance and might be associated with powerlessness and vulnerability. It is important for leaders to be aware of these important dynamics and to take initiative and ownership over creating relational connections for followers of all power-statuses. This body of literature provides examples of how organizations can shift from Masculinity Contest Cultures to “Relational Belonging Cultures,” and how this shift will benefit men and women alike. Incorporating job crafting approaches into inclusion behaviors and interventions can provide clear guidance for leaders seeking to shift from hierarchical supervision to relational leadership and for peers and mentors to work towards this shift from masculinity contest cultures to relational belonging (Fletcher, 1998).

Implications

This paper has several practical implications that add to the research on positive organizational scholarship and organizational behavior. First, it gives guidance and support to people seeking to become “includers” and enact behaviors and mindsets that can lead to their more successful inclusion of women in STEM fields. The study also sheds light on the important ways that women in STEM conceptualize their belonging at differing levels, from the individual, the group, the organization, and the greater field. Scholars and practitioners should take this into consideration when researching and implementing belonging interventions – that belonging is not a ubiquitous term, but rather it captures an experience that can vary across many levels of a work climate.

Next, it is important to note that the topic of belonging is often not directly acknowledged or addressed in conversations around women’s lack of representation in STEM spaces, and

instead is being hidden beneath conversations around representation and hiring, and related concepts. Creating space for direct and open conversations around this phenomenon is an important first step in increasing women's belonging in these spaces. Leaders holding discussions about women's experiences in STEM, and individuals opening discussions in the work setting are examples of how this could work in a STEM setting, and the final chapter of this dissertation provides more concrete examples. Organizations and leaders should be aware that women today still experience negative experiences with belonging, and there is great learning to be done around what behaviors lead to women's belonging in STEM, and which behaviors thwart this desired outcome.

By identifying the includers, their behaviors, and women's cognitions around belonging that have led to women's experiences of belonging in STEM fields, this study stands as a launching point to develop a more thorough 'job crafting for inclusion' intervention that can be implemented by all employees seeking to be "includers." Therefore, the current study provides valuable ideas on how to further shift the inclusion conversation toward the majority-group members (i.e., includers) and the responsibility of these members to take actions to increase authentic belonging in minority-group members.

Limitations and Areas for Future Research

The current study provides a better understanding of the relationships, tasks, and cognitions related to women's experiences of authentic belonging in STEM. The fact that the participants were recruited using personal networks and convenience sampling methods may potentially limit the diversity and variation of experiences in this area. However, I was able to recruit 25 participants from very different fields (e.g., astronomy, biology, chemistry, materials science, ecology, engineering, neuroscience, robotics/AI, ...), diverse gender and sexual

identities (e.g., cisgender women, non-binary, queer) and ethnic identities, and different age and tenure ranges as reflected in table 2.1.

Additional concepts from positive organizational scholarship such as appreciative inquiry and job crafting should continue to be pulled into DEIB research to continue to investigate ways that initiatives can be both effective and minimally harmful to all attendees. Additional areas of future research should continue to look at the ways in which we can provide recommendations for inclusions to craft their jobs in a way that is directly tied to retention of women in STEM fields, and the ways in which women and other minority groups in STEM can craft their careers to attain more engagement and commitment in these spaces in the long term. Boundary conditions that explain when and how these initiatives may be successful, and studies that explain the mechanisms of job crafting for inclusion, would facilitate the implementation of job crafting practices toward fostering belonging.

Conclusion

Through these two studies, I have developed a deeper understanding of how to promote inclusive behaviors that impact women's feelings of authentic belonging, potentially leading to greater retention of women in STEM fields, using a job crafting framework. Developing a job crafting toward inclusion framework would allow employees to develop their own inclusion behaviors that best suit their work styles and preferences, which should lead to the long-term enactment of these behaviors. The job crafting framework provides structure and meaning for people seeking to be a part of fostering women's authentic belonging in STEM spaces. By gaining a better understanding of the mechanisms by which individuals are motivated to enact inclusive behaviors, organizations should be able to design interventions that encourage individual level job crafting toward women's authentic belonging in STEM fields.

The next section of this dissertation seeks to outline a Job Crafting for Inclusion intervention that incorporates all elements of the previous two studies into a proposed intervention for includers in STEM fields seeking to facilitate women's authentic belonging in these fields. I begin with a review of allyship literature and foundational theories of motivation to illustrate why job crafting is an important intervention to incorporate into inclusion behavioral interventions.

Chapter 4

Job Crafting for Inclusion Activity – Motivating Allyship

The following chapter will include a proposed activity for Job Crafting for Inclusion that should serve as a guide for includers, or individuals that seek to include others. The framework will be based on the results of the two previous qualitative studies and leading concepts from positive organizational scholarship, outlining cognitions, relationships, and tasks that includers can enact to facilitate women's authentic belonging in STEM.

In the context of women's historical exclusion from STEM fields, men must be motivated to act with agency in enacting non-performative inclusive behaviors toward women, so women feel authentic belonging in these spaces. The aim of inclusion-based initiatives should be on motivating majority-group members (e.g. men in STEM) to enact inclusive behaviors toward minority-group members (e.g. women in STEM), and these behaviors should in turn lead to women's feelings of authentic belonging in STEM spaces. Therefore, before presenting the Job Crafting for Inclusion Activity, I explore the literature on allyship and motivation to provide a solid foundation upon which such an intervention might stand.

Allyship in STEM

The scholarly area of allyship can be a fruitful source of guidance for those seeking to understand the potential effects that a job craft for inclusion intervention could have. An extensive body of research points to the positive impact allies (or as we label them in the present research, includers) can have on minority-group member's experiences at work. Research conducted by Moser & Branscombe (2022) suggests that the mere presence of an equality-supportive male ally reduces anticipated isolation and workplace hostility and increases anticipated support, respect, and gender-equality norms for women in science, technology, and

mathematics fields. Similar research conducted by Johnson & Pietri (2022) suggests the great impact that allyship cues (the presence of an endorsed scientist) can have on white women in computer science - leading to feelings of identity-safety, interest, and self-efficacy. Lastly, Research conducted by Kim & Meister (2022) suggests that microaggressions against women can lead to an immense amount of self-doubt and negative impact to women's work identities. Yet, despite these negative effects, the presence of allies can influence a redemptive sensemaking process that can counter them. Taken together, the presence of allies and allyship cues might have a strong influence on women's persistence in STEM and might also be a strategy for men seeking to recruit and retain women in these fields. Developing allyship for women in STEM through a Job Crafting for Inclusion intervention might have a great impact on women's persistence in these fields.

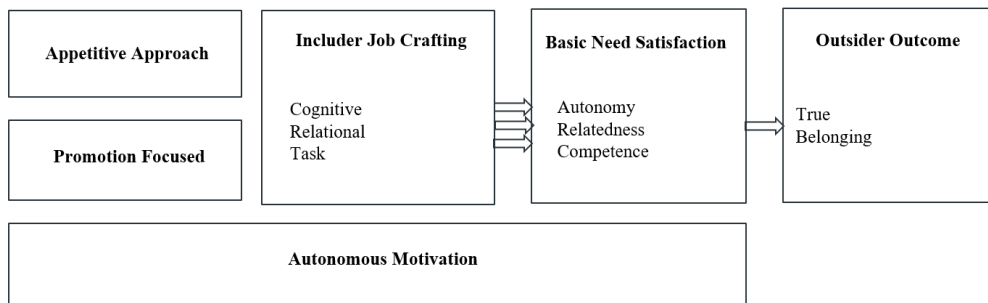
Research also suggests the benefits of enacting allyship on the allies themselves – Yoon, Joshi, & Dang (2023) recently conducted research that suggests that when men enact allyship, they reap relational benefits, and that the awareness of male privilege is an antecedent to this process. It is important to foster an awareness of majority-group members' privilege for inclusions to initiate a Job Crafting for Inclusion practice that reaps the relational benefits of their allyship efforts and maintains their motivation to engage in such practice. Developing a deeper understanding of the benefits and motivations for allyship is a ripe area of research and can shed light on the important mechanisms that might render a Job Crafting for Inclusion intervention successful or not. I next look to the motivational mechanisms that might render Job Crafting for Inclusion most impactful.

Motivational Approaches to Job Crafting for Inclusion

It is important to investigate the motivational mechanisms that underly the success or failure of a Job Crafting for Inclusion intervention. Using extant research on various motivational mechanisms such as approach/avoidance orientation (Carver, 1996), regulatory focus (Higgins, 1998), and Self Determination Theory (Deci & Ryan, 1985), the following section outlines connections between job crafting, inclusion, and motivation that would help in further developing interventions with the aim of increasing women's belonging in STEM fields. Figure 4.1 depicts the relationships among these motivational elements. Based on concepts presented above, I have designed a Job Crafting for Inclusion intervention that supports organizations to train includers in Job Crafting for Inclusion. I use appreciative inquiry and job crafting principles to create a worksheet for includers that follow the motivational mechanism pathways described below.

Figure 4.1.

Job Crafting for Inclusion & Motivational Mechanisms



Motivating Inclusion Behaviors Using Appetitive, Approach-Oriented, and Promotion-Focused Approaches

One way to further explain the basis for majority-group members (e.g., men in STEM) enacting inclusive behaviors (e.g., toward women in STEM) is through Carver's motivational approaches (1996) and Higgins' Regulatory Fit Theory (1998). Carver (1996) introduced the idea that motivational processes in relationships can be aversive, whereby individuals exhibit avoidance-oriented behaviors to move away from threatening outcomes, or appetitive processes whereby individuals exhibit approach-oriented behaviors to move toward positive outcomes. Gable (2006) took this concept further and introduced a model of appetitive and aversive interpersonal motivation to reach social goals. This research illuminates the need to foster positive incentives in relationships (appetitive) as opposed to merely focusing on mitigating the negative experiences of threat and harm in relationships (aversive). In the context of women's authentic belonging in STEM, this points to men harnessing appetitive approach-oriented motivation toward including women (focusing on developing positive relationships) as opposed to aversive avoidance-oriented motivation (focusing on preventing harm and threat) toward including women. To create a sense of authentic belonging for women in STEM fields, individuals and organizations must not just aim for the lack of aversive processes taking place among employees such as sexism, harassment, and hostility. Rather, they must harness the appetitive motivation that leads them to actively pursue positive outcomes in relationships, such as meaning, connection, involvement, and belonging that will lead to women's inclusion in these spaces.

Research on inclusion (e.g., Shore, 2018) has taken a similar approach in looking at the lens of the two motivational dimensions of regulatory fit theory (Higgins, 1998), which includes

the promotion-focused or prevention-focused orientation. The call to action in this research is for individuals and organizations to approach inclusion behaviors from a promotion-based lens whereby the motivation of includers from majority-groups (e.g. men in STEM) is to proactively initiate connection with minority-group members and create positive outcomes in these relationships (e.g., women in STEM), as opposed to a prevention-focused motivation that is based in defensive mechanisms protecting against feelings of diversity threats. Using a promotion-focused motivational strategy, includers in STEM would create their own inclusive behaviors to foster the needed sense of authentic belonging among women in these spaces. Figure 4.2 illustrates the Job Crafting for Inclusion elements, including appreciative inquiry and the development of a vision and mission statement and inquiry into rewarding inclusion experiences, that represent the appetitive, approach-oriented, and promotive elements that would motivate includers using these mechanisms.

Figure 4.2.

Job Crafting for Inclusion Worksheet: Cognitive Crafting Activities

<p style="text-align: center;">Includer Thinking</p> <p style="text-align: center;">INCLUSION VISION AND MISSION STATEMENT</p> <p>Next you will create your own vision for inclusion. Think about an ideal group in which people can behave authentically and feel like they are truly a part of the group. In this group, people feel they can be their true selves and they are appreciated for their uniqueness. Each team member can bring their authentic self to work, and they can thrive because they feel that they belong to the team. As you answer the following questions, think about an inspiring outcome for creating a sense of belonging among all team members.</p> <p>DISCOVER Describe a time when you were part of a collaborative team that brought out the best in you and made you feel like you truly belonged.</p> <p>DREAM Please discuss/share your dreams and aspirations for a workplace where every single person feels a sense of belonging and that they can behave authentically.</p> <p>DESIGN What does the ideal scenario look like where all people feel a deep sense of belonging in their workplace?</p> <p>DELIVER What are a few things you might do to make your workplace a culture of belonging with more inclusion of all people?</p> <p>Write your mission statement to reflect the value YOU place on inclusion and valuing people of different backgrounds in your workplace.</p>	<p style="text-align: center;">Includer Thinking</p> <p style="text-align: center;">INCLUSION REFLECTION</p> <p>Reflect on the ways you currently think about your job and how you include others.</p> <p>Rewarding Experiences / Autonomous & Appetitive Motivation How does your role as an includer positively impact your life? How does your role as an includer impact your overall wellbeing? How does your role as an includer allow you to grow personally and professionally?</p> <p>Think about a time when you included an outsider at work. What motivated you to do this inclusion act? How did you feel after you completed the act? What impact did the act have on you and the outsider?</p> <p>Think about a time when you or someone else demonstrated openness to an outsider at work. What did you/they do? How did you/they feel after this? Think about a time when you or someone else demonstrated <i>humility</i> to an outsider at work. What did you/they do? How did you/they feel after this? Think about a time when you or someone else demonstrated <i>respect</i> to an outsider at work. What did you/they do? How did you/they feel after this?</p>
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Motivating Self Determined Inclusion Using a Job Crafting Framework

Since the introduction of job crafting over twenty years ago, many scholars have investigated the antecedents and predictors, outcomes, and boundary conditions around which job crafting is optimally implemented. I will next outline the concepts and mechanisms of inclusion-focused job crafting and Self Determination Theory that might aid inluders in STEM to facilitate women's authentic belonging in these male-dominated fields.

Autonomous vs Controlled Motivation. Job crafting is closely tied to the autonomous motivation of SDT (Deci & Ryan, 1991). The theory makes a distinction between autonomous motivation and controlled motivation, such that autonomous motivation stems from people choosing to engage in an activity with volition while they are being authentic to themselves (e.g. an employee designing their own job crafting toward inclusion intervention). Controlled motivation is characterized by a person feeling controlled to engage in an activity through external rewards or power dynamics (e.g., an employee being forced to attend a diversity training and not being given tools to carry out appropriate behaviors). Individuals that are autonomously motivated have higher performance and learning outcomes. Yip et al. (2023) conducted research in autonomous and controlled motivation in the context of social change movements and found that increases in autonomous motivation positively predicted self-reported collective action through increases in opinion-based group identification. Further, controlled motivation negatively predicted changes in action. Thus, autonomous motivation led to sustained action over time, whereas controlled motivation had the reverse impact. When an employee can job craft toward inclusion behaviors, they are autonomously motivated and therefore their actions are more closely tied to their values. Figure 4.3 illustrates the Cognitive Crafting for Inclusion

elements, including authenticity-based reflection questions, that represent the autonomous motivation elements that would motivate includers using these mechanisms.

Figure 4.3.

Job Crafting for Inclusion Worksheet: Cognitive Crafting Activity

Includer Thinking

INCLUSION REFLECTION

Reflect on the ways you currently think about your job and how you include others.

Authenticity

- What strengths do you have that can help you be a better includer?
- How do your core values support your desire to become an includer?
- How does your role as an includer give your life purpose and meaning?
- How does your role as an includer contribute to the success of the organization?
- How does your role as an includer contribute to the success of the broader community?
- What is the main purpose of your role as an includer?
- How can you initiate meaningful and humble conversations asking your teammates what they need to feel included?

Job Crafting Motivational Mechanism: Basic Need Satisfaction

The purpose of this dissertation research has been to identify actual behaviors and actions that people can take to job craft for inclusion – and the use of the basic tenets of Self Determination Theory (Deci & Ryan, 1985) serve as the underlying motivational mechanism driving such an initiative. Given that the basic psychological needs introduced by this theory (autonomy, competence, and relatedness) align with Wrzesniewski and Dutton’s original definition of the three elements of job crafting (cognitive, task, and relational crafting), Job Crafting for Inclusion behaviors might powerfully harness the needed motivational mechanisms to incite majority-group members to enact inclusion behaviors over the long term.

One of the foundational theories of motivation, Self Determination Theory (Deci & Ryan, 1991) postulates that every human being is driven by the fulfillment of three inherent and

universal psychological needs – the need for autonomy, relatedness, and competence (Deci & Ryan, 1991). Job crafting has a direct connection to an employee’s most prominent motivational mechanisms and could be a strong foundation for the appetitive and promotion-focused motivation needed for inclusion-focused job crafting. I look to the existing research connecting the three forms of job crafting (cognitive, relational, and task crafting) to the meeting of the basic psychological need satisfaction of Deci & Ryan’s Self Determination Theory (1991).

Research on Job Crafting and Basic Need Satisfaction. Prior research has indeed found evidence to suggest that the three elements of job crafting – cognitive, relational, and task crafting - work through the satisfaction of the basic psychological needs of SDT – autonomy, relatedness, and competence. Slemp and Vella-Brodrick (2014) found a positive mediating role of the meeting of basic psychological needs on the relationship between job crafting behaviors and wellbeing. Moreover, Van Wingerden et al.’s (2017) quasi-experimental study found that all three job crafting elements increased after a job crafting intervention, and there was a mediating effect of psychological need satisfaction on the relationship between job crafting and work engagement. I next take each of the three elements of the job crafting for inclusion activity and relate them to their corresponding basic psychological need, beginning with cognitive crafting for inclusion.

Cognitive Crafting to Meet Autonomy Need. The motivational mechanism that renders cognitive crafting toward inclusion powerful and effective is the meeting of the basic psychological need for autonomy. Autonomy refers to a person’s actions coming from one’s “true self” and has an internal locus of control. This element also includes the idea that a person acts in line with his or her values, and that his or her values have been integrated into their self-structure (Ryan, 1993). An employee cognitive crafting toward inclusion would have a direct tie

to their values and “true self,” which would illuminate the autonomy they had in designing their job crafting plan. Figure 4.4 illustrates the Cognitive Crafting for Inclusion elements, including an activity about insider vs outsider thinking and uniqueness and belonging thinking, that would motivate includers by satisfying the basic psychological need for autonomy.

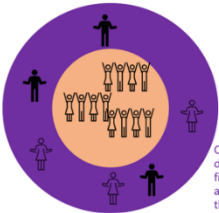
Figure 4.4.

Job Crafting for Inclusion Worksheet: Cognitive Crafting Activities

Includer Thinking

INSIDER OR OUTSIDER?

Below is an image of inclusion – which group do you most identify with, orange or purple?




Inside area: Includers already feel belonging at work. They are insiders. They usually are part of majority groups in their field or organization.

Outside area: Outsiders are people who do not experience belonging in their field or organization. They usually are part of minority groups in society, their field or organization.

Are you an insider, an outsider, or someone in between? Why?

How might others in your group place themselves in the inclusion landscape? Write their names in the corresponding circle.



Inside area: Includers already feel belonging at work. They are insiders. They usually are part of majority groups in their field or organization.

Outside area: Outsiders are people who do not experience belonging in their field or organization. They usually are part of minority groups in society, their field or organization.

Includer Thinking

UNIQUENESS AND BELONGING

Researchers (Shore et al., 2011) use a 2x2 matrix to define inclusion:

A person is included when they are valued for their uniqueness/authentic self, and they feel they belong to the group.

		BELONGING →	
		Exclusion	Assimilation
UNIQUENESS ↓	Individual is not treated as an organizational insider with unique value in the work group but there are other employees or groups who are insiders.	Individual is treated as an insider in the work group when they conform to organizations/dominant culture norms and downplay uniqueness.	
	Individual is not treated as an organizational insider in the work group but their unique characteristics are seen as valuable and required for group/organizational success.	Individual is treated as an insider and also allowed/encouraged to retain uniqueness within the work group. ★	

How do you currently view your own inclusion in this matrix?

How might others in your team view their inclusion?

Are there people in your group that might feel that they are required to assimilate in order to be treated as an insider?

Are there people in your group that might feel that they are not an insider, but they are valued for their uniqueness?

Are there people in your group that might feel that they are an outsider in your group and that they are not valued for their uniqueness, nor do they belong?

Relational Crafting to Meet Relatedness Need. The motivational mechanism that renders relational crafting toward inclusion powerful and effective is the meeting of the basic psychological need for relatedness. Relatedness is the feeling of connectedness and a sense of belonging with others (Baumeister & Leary, 1995). The root of the need for relatedness lies in a

person’s desire to feel others are sensitive and caring to their experience and when a person feels significant and loved. A person involved in relational crafting would themselves be able to connect to their own relatedness need, through fostering new relationships and deeper connections with others. Figure 4.5 illustrates the Relational Crafting for Inclusion elements, including a relationship matrix and reflection questions, that would motivate includers by satisfying the basic psychological need for relatedness.

Figure 4.5.

Job Crafting for Inclusion Worksheet: Relational Crafting Activity

Includer Relationships

WHO WILL YOU INCLUDE?

In the box below, write the names of the people with whom you have the strongest and weakest relationships through your job and signal if they are outsiders and insiders.

	Strong Relationship	Weak Relationship
Insider		
Outsider		

Interests
 Who do you work with that shares your interests?
 How do you share your interests with others, and how do you learn about other’s interests?
 How do people currently share their personal and individual interests at work?
 How can you share your interests more and connect with others around them?

Casual Interactions
 How can you incorporate more casual and informal conversations into your relationships with women at work?
 How can you do this in the remote setting?

Safety to Take Risks
 Do the people on your team currently feel safe to ask questions and make mistakes without being judged or shamed?
 How can you ensure that the women on your team currently feel safe to ask questions and make mistakes without being judged or shamed?

Feeling Heard
 How can you better show the women on your team that you hear and value their contributions?

Opportunities for Connection
 What opportunities for connection on a personal level can you create to facilitate inclusion at work?
 What about opportunities for women to connect on a personal level at work?
 Is there a woman at work that you can offer to mentor? Who is it? How might you create a mentorship relationship with her?
 How can you do this in the remote setting?

Task Crafting to Meet Competence Need. The motivational mechanism behind the efficacy of task crafting lies in the meeting of the basic psychological need for competence. By enacting task crafting for inclusion, includers are given opportunities to express the skills and capacities that they are most competent in. Task crafting for inclusion would allow includers in STEM to practice the tasks and behaviors that lead to women’s feelings of inclusion in these spaces, and men would develop competence and confidence in these areas. In this way, task crafting for inclusion is mutually beneficial for both women and men in STEM. Figure 4.5 illustrates the Task Crafting for Inclusion elements, including questions and suggestions around tasks and actions that lead to belonging that would motivate includers by satisfying the basic psychological need for competence.

Figure 4.6.

Job Crafting for Inclusion Worksheet: Task Crafting Activity

Includer Actions

HOW WILL YOU INCLUDE?

Direct Acknowledgement
How can you directly acknowledge women's in STEM experiences being different from men's experiences in STEM?

Hiring and Representation
What contributions can you make to women's increased representation and hiring efforts at work?

Support and Affirmations
How can you provide more direct support and affirmations to women at work? When would you do this and with what frequency? How would you do this (e.g., written, verbal, etc.)?

Invite to Speak/Contribute
Which women can you invite to speak at an upcoming conference?
Which women can you invite to contribute to discussions in your next meeting? How will you invite them to contribute?

Meaningful Follow-Up
Is there a scenario where you can follow-up meaningfully with a woman at work? What is the scenario? How do you plan to follow-up?

Visual Signal
Is there a visual signal of your being an includer that you want to display to the women in your group or department? How can you do this in the remote setting? Examples are:

- Stickers on laptop computer
- Pictures of pets displayed
- Dressing outside of the norms of the dominant culture (Uniquely colored hair/piercings)
- Display a Pride flag, BIPOC Pride flag at your desk

Activities
Is there a celebration that you can participate in that signals your value of women and members of underrepresented groups at your work? Examples are:

- Celebrate Women in Science Day
- Show the Picture a Scientist film

Can you start a reading group about the topic of Women in STEM? Some book recommendations are:

- Inclusivity (Johnson, 2020)
- What Inclusive Leaders Do (Addy et al., 2021)
- Lessons in Chemistry (Sattmvs, 2022)

Through the connecting of the Job Crafting for Inclusion Activity to the motivational mechanisms that might render the activity effective in the long-term, this chapter has set forth a potentially powerful intervention that can serve as a basis for includers seeking to Job Craft for Inclusion, on their own terms, in their own way, using their autonomy and authentic selves as a guide.

Implications

This dissertation has several practical implications that add to the research on positive organizational scholarship and organizational behavior. First, it contributes a solution to the longstanding mixed results of diversity training initiatives. Historically, diversity trainings have focused on improving participant attitudes and cognitive outcomes (Bezrukova et al., 2012). While these trainings successfully develop awareness and knowledge of diversity-related issues among participants in the short term, they often lack a focus on the transfer of the new knowledge and attitudes to the performance of actual real world diversity behaviors in the long term. The true goal of DEIB initiatives should not stop at changing participant knowledge and attitudes in the short term, but rather should be on the enactment of long-term diversity behaviors such as inclusion behaviors that lead to a diverse workforce that feels they truly belong. The development of a Job Crafting for Inclusion Activity is a step in a positive direction toward achieving this goal.

Using the experiences of the outsiders who might not automatically experience belonging allowed me to guide the intervention design based on real experiences and critical incidents. The rich data collected using a qualitative approach provided a source of critical examples and meaningful content that can be used to add activities and examples that STEM professionals can connect to. By outlining a Job Crafting for Inclusion activity, this dissertation serves to shift the

inclusion conversation toward the majority-group members and the responsibility of these members to take actions to increase authentic belonging in minority-group members, thus removing the burden of inclusion off the outsiders and placing it onto the insiders.

Areas for Future Research

Future research should test the efficacy and impact of implementing such a Job Crafting for Inclusion Activity on women's experiences of authentic belonging in STEM. Additional research might seek to uncover the motivational mechanisms that explain the success of allyship and Job Crafting for Inclusion initiatives to further aid in the successful long-term implementation of such an intervention.

Conclusion

Through the first study of this dissertation, I uncovered the similarities and differences between men's and women's experiences of authentic belonging in STEM fields. I uncovered similarities around the three primary ways that both groups conceptualized authentic belonging in these spaces – through feeling heard and contributing, through representation, and through feeling safe to take risks. I also identified major differences in the ways the men and women conceptualized authentic belonging, such that the women had a stronger leadership orientation, had a greater pull toward connection, and had more negative mindsets around their inclusion in STEM spaces. The men, on the other hand, had a strong orientation toward merit and performance, did not have as strong of a leadership orientation, and had far more positive mindsets about women's authentic belonging in STEM fields. Through the second study of this dissertation, I uncovered the relationships, cognitions, and actions that led to participant's experiences of authentic belonging in STEM fields. The major takeaways from the second study were the impact that leaders had on women's experiences of belonging, and the specific ways

that connecting with others led to women's experiences of authentic belonging in STEM fields. I also uncovered behaviors and actions that most commonly led to women's experiences of authentic belonging in STEM fields. Taking the results of the two studies together, I developed a Job Crafting for Inclusion Activity, answering the call for more behavior-based, long-term interventions around inclusion that can serve to facilitate women's authentic belonging in STEM fields. To address the staggering dearth of women in STEM fields, including the less than 4% of Nobel Prizes in STEM having been awarded to women in history, organizations and leaders must immediately acknowledge the issue of women's disproportionate lack of authentic belonging in STEM fields and take action to create spaces where women can experience authentic belonging and can feel pulled to remain in these spaces so their voices and contributions are heard.

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Appendix A



AGREEMENT TO PARTICIPATE IN *VIDEO STUDY* (IRB # 4061)

You are invited to be a subject in a research project. Participating may not benefit you directly, but you will be helping us explore the ways that people react to videos about working in the STEM profession. If you volunteer, you will watch two 6-minute videos, answer 3 open-ended questions, and complete a survey. This will take about 45 minutes of your time. Volunteering for this study involves no more risk than what a typical person experiences on a regular day. Your involvement is entirely up to you. You may withdraw at any time for any reason. Please continue reading for more information about the study.

STUDY LEADERSHIP: This research study is led by Cecelia Dotzler, Doctoral Student in organizational psychology at Claremont Graduate University and supervised by Maria Gloria Gonzalez-Morales, PhD, a professor of psychology at Claremont Graduate University.

PURPOSE: The purpose of this study is to learn more about how people react to videos about the fields of science, technology, engineering, and math, and the ways that answering questions might influence their reactions.

ELIGIBILITY: To be in this study, you must be 18 years of age and employed in one of the STEM fields of science, technology, engineering, or mathematics. You must also be registered on a participant crowdsourcing platform.

PARTICIPATION: During the study, you will be asked to view two short videos about people working in the STEM profession. You will also be asked to answer open-ended questions where you will reflect on the topics presented and write out your answers, then you will answer several close ended questions. The total study should take no more than 45 minutes to complete.

RISKS OF PARTICIPATION: The risks that you run by taking part in this study are minimal. The risks include any inconvenience that accompanies viewing two videos, filling out a survey, responding to questions that may be related to your experiences working in STEM in a negative light or otherwise answering questions posed by others.

BENEFITS OF PARTICIPATION: We do not expect the study to benefit you personally. Participation may lead to increased self-awareness based on the time spent reflecting on the study topics. Additionally, participants may feel a sense of pride that they are contributing to important research. This study will benefit the researchers by furthering our own knowledge and understanding of the study constructs. Additionally, there will be the possibility of presenting our findings at an academic conference or publication in an academic journal.

COMPENSATION: You will be compensated \$7.20 for participating in this study upon completion of all the sections. Due to the nature of the study, you will be compensated ONLY if:

1. you complete the full study

AND

2. you provide thoughtful written responses to open-ended questions.

You will NOT be compensated if you do not complete all the sections or if you do not provide thoughtful written responses to the open-ended questions.

There will an initial check for 'bots' at the start of the survey - if this is not passed, then you will be omitted from completing the remainder of the study and you will not be compensated. Additionally, there are several questions throughout the study that you will be instructed to answer in certain ways as a form of

checking that you are paying attention. If those questions are not answered correctly, you will not be compensated.

VOLUNTARY PARTICIPATION: Your participation in this study is completely voluntary. You may stop or withdraw from the study at any time or refuse to answer any question (except for the attention checks) for any reason without negative consequences. Your compensation will not be affected. Your decision whether to participate will have no effect on your current or future connection with anyone at CGU or at your work.

CONFIDENTIALITY: Your individual privacy will be protected in all papers, books, talks, posts, or stories resulting from this study. The study is being conducted through Qualtrics which uses TLS encryption for all transmitted data. Survey data will be stored only on a password-protected computer. Identifying information will be scrubbed. We may share the data set with other researchers but will not reveal your identity with it.

FURTHER INFORMATION: If you have any questions or would like additional information about this study, please contact Cecelia Dotzler at cecelia.dotzler@cgu.edu. You may also contact Dr. M. Gloria González-Morales, the faculty member supervising this research, at gloria.gonzalez@cgu.edu. The CGU Institutional Review Board has certified this project as exempt. If you have any ethical concerns about this project or about your rights as a human subject in research, you may contact the CGU IRB at (909) 607-9406 or at irb@cgu.edu. You may print and keep a copy of this consent form.

CONSENT: By marking the “YES, I agree to participate in the study” box below means that you understand the information on this form, that someone has answered any and all questions you may have about this study, and you voluntarily agree to participate in it.

We will also ask if you are willing to provide your email address for the opportunity to participate in future research projects. By marking the "YES, I agree to participate in the study AND I agree to be contacted by email for future opportunities to participate in research" box below you grant your permission to be contacted by email.

- YES, I agree to participate in the study AND I agree to be contacted by email for future opportunities to participate in research.
- YES, I agree to participate in the study.
- NO, I do not agree to participate.

Appendix B

Thank you for answering those questions! There are just a few short questions remaining.
Please answer the following group of questions about your demographic information.

These are optional and confidential.

How many hours do you work in a typical week?

What is the highest level of education you have completed? Choose one answer.

- Less than a high school degree
- High school diploma or equivalent (e.g., GED)
- Some college but no degree
- Technical, Trade, or Vocational certificate
- Associate Degree (2 Year Degree)
- Bachelor's Degree (4 Year Degree)
- Graduate Degree (Masters, Ph.D., JD, MD, etc.)

What is your sexual orientation? Select all that apply.

- Gay
- Lesbian
- Bisexual
- Pansexual
- Asexual
- Queer
- Heterosexual/Straight
- A sexual orientation not listed. Please specify:
- I prefer not to say

To which gender identity do you most identify?

- Female
- Male
- Non-binary/Third gender/Gender non-conforming
- Other
- Prefer Not to Answer

Which of the following best describes your ethnic background? Please CHECK ALL THAT APPLY.

- Indigenous (Inuit/First Nations/Metis)
- White/European
- Black/African/Caribbean
- Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino, etc.)
- Arab (Saudi Arabian, Palestinian, Iraqi, etc.)
- South Asian (East Indian, Sri Lankan, etc.)
- Latin American (Costa Rican, Guatemalan, Brazilian, Colombian, etc.)
- West Asian (Iranian, Afghani, etc.)
- Other (Please specify)
- Prefer Not to Answer

Did you take the entire survey seriously? Please answer this question HONESTLY; how you answer will not affect whether you receive credit or incentives. We simply need to know this for our results; if a survey isn't taken seriously, it could impact our results, so we would omit that survey from the analysis. Yes/No

Appendix C



AGREEMENT TO PARTICIPATE IN WOMEN'S BELONGING IN STEM (IRB # 4374)

You are invited to participate in an interview for a research project. Volunteering may not benefit you directly, but you will be helping extend organizational psychology research. If you volunteer, you will participate in an interview that asks you about your experiences as a professional in STEM, and the feelings of belonging you experience at work. This will take 30 minutes of your time. Volunteering for this study involves no more risk than what a typical person experiences on a regular day. Your involvement is entirely up to you. You may withdraw at any time for any reason. Please continue reading for more information about the study.

STUDY LEADERSHIP: This research project is led by Cecelia Dotzler, a PhD student at the School of Social Science, Policy & Evaluation at Claremont Graduate University, who is being supervised by Dr. Maria Gloria Gonzalez-Morales, a professor of psychology at Claremont Graduate University.

PURPOSE: The goal of this study is to investigate the overall belonging experiences of women working in STEM fields.

ELIGIBILITY: To be in this study, you must be 18 years of age or older, identify as a woman and be employed in a STEM field.

PARTICIPATION: Should you agree to participate in this study by consenting to this form, you will be asked a series of demographic questions via Qualtrics to complete before participation in the interview. During the study, you will be asked to participate in an interview that asks about your experience at work as a woman in STEM and the feelings of belonging you have experienced. This will take 30 minutes of your time. In addition, you may be contacted for a follow up interview or focus group to clarify any information you provided, though there is no additional obligation to participate.

RISKS OF PARTICIPATION: The risks that you run by taking part in this study are minimal. Some questions could make participants think about their work environment, and their experiences as women in STEM in ways that could make them feel a bit uneasy. To minimize any discomfort or inconvenience, participants are able to opt-out of continuing or skip questions at any time. There is no risk to nonparticipants. If you have any questions or would like to discuss the details of the study at its completion, please feel free to contact the researcher, Cecelia Dotzler (cecelia.dotzler@cgu.edu; (757) 802-6707).

BENEFITS OF PARTICIPATION: We do not expect the study to benefit you personally. Though we hope the study findings will advance the researchers' understanding of the experiences of belonging experiences of women working in STEM fields.

COMPENSATION: Subjects who qualify for the study and participate in the interview will receive an email with a \$10 charity e-gift card from Tisbest within 1-2 days. A TisBest Charity Gift works like any other gift card, except that instead of buying more things for themselves, the recipient of the Charity Gift Card spends it to support a charity of their choice.

VOLUNTARY PARTICIPATION: Your participation in this study is completely voluntary. You may stop or withdraw from the study at any time without it being held against you. Your decision on whether or not to participate will have no effect on your current or future connection with anyone at Claremont Graduate University.

CONFIDENTIALITY: Your individual privacy will be protected in all papers, books, talks, posts, or stories resulting from this study. We may use the data we collect for future research or share it with other researchers, but we will not reveal your identity with it. The interview will be captioned and recorded, both audio and video. Transcripts, audio or video recordings are not anonymous. We will use these recordings and transcripts to transcribe all interviews within 48 hours after they take place. After the interview has been transcribed to text, all video recordings will promptly be permanently deleted and erased from the researcher's personal computers (which are password protected), in order to protect participant privacy. Upon the conclusion of the study, audio recordings will be deleted permanently. The audio recorded file and the transcription file would be named according to the participant number.

FURTHER INFORMATION: If you have any questions or would like additional information about this study, please contact researcher Cecelia Dotzler (cecelia.dotzler@cgu.edu; (757) 802-6707). You may also contact my faculty supervisor, Dr. Maria Gloria Gonzalez-Morales (gloria.gonzalez@cgu.edu; (716) 352-9333). The CGU Institutional Review Board has certified this project as exempt. If you have any ethical concerns about this project or about your rights as a human subject in research, you may contact the CGU IRB at (909) 607-9406 or at irb@cgu.edu. A copy of this form will be given to you if you wish to keep it. You may print and keep a copy of this consent form.

CONSENT: By marking the "YES, I agree to participate in the study" box below means that you understand the information on this form, that someone has answered any and all questions you may have about this study, and you voluntarily agree to participate in it. We will also ask if you are willing to provide your email address for the opportunity to participate in future research projects. By marking the "YES, I agree to participate in the study AND I agree to be contacted by email for future opportunities to participate in research" box below you grant your permission to be contacted by email after your participation in this study is finalized.

- YES, I agree to participate in the study AND I agree to be contacted by email for future opportunities to participate in research.
 - YES, I agree to participate in the study.
 - NO, I do not agree to participate.
-

Appendix D

Demographics Questionnaire

About You

The following questions ask for basic information about you and your work.

What is your name?

What is your email address?

What is your gender?

What is your race? Select all that apply.

- Black or African American
- Asian
- Hispanic or Latinx
- White or Caucasian
- American Indian or Alaska Native
- Native Hawaiian or Other Pacific Islander
- Other:
- I prefer no to say

In which country do you currently reside?

In which state do you currently reside?

What is your age? (0-100)

How long (in years) have you been employed in a STEM field?

What is the name of your current institution?

What department/field are you in (e.g., biology, theoretical physics, mathematics, engineering, etc.)?

Appendix E

Qualitative Interview Protocol: Job Crafting for Inclusion in STEM

Cecelia Dotzler, November 21, 2022

Before the interview: Send each participant the consent form and demographic questionnaire via Qualtrics and have them sign it and return it to the interviewer prior to the interview.

INSTRUCTIONS

Hello! My name is Cece. Thank you for taking the time to talk with me today. We are conducting a qualitative study about women in STEM and the experiences they have had with feelings of belonging in their field. You are the expert in this domain, so we appreciate you sharing your insights and experiences with us. Throughout this interview, we will ask about your experiences and in total, it should take around 30 minutes. There are no right or wrong answers, or desirable or undesirable answers. All information you provide during the study will be confidential. This is a safe space where you can share any of your thoughts, feelings, and experiences. Many studies have shown that participating in a study of this nature, that offers space for reflection, can lead to greater meaning and direction in your work. I assure you that all your comments will remain confidential. After the interview is completed, we will replace your name with an anonymous identifier so that your responses can't be linked to your name. Your organization won't have access to the data either.

Your answers are extremely important to the research we're doing, and ultimately to understanding an enhancing women's experiences of belonging in STEM. Please be as detailed and thorough as possible in your answers. Again, thank you so much for participating. It means a lot to us, and we value your time and contributions.

RECORDER INSTRUCTIONS (Audio/Video)

If it is okay with you, I will be recording our conversation and turning on the captions, so that I can get all of the details, but still be able to carry on an attentive conversation with you. Is that okay?

PREAMBLE/CONSENT FORM INSTRUCTIONS

Before we get started, did you have any questions about the consent form you signed? (Answer questions, record on Zoom.)

Opening Questions

1. To get started, what brought you to [your organization]? How long have you been working at [your institution]?
2. Can you describe your general role as at [your institution]?
3. What have you liked best about your time at [your institution]?

Belonging

Now I'm going to ask you some questions about the experiences you've had with feelings of belonging in your field. For this study, authentic belonging is defined as the combined feelings of being valued for your uniqueness, and that you belong in the group or organization where you work.

The best organizations create an inviting and welcoming space for all employees to feel that they belong. Think about an ideal organization in which people can behave authentically and feel like they are truly a part of the organization. At this organization, people feel they can be their true selves and they are appreciated for their uniqueness. Each team member can bring their authentic selves to work, and they can thrive because they feel that they belong to the team. As you answer the following questions, think about an inspiring and ideal outcome for women's belonging in STEM fields.

4. How would you describe the belonging you've experienced as a STEM professional?
5. Do you believe belonging is important in your work? Why or why not?

Relational Crafting

6. Who at work has made you feel you authentically belonged there?
7. What was it about these people or your relationships that made you feel you authentically belonged?
8. How did these relationships initially form, how did they progress?
9. In general, what are the relationships and people that lead you to believe that you truly belong where you work?

Cognitive Crafting

10. What conversations have you had with your leaders or teammates that helped you understand their drive for including you at work?
11. How do you think the people that have made you feel that you belong approach or think about the role they play in facilitating this for you? Do you have any examples of why you think this way?
12. Tell me about a time a male colleague realized merit and hard work were not the only factors in your performance?
13. Can you describe the context that led to the men in your group understanding there wasn't a level playing field for women?

Task Crafting

14. What specific behaviors have you encountered at work that led you to feel that you truly belonged there?
15. What tasks or activities have your leaders or colleagues performed that led you to feel you truly belonged at work?
16. In general, what are the tasks, activities, or behaviors that signal to you that you truly belong where you work?

Closing Questions

17. If you were designing an ideal intervention to people in STEM how to make women feel that they belong there, what would you include?

18. What are the specific behaviors, tasks, ways of thinking, relationships, etc. that create an ideal organization of belonging for women?

19. Is there anything I didn't ask, but you think I should have?

As the study and data collection progresses, we may be interested in conducting a series of focus groups. Would you be interested in or open to joining a focus group if we go that route?

18. Would you mind if I followed up with you again in the future, if I need to clarify anything you said here?

Thank you!

Appendix F

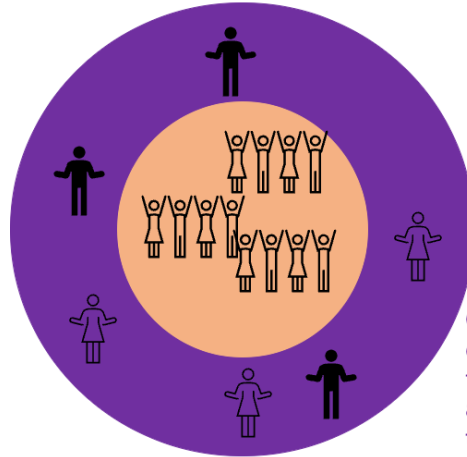
Job Crafting for Inclusion Worksheet

This worksheet will get you started with your own Job Crafting for Inclusion practice to help you achieve your individualized inclusion goals. First, you will reflect upon and write down how you think about your role as an includer and the inclusion climate at your workplace. Next, you will reflect upon the relationships and connections you have at work and the relationships you can foster and facilitate at work. Lastly, you will design includer actions that you can take to help outsiders feel like they are included and that they truly and authentically belong.

Includer Thinking

INSIDER OR OUTSIDER?

Below is an image of inclusion – which group do you most identify with, orange or purple?

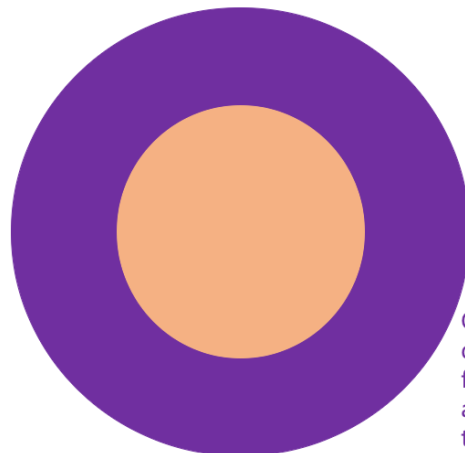


Inside area: Includers already feel belonging at work. They are insiders. They usually are part of majority groups in their field or organization.

Outside area: Outsiders are people who do not experience belonging in their field or organization. They usually are part of minority groups in society, their field or organization.

Are you an insider, an outsider, or someone in between? Why?

How might others in your group place themselves in the inclusion landscape? Write their names in the corresponding circle.



Inside area: Includers already feel belonging at work. They are insiders. They usually are part of majority groups in their field or organization.

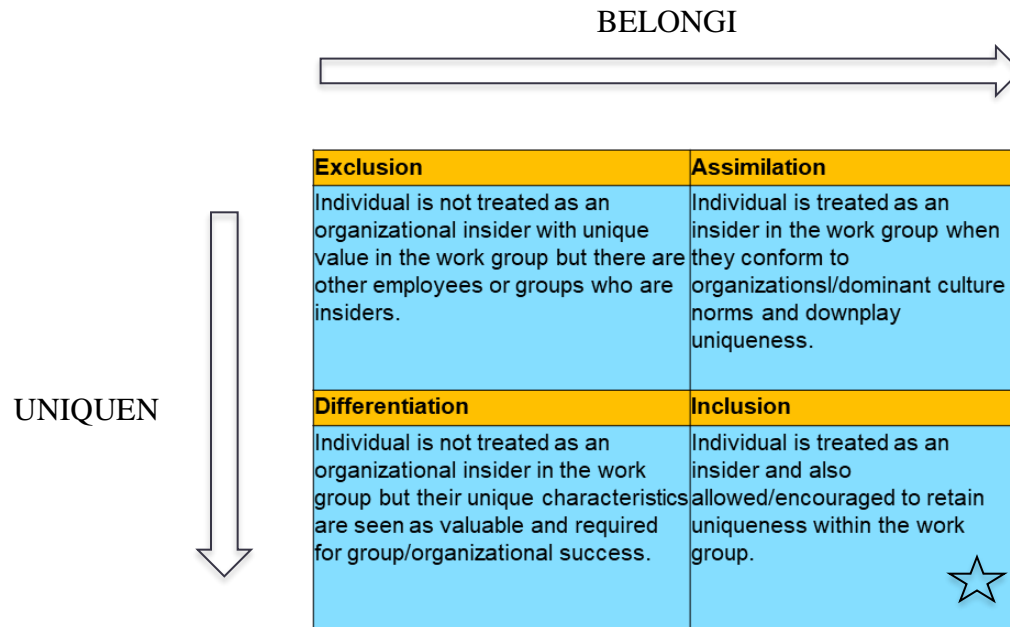
Outside area: Outsiders are people who do not experience belonging in their field or organization. They usually are part of minority groups in society, their field or organization.

Includer Thinking

UNIQUENESS AND BELONGING

Researchers (Shore et al., 2011) use a 2x2 matrix to define inclusion:

A person is included when they are valued for their uniqueness/authentic self, and they feel they belong to the group.



How do you currently view your own inclusion in this matrix?

How might others in your team view their inclusion?

Are there people in your group that might feel that they are required to assimilate in order to be treated as an insider?

Are there people in your group that might feel that they are not an insider, but they are valued for their uniqueness?

Are there people in your group that might feel that they are an outsider in your group and that they are not valued for their uniqueness, nor do they belong?

Includer Thinking

INCLUSION VISION AND MISSION STATEMENT

Next you will create your own vision for inclusion. Think about an ideal group in which people can behave authentically and feel like they are truly a part of the group. In this group, people feel they can be their true selves and they are appreciated for their uniqueness. Each team member can bring their authentic self to work, and they can thrive because they feel that they belong to the team. As you answer the following questions, think about an inspiring outcome for creating a sense of belonging among all team members.

DISCOVER

Describe a time when you were part of a collaborative team that brought out the best in you and made you feel like you truly belonged.

DREAM

Please discuss/share your dreams and aspirations for a workplace where every single person feels a sense of belonging and that they can behave authentically.

DESIGN

What does the ideal scenario look like where all people feel a deep sense of belonging in their workplace?

DELIVER

What are a few things you might do to make your workplace a culture of belonging with more inclusion of all people?

Write your mission statement to reflect the value YOU place on inclusion and valuing people of different backgrounds in your workplace.

Includer Thinking

INCLUSION REFLECTION

Reflect on the ways you currently think about your job and how you include others.

Authenticity

What strengths do you have that can help you be a better includer?

How do your core values support your desire to become an includer?

How does your role as an includer give your life purpose and meaning?

How does your role as an includer contribute to the success of the organization?

How does your role as an includer contribute to the success of the broader community?

What is the main purpose of your role as an includer?

How can you initiate meaningful and humble conversations asking your teammates what they need to feel included?

Rewarding Experiences / Autonomous & Appetitive Motivation

How does your role as an includer positively impact your life?

How does your role as an includer impact your overall wellbeing?

How does your role as an includer allow you to grow personally and professionally?

Think about a time when you included an outsider at work. What motivated you to do this inclusion act? How did you feel after you completed the act? What impact did the act have on you and the outsider?

Think about a time when you or someone else demonstrated *openness* to an outsider at work. What did you/they do? How did you/they feel after this?

Think about a time when you or someone else demonstrated *humility* to an outsider at work. What did you/they do? How did you/they feel after this?

Think about a time when you or someone else demonstrated *respect* to an outsider at work. What did you/they do? How did you/they feel after this?

Includer Relationships

WHO WILL YOU INCLUDE?

In the box below, write the names of the people with whom you have the strongest and weakest relationships through your job and signal if they are outsiders and insiders.

	<u>Strong Relationship</u>	<u>Weak Relationship</u>
<u>Insider</u>		
<u>Outsider</u>		

Interests

Who do you work with that shares your interests?

How do you share your interests with others, and how do you learn about other's interests?

How do people currently share their personal and individual interests at work?

How can you share your interests more and connect with others around them?

Casual Interactions

How can you incorporate more casual and informal conversations into your relationships with women at work?

How can you do this in the remote setting?

Safety to Take Risks

Do the people on your team currently feel safe to ask questions and make mistakes without being judged or shamed?

How can you ensure that the women on your team currently feel safe to ask questions and make mistakes without being judged or shamed?

Feeling Heard

How can you better show the women on your team that you hear and value their contributions?

Opportunities for Connection

What opportunities for connection on a personal level can you create to facilitate inclusion at work?

What about opportunities for women to connect on a personal level at work?

Is there a woman at work that you can offer to mentor? Who is it? How might you create a mentorship relationship with her?

How can you do this in the remote setting?

Includer Actions

HOW WILL YOU INCLUDE?

Direct Acknowledgement

How can you directly acknowledge women's in STEM experiences being different from men's experiences in STEM?

Hiring and Representation

What contributions can you make to women's increased representation and hiring efforts at work?

Support and Affirmations

How can you provide more direct support and affirmations to women at work? When would you do this and with what frequency? How would you do this (e.g. written, verbal, etc.)?

Invite to Speak/Contribute

Which women can you invite to speak at an upcoming conference?

Which women can you invite to contribute to discussions in your next meeting? How will you invite them to contribute?

Meaningful Follow-Up

Is there a scenario where you can follow-up meaningfully with a woman at work? What is the scenario? How do you plan to follow-up?

Visual Signal

Is there a visual signal of your being an includer that you want to display to the women in your group or department? How can you do this in the remote setting? Examples are:

- Stickers on laptop computer
- Pictures of pets displayed
- Dressing outside of the norms of the dominant culture (Uniquely colored hair/piercings)
- Display a Pride flag, BIPOC Pride flag at your desk

Activities

Is there a celebration that you can participate in that signals your value of women and members of underrepresented groups at your work? Examples are:

- Celebrate Women in Science Day
- Show the Picture a Scientist film

Can you start a reading group about the topic of Women in STEM? Some book recommendations are:

- Inlusify (Johnson, 2020)
- What Inclusive Leaders Do (Addy et al., 2021)
- Lessons in Chemistry (Garmus, 2022)