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Silence in STEM? The Impact of Experienced Social Identity Threats on Women

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SILENCE IN STEM? THE IMPACT OF EXPERIENCED SOCIAL IDENTITY THREATS ON WOMEN

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ABSTRACT

Despite making up a similar proportion of the workforce, women are grossly underrepresented in STEM occupations compared to men (65% vs. 35%). Prior research suggests that women's underrepresentation in STEM results in negative consequences, such as increased psychological burnout and decreased work engagement (Hall et al., 2015; Hall et al., 2018), through the mechanism of social identity threat. Academics have yet to explore how experiencing social identity threat impacts silence behaviors for underrepresented women in STEM. Building off social identity theory and prior research on social identity threat, the current study sought to compare women working in STEM occupations who are also outnumbered by male colleagues to women not subjected to this "double dominance". Specifically, this study investigated their experience of social identity threat and the subsequent impact this experience has on employee silence behaviors, a regulatory response from the behavioral inhibition system. Survey data suggest that individuals who identify more strongly with being a woman experience more social identity threat, which in turn predicts employee silence behaviors. Importantly, this relationship occurred irrespective of a woman's exposure to double dominance. Though most hypotheses were not confirmed, the supplementary analyses contribute to a growing body of research on differentiating between predictors of employee voice and employee silence.

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INTRODUCTION

According to the National Science Foundation, about a quarter of the United States workforce was employed in a STEM (Science, Technology, Engineering, and Math) occupation in 2021. Compared to their non-STEM counterparts, those working in STEM enjoy benefits such as significantly higher wages ($55,000 median salary vs. $33,000), lower unemployment rates (2.2% vs. 3.6% in 2019), and greater employment growth (2.3% vs. 1.2%) (Okrent & Burke, 2021). Unfortunately, men and women are not equally represented in these coveted occupations. While men and women account for a similar share of the workforce (52% and 48% respectively), men make up a much larger proportion of those working in STEM occupations (65% vs. 35%) (NSF, 2021). Although the number of women working in STEM occupations increased by 31% from 2011 to 2021, women remain grossly underrepresented.

Extant research shows that underrepresented women in STEM experience various social identity threats, which in turn predicts negative outcomes such as increased psychological burnout, decreased work engagement, and decreased career confidence (Hall et al., 2015; Hall et al., 2018; van Veelan et al., 2019). Social identity threat broadly refers to an individual's belief that they may be treated negatively or devalued because of their social identity as a member of a social group (Steele et al., 2002). While academics who study the experience of underrepresented women in STEM have explored a variety of outcomes stemming from experiencing social identity threat, including increased psychological burnout and decreased work engagement (Hall et al., 2015; Hall et al.,

2018), no research has been conducted on this population to understand how experiencing social identity threat impacts employee silence behaviors.

When presented with the opportunity to speak up, referred to as a latent voice opportunity, employees can either share their voice or remain silent (Morrison, 2014; Morrison, 2023). In a recent meta-analysis, Sherf and colleagues (2021) provide evidentiary support for their theory that employee voice and silence behaviors are motivated by two "functionally independent and biologically based self-regulatory systems", the behavioral activation system (BAS) and the behavioral inhibition system (BIS) respectively (p. 115). I propose that the negative emotional state induced by experiencing social identity threats will spur a BIS regulatory response in underrepresented women in STEM towards silence behaviors. Understanding this phenomenon is important, as extant research associates employee silence with negative impacts to individual well-being, job attitudes, and performance-related outcomes (Hao et al., 2022). For instance, Hao and colleagues' (2022) meta-analysis revealed that employee silence had a significant positive relationship with burnout, stress, turnover intentions, job withdrawal, and deviant behavior.

In this paper, I review relevant literature around social identity theory, stereotypes, and social identity threats in the context of underrepresented women in STEM. Then, I discuss extant research on employee voice and silence behaviors, with an emphasis on evidence of their construct heterogeneity. Finally, I propose the present study. Building off social identity theory and prior research on social identity threat, I suggest that women working in STEM occupations who are outnumbered by male

colleagues will experience higher levels of social identity threat than women who are not subjected to this "double dominance". Additionally, I hypothesize that for women, the relationship between being subjected to double dominance and social identity threat will be moderated by the degree they identify with their gender group. Further, using Sherf and colleagues (2021) novel framework, I propose that experiencing social identity threat, a negative emotional state, will predict employee silence behavior, a BIS regulatory response.

Social Identity, Stereotypes, and Social Identity Threats

Tajfel and Turner's (1986) Social Identity Theory (SIT) proposes that individuals derive their self-concept in part from their social group membership(s), and that the categorization of the self and others into social groups plays an important role in intergroup behavior. Social groups are determined along many lines, such as gender identity, and these groups are ascribed stereotypes. Stereotypes are defined as "beliefs about the characteristics, attributes, and behaviors of members of certain groups" (Hilton & von Hippel, 1996, p. 240). According to Fiske and colleagues' (2002) Stereotype Content Model (SCM), stereotypes differ from group to group, but can be systematically predicted along two dimensions: perceived warmth and perceived competence.

According to the authors, groups perceived as warm are likable; these group members are friendly, well-intentioned, sincere, trustworthy, and good-natured. On the other hand, groups perceived as competent are respectable; these groups members are intelligent, skillful, capable, independent, and confident. Stereotypes can include mixed perceptions of warmth and competence, such that a group can be perceived as low in one

dimension but high on the other. Ellemers (2018) describes these dimensions as universally applicable, primary features that are assessed when individuals evaluate and compare others in intergroup or interpersonal interactions. As such, humans aim to predict the behavior of others by assessing their intentions (warmth) and capabilities (competence) in relation to their impact on the in-group (Fiske et al., 2002; Ellemers 2018). In general, warmth is stereotypically feminine while competence is stereotypically masculine (Fiske et al., 2002).

Social identities and their associated stereotypes are central to the experience of social identity threat. Social identity threat broadly refers to an individual's belief that they may be treated negatively or devalued because of their social identity as a member of a social group (Steele et al., 2002). Extant literature often uses other psychosocial phenomena, such as stigma consciousness or stereotype threat, interchangeably with social identity threat. These phenomena can be viewed as types of social identity threat that occur when an individual believes they may be treated negatively or devalued specifically because of a prominent, negative stereotype about a social group to which they belong (Pinel, 1999; Steele et al., 2002).

Both stigma consciousness and stereotype threat can be induced when a prominent, negative stereotype about a group to which an individual belongs is situationally relevant (Pinel, 1999; Spencer et al., 2016; Steele & Aronson, 1995). Stigma consciousness refers to the extent to which an individual expects to be judged or stereotyped by others due to their group membership (Pinel, 1999). Similarly, stereotype threat refers to an individual's fear of being judged or poorly treated specifically because

of a prominent, negative stereotype about their social group (Steele & Aronson, 1995; Spencer et al., 2016). These phenomena manifest in slightly different ways. Both phenomena involve experiencing social identity threat because of negative group stereotypes, regardless of whether the individual personally believes in the merit of the stereotype held against their group (Pinel 1999; Spencer et al., 2016). Even if an individual does not personally believe the stereotype held against their group, the mere thought of the stereotype being relevant could be self-threatening. The two phenomena differ in that individuals facing stereotype threat also fear the possibility of conforming to and confirming a negative stereotype about their group (Steele & Aronson, 1995). Conversely, individuals experiencing stigma consciousness expect to be stereotyped regardless of whether they conform to the stereotype (Pinel, 1999).

The Experience of Women in STEM

Like social identities, occupations can be stereotyped along the dimensions of warmth and competence (He et al., 2019). For instance, STEM occupations such as computer programmers, engineers, and scientists are stereotyped as highly competent but not very warm. On the other hand, non-STEM occupations such as teachers and childcare workers are stereotyped as highly warm but not very competent (He et al., 2019). STEM occupations exhibit what val Veelan and colleagues (2019) call "normative male dominance", or an occupational culture that positively evaluates stereotypically male attributes. Occupational cultures exhibiting normative male dominance not only embody and reward male stereotypes, but can negatively evaluate feminine attributes and enforce prominent, negative stereotypes for women (van Veelan et al., 2019).

Women in STEM face the negative stereotype that they are less competent than men in math and science because of their gender identity (Sebastián-Tirado et al., 2023). This gender-based stereotype is made salient to women in STEM through contextual and situational cues such as being underrepresented (van Veelan et al., 2018; Schuster & Martiny, 2017; Crystal, 2016) or interactions with male colleagues that signal feelings of incompetence or a lack of acceptance (Hall et al., 2015; Hall et al., 2018) which in turn induces the experience of social identity threat. Recent findings from van Veelan and colleagues (2019) suggest that experienced identity threat is most extreme for women who are subjected to an environment of "double dominance". Meaning, those women who simultaneously work in an industry with a culture of normative male dominance (STEM) and are also outnumbered by male colleagues. Women who worked in STEM but were not outnumbered by male colleagues and women working outside of STEM experienced lower levels of social identity threat than their counterparts facing double dominance. Men working in STEM occupations did not experience such social identity threats. It is unfortunate but unsurprising that extant research links women in STEM experiencing social identity threat to negative outcomes such as feelings of burnout (Hall et al., 2015; Hall et al., 2018; Hall et al., 2019), decreased work engagement, and decreased career confidence (van Veelan et al., 2019). Based on findings from extant research, the following hypotheses are proposed:

Hypothesis 1: For women, being subjected to double dominance at work will positively predict social identity threat.

Hypothesis 2: Women subjected to double dominance (working in a STEM occupation while also being outnumbered by male colleagues) will experience higher levels of social identity threat compared to women who are not subjected to such double dominance at work (women working in STEM who are not outnumbered by men and women not working in STEM).

Academics have researched the impact of group commitment and social context on identity concerns (Ellemers et al., 2002). Social identity researchers theorized that committed group members are threatened by a lack of acceptance for or exclusion of their own group by valued group members (Ellemers et al., 2002). Extant research supports this theory; empirical findings suggest that how strongly one identifies with their gender group impacts their experience of social identity threats (Schmader, 2002; Kaiser & Hagiwara, 2011). For example, van Veelan and colleagues (2019) found that individuals who strongly identify with their gender group experience more gender identity threats at work than those who do not. The authors examined the interaction effect between work gender ratio (low ratio of women vs. high ratio of women) and gender identification on gender identity threat, and between work sector (STEM vs. Non-STEM) and gender identification on gender identity threat. The authors' findings indicate that women on teams with a low ratio of women reported experiencing significantly higher gender identity threat when they strongly identified with their gender group than when they did not. Interestingly, both women in STEM and non-STEM occupations reported experiencing significantly higher gender identity threat when they strongly identified with their gender group, although this was higher for women working in STEM.

Unfortunately, the authors did not examine the role gender identification plays between double dominance status specifically and experiencing social identity threat. Based on aforementioned evidence of the heighted negative experience for those women subjected to double dominance and the attenuating effect of gender identification on the experience of social identity threat, the following hypothesis is proposed:

> **Hypothesis 3:** The relationship between being subjected to double dominance and social identity threat will be moderated by the degree an individual identifies with their gender group, such that it is stronger for women who identify more strongly with their gender group.

Employee Voice and Silence Behaviors

Employees are full of ideas, suggestions, concerns, and opinions about work-related issues. When presented with the opportunity to speak up, referred to as a latent voice opportunity, employees can either share their voice or remain silent (Morrison, 2014; Morrison, 2023). Academics across a multitude of disciplines, including organizational behavior, industrial relations, and employment relations, study the construct of employee voice (Morrison, 2023). Due to the lack of cross-disciplinary consensus on defining employee voice, I will adopt Morrison's definition as "informal and discretionary communication of ideas, suggestions, concerns, problems, or opinions about work-related issues, with the intent to bring about improvement or change" (2023, p. 80). Morrison's (2023) definition is consistent with the dominant view of organizational behaviorists set forth by Van Dyne and LePine (1998), that employee voice behavior is discretionary, prosocial, and change-oriented. This definition

intentionally excludes content included by industrial and employment relations scholars, such as formal communication through employee suggestion systems and grievance procedures, collective communication efforts, and communication that has been solicited from employees (Morrison, 2023). Importantly, just because an employee has an idea, suggestion, concern, problem, or opinion does not mean they will voice it. Employee silence refers to "a reluctance to speak up about organizational issues or share information in an organization" (Hao et al., 2022, p. 1039). Like voice, silence is an intentional choice.

Employees are faced with many latent voice opportunities and may choose to use their voice in some instances and to remain silent in others (Sherf et al., 2021). As such, extant research predominantly focuses on the frequency in which an employee engages in employee voice or employee silence behaviors in general or over a period of time. Although almost exclusively treated as opposite ends of the same continuum, meta-analytic evidence suggests that employee voice and employee silence behaviors represent distinct constructs, differentially predicted by key antecedents (Hao et al., 2022; Sherf et al., 2021). As such, the frequency in which an employee engages in employee voice is independent of the frequency in which they engage in silence, rather than being in equal and opposite magnitude of one another.

Evidence of Construct Heterogeneity

In Sherf and colleagues (2021) meta-analysis, the authors found a weak, negative correlation between employee voice and employee silence ($\rho = -0.15$). Using Cohen's (1992) guidelines for evaluating effect sizes, Sherf and colleagues (2021) considered a

correlation of .50 or below as indicative that employee voice and employee silence are distinct constructs. To provide further evidence of construct heterogeneity, the authors investigated the relationship between two antecedents, perceived impact and psychological safety, and employee voice and employee silence using a novel theoretical framework.

As stated in the introduction section, the authors hypothesized that employee voice and employee silence would be differentially predicted by the same antecedent because the behaviors are motivated by two "functionally independent and biologically based self-regulatory systems", the behavioral activation system (BAS) and the behavioral inhibition system (BIS) respectively (p. 115). On one hand, the BAS motivates one's actions toward achieving goals toward positive change, such as constructive change in the workplace, and is triggered by positive emotional states (Sherf et al., 2021). On the other hand, the BIS motivates one's actions to avoid negative change, such as risks associated with speaking up, and is triggered by negative emotional states (Sherf et al., 2021). The authors submit that employee voice represents a response to BAS regulation, while employee silence represents a response to BIS regulation.

To investigate this phenomenon, the authors proposed that perceived impact acts as an environmental cue that triggers an individual's BAS, which in turn directs them toward employee voice behaviors, while a lack of psychological safety acts as an environmental cue that triggers an individual's BIS, which in turn directs them toward employee silence behaviors. In line with their hypotheses, the two antecedents differentially predicted employee voice and employee silence. Perceived impact related

more strongly to employee voice (β = .28) than employee silence (β = -.03) when controlling for the effect of psychological safety. Similarly, psychological safety related more strongly to employee silence (β = -.44) than employee voice (β = .14) when controlling for the effect of perceived impact. These results were subsequently replicated in a follow-up study conducted by the authors.

Sherf and colleagues (2021) empirical evidence directly challenges the assumption made by many that whatever increases employee voice decreases employee silences in equal and opposite magnitude. The findings suggest that despite sharing predictors, findings relating to employee voice cannot be readily applied to the construct of employee silence (Hao et al., 2022). With this, Sherf and colleagues (2021) shifted the overarching question from "Why are people speaking up or not?" to "Why are people speaking up" and "Why are they keeping silent?" (p. 115).

More recent meta-analytic research by Hao and colleagues (2022) provides further evidence of construct heterogeneity, and that antecedents aligned with the BAS (positive emotional states/stimuli) account for a larger proportion of explained variance in employee voice, while those aligned with the BIS (negative emotional states/stimuli) account for a larger proportion of explained variance in employee silence. For example, the author's findings indicate that antecedents aligned with the BAS such as positive affect, extraversion, proactive personality, autonomy, and leader-member exchange (LMX), accounted for a larger portion of the explained variance in employee voice behaviors. On the other hand, antecedents aligned with the BIS, such as negative affect and psychological safety, accounted for a larger proportion of explained variance in

employee silence behaviors. Though employee voice and silence may share antecedents, extant research suggests that the antecedent is more strongly related to the BAS or BIS to the degree it is associated with positive or negative emotional states or stimuli (Hao et al., 2022; Sherf et al., 2021).

Because experiencing social identity threat is inherently negative, I believe such an experience will activate the BIS and motivate individuals to avoid negative change and repercussions by staying silent. Prior research defines this form of silence as defensive or quiescent silence, which involves actively withholding voice in an act of self-preservation due to fear of retribution (Hao et al., 2022). This form of silence is a "proactive behavior intended to protect the person involved from external threats" (Hao et al., 2022), and differs from the other three forms of silence: acquiescent silence, prosocial silence, and opportunistic silence. Acquiescent silence involves passively withholding voice because an employee perceives they do not make a difference, and therefore, are unwilling to put forth the effort. Prosocial silence involves withholding voice for the benefit of others or the organization. Lastly, opportunistic silence involves strategic withholding of voice for one's own advantage while accepting others disadvantage. Extant research suggests that other negative experiences aligned with the BIS such as workplace ostracism, abusive supervision, and perceptions of organizational politics positively predict defensive/quiescent silence (Hao et al., 2022). As such, I propose the following hypothesis:

> **Hypothesis 4:** Experiencing higher levels of social identity threat will positively predict defensive/quiescent employee silence behaviors.

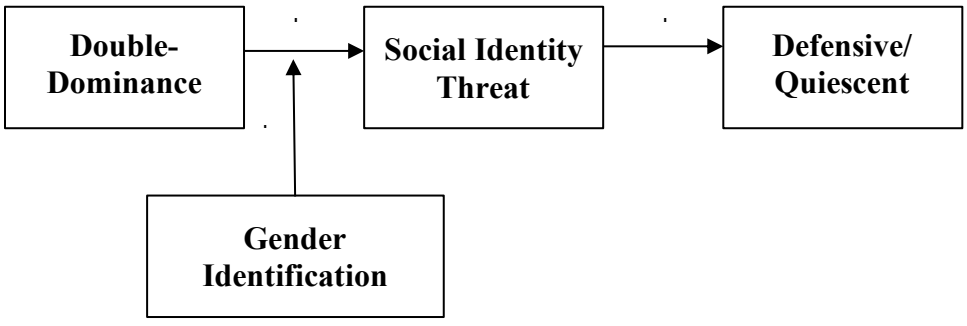
As described in the previous sections, extant literature supports the hypothesis that women subjected to double dominance will experience social identity threats, and that this relationship will be moderated by the degree an individual identifies with their gender group, such that it is stronger for women who identify more strongly with their gender group. Additionally, prior literature supports the hypothesis that negative stimuli, such as experiencing social identity threat, positively predicts employee silence behaviors. I propose the following hypotheses to tie together the aforementioned hypotheses, which are illustrated in Figure 1:

Hypothesis 5: For women, experiencing double dominance at work will positively predict defensive/quiescent silence behaviors through the experience of social identity threat.

Hypothesis 6: The indirect effect of experiencing double dominance at work for women on defensive/quiescent silence behaviors through the experience of social identity threat will be moderated by the degree an individual identifies with their gender.

Figure 1

Hypothesis 5 and Hypothesis 6 Predicted Relationships



METHOD

Participants and Procedure

This study was specifically concerned with the female work experience. Prolific, an online platform designed to help researchers obtain survey participants quickly and reliably, was used to recruit study participants to take a short, 7 minute survey. Within Prolific, participants were screened to ensure they were at least 18 years old, currently employed, and identified as a woman. Attention checks were used to ensure participants were paying sufficient attention to the survey.

Three-hundred and ninety valid responses were collected for this study. Participants were an average age of 36.51 years old and had an average occupational tenure of 8.16 years. Two-hundred and forty participants earned a Bachelor's degree, 77 earned a Master's, 34 earned a high school diploma/GED, 21 earned an Associate's, 14 earned a Doctorate, and 4 attended Trade, Technical, or Vocational Training.

Two-hundred and thirty-four participants indicated that they considered their occupation to be a STEM (science, technology, engineering, and math) occupation, while 156 did not. Eight participants indicated they work with only male colleagues, 146 work with mostly men, 112 work with an equal amount of men and women, 112 work with mostly women, and 12 work with only women colleagues.

Measures

The following measures were included in the Prolific survey alongside age and tenure, which served as control variables. Using control variables is a best practice in psychological research conducted with the purpose of describing and explaining

relationships among variables of interest (Bernerth & Aguinis, 2016). The use of control variables in statistical analysis allows researchers to "identify and isolate factors that explain and predict the phenomena of interest while controlling other relevant variables that may extraneously affect the relationships being investigated" (Bernerth & Aguinis, 2016, p. 230). Note that for all multi-item measures, scale scores were computed using the mean of the items.

Normative male dominance. Normative male dominance was measured using a single item adapted from van Veelan and colleagues (2019). Participants were asked "Would you describe your occupation as a STEM (science, technology, engineering, or math) occupation?". The wording of the question was augmented to ask about occupation rather than sector, as an individual can work in a STEM occupation and not work in a traditional STEM sector (e.g., an IT employee working for a hospitality company). Additionally, respondents were asked to indicate their occupation in an open-text box. This was done to understand if any participants worked in non-STEM occupations that happen to be male dominated, and to check if individuals accurately indicated that their occupation was a STEM occupation. This information is publicly available from the Bureau of Labor Statistics (U.S. Bureau of Labor Statistics, 2024).

Numerical male dominance. Numerical male dominance was measured using a single item taken from van Veelan and colleagues (2019). Participants were asked to think about the colleagues they worked with most frequently and to estimate the ratio of women relative to men in this group of people. Participants responded on a 5-point scale (1 = no women, only men; 2 = some women, mostly men; 3 = an equal amount of women

and men; 4 = mostly women, some men; 5 = only women, no men). Higher scores indicate a higher ratio of women relative to men, while lower scores indicate a lower ratio of women relative to men. This study did not differentiate between peers and supervisors when asking about colleagues.

Gender identification. Gender identification was measured using 4 items from Luhtanen and Crocker's (1992) importance to identity subscale from their Collective Self-Esteem Scale. The wording of these items was augmented slightly to assess the importance of one's gender group to their self-identity and to reflect that all respondents identify as a woman. The Cronbach's α for this measure was .84. Respondents were asked to respond on a 5-point Likert scale from (1) "strongly disagree" to (5) "strongly agree". Higher scores indicate higher gender identification. An example item is "Overall, being a woman has very little to do with how I feel about myself" (R).

Social identity threat. Social identity threat was measured using 5 items adopted from Pinel's (1999) Stigma Consciousness Questionnaire. The wording of these items was augmented slightly to be specific to one's gender. The Cronbach's α for this measure was .81. Respondents were asked to respond on a 5-point Likert scale from (1) "strongly disagree" to (5) "strongly agree". Higher scores indicate higher experienced social identity threat. An example item is "When interacting with men, I feel like they interpret all my behaviors in terms of the fact that I am a woman".

Employee silence. Employee silence was measured using 4 items from Knoll and van Dick's (2012) Four Forms of Employee Silence Scale to assess defensive/quiescent silence behaviors. This full scale includes four subscales to assess acquiescent,

defensive/quiescent, prosocial, and opportunistic silence. The Cronbach's α for this measure was .93. The scale was modified for individuals to indicate the extent to which they agreed with statements presented on a 5-Point Likert scale from (1) "strongly disagree" to (5) "strongly agree". Higher scores indicate a higher degree of employee silence behaviors. An example of a defensive/quiescent silence item is "I have remained silent at work because of fear of negative consequences".

Employee Voice. Employee voice was measured using 6 items from Van Dyne and LePine's (1998) Voice Behavior Scale. The Cronbach's α for this measure was .87. The scale was modified for individuals to indicate the extent to which they agreed with the statements presented on a 5-Point Likert scale from (1) "strongly disagree" to (5) "strongly agree". Higher scores indicate a higher degree of employee voice behaviors. An example of an item is "I develop and make recommendations to my supervisor concerning issues that affect my work".

Data Analysis

The data were cleaned by removing any participants who did not pass the attention check items. Using responses to the normative male dominance and numerical male dominance items, two new variables were created for hypothesis testing. The first variable, Double Dominance, was created to separate participants into two groups: those subjected to double dominance at work (n = 120) and those who are not (n = 270). Individuals were deemed to be subjected to double dominance at work if they indicated they worked in a STEM occupation (normative male dominance) and were outnumbered by male colleagues (numerical male dominance). Individuals who were deemed *not* to be

subjected to double dominance either indicated they did not work in STEM, or indicated they worked in STEM but were not outnumbered by male colleagues. This variable was used to test Hypotheses 1, 3, 4, 5, and 6.

The second variable, Work Category, was created to separate participants into four groups to understand the experience of women who experienced double dominance, exclusively normative male dominance, exclusively numerical male dominance, or no male dominance. The four categories included: STEM - Male Dominated (n = 120), STEM - Not Male Dominated (n = 114), Non-STEM - Male Dominated (n = 34), and Non-STEM - Not Male Dominated (n = 122). This variable was used to test Hypothesis 2. After this variable was created, the data were then imported into R (R Core Team, 2023) where all statistical analyses were conducted.

RESULTS

Pearson correlations were conducted between age, tenure, social identity threat, gender identification, employee silence, employee voice, and numerical male dominance (Table 1).

Table 1

Means, standard deviations, and correlations with confidence intervals

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Age	36.51	12.31							
2. Tenure	8.16	8.26	.70**						
3. Stigma Consciousness	3.29	0.87	-.17**	-.17**					
4. Gender Identification	3.56	0.87	-.07	-.03	.35**				
5. Employee Silence	2.38	1.09	-.11*	-.10	.36**	.14**			
6. Employee Voice	3.73	0.73	.15**	.09	-.16**	-.09	-.47**		
7. Numerical Male Dominance	2.93	0.93	-.08	-.09	.06	.05	-.06	.01	
8. Double Dominance	0.31	0.46	.06	.10*	.02	.01	.10	.07	-.70**

Note. $p < .05$. ** indicates $p < .01$.

Variables 3 - 6 were measured on a 5-point Likert agreement scale from strongly disagree to strongly agree. Numerical male dominance was also measured on a 5-point

scale, with higher scores indicating a higher ratio of women relative to men, while lower scores indicate a lower ratio of women relative to men. Results indicated that age was significantly correlated with four variables, tenure (.70), social identity threat (-.17), employee voice (.15) and employee silence (-.11). In addition to age, social identity threat was significantly correlated with employee silence (.36), gender identification (.35), tenure (-.17), and employee voice (-.16). Gender identification was also significantly correlated with employee silence (.14), which was significantly correlated with employee voice (-.47). For all models, Variance Inflation Factor's (VIF) were examined for all predictors, and none exceeded 5, suggesting that there was no evidence of multicollinearity.

Hypothesis Testing

To test Hypothesis 1, a linear regression was conducted using social identity threat as the outcome and double dominance as the main predictor. The overall model was significant when controlling for tenure and age, $F(3, 386) = 4.988$, $p = .002$. However, double dominance did not significantly predict social identity threat $t(386) = .810$, $p = .418$. Thus, Hypothesis 1 was not supported. A subsequent one-way analysis of variance (ANOVA) was conducted to compare the level of social identity threat among the four Work Categories while controlling for tenure and age. Although the overall model was significant $F(5, 384) = 3.607$, $p = .003$, this was attributed to adding tenure and age into the model rather than a difference in the level of social identity threat between the different Work Categories. Therefore, Hypothesis 2 was not supported.

Table 2

Descriptive Statistics for Social Identity Threat as a function of Work Category

Work Category	*M*	*SD*
Non-STEM - Male Dominated	3.28	1.03
Non-STEM - Not Male Dominated	3.35	0.85
STEM - Male Dominated	3.32	0.82
STEM - Not Male Dominated	3.19	0.88

Note. $N = 390$.

To test Hypothesis 3, a moderation analysis was conducted using social identity threat as the outcome, double dominance as the main predictor, gender identification as the moderator, and tenure and age as control variables. Although the overall model was significant $F(5, 384) = 14.43$, $p < .001$, the test on the interaction term was not statistically significant $F(1,384) = 2.483$, $p = .116$. Therefore, Hypothesis 3 was not supported.

To test Hypothesis 4, a second linear regression was conducted using employee silence behaviors as the outcome variable and social identity threat as the predictor variable. When controlling for tenure and age, the overall model was significant, $F(3, 386) = 19.98$, $p < .001$. Social identity threat specifically predicted employee silence behaviors ($B = .45$, $p < .001$), while tenure ($B = .001$, $p = .949$) and age ($B = -.004$, $p = .399$) did not. Thus, Hypothesis 4 was supported.

Using the mediation package, a mediation analysis was conducted to test Hypothesis 5 using employee silence behaviors as the outcome variable, double dominance as the main predictor variable, and social identity threat as the mediator. Controlling for tenure and age, the bootstrapped unstandardized indirect effect was .03, and the 95% confidence interval ranged from -.04 to .12. The model shows the indirect

effect of social identity threat on the relationship between double dominance and employee silence was not significant (ACME = .03, p = .34). Thus, Hypothesis 5 was not supported. A moderated mediation was conducted to test Hypothesis 6, using the same variables as the prior analysis while adding in gender identification as a moderator. When adding in gender identification as a moderator and controlling for tenure and age, the bootstrapped unstandardized indirect effect was .03, and the 95% confidence interval ranged from -.04 to .11. The model shows the indirect effect of social identity threat on the relationship between double dominance and employee silence was not significant (ACME = .03, p = .40). Thus, Hypothesis 6 was not supported.

Supplementary Analyses

The lack of support for most of the tested hypotheses prompted further questions. This study found that experiencing social identity threat was not related to participant work environment when assessing combinations of exposure/non-exposure to normative male dominance and numerical male dominance. To test if normative male dominance or numerical male dominance independently predicted social identity threat, two subsequent linear regressions were conducted using the former two variables as outcomes and the latter variable as the predictor variable. When controlling for tenure and age, both the model for normative male dominance, $F(3, 386) = 5.07$, p = .002, and the model for numerical male dominance, $F(3, 386) = 4.973$, p = .002, were statistically significant. However, neither normative male dominance $t(386) = .944$, p = .346, nor numerical male dominance, $t(386) = .782$, p = .434, independently predicted experiencing social identity threat in their respective models.

No hypothesis investigated whether being subjected to double dominance had a direct effect on employee silence behaviors. A linear regression analysis was conducted using employee silence behaviors as the outcome variable and double dominance as the predictor variable. Controlling for tenure and age, the model was significant, $F(3, 386) = 3.324$, $p = .02$. Double dominance specifically predicted employee silence behaviors ($B = .26$, $p = .03$), while tenure ($B = -.01$, $p = .52$) and age ($B = -.01$, $p = .20$) did not. While social identity threat does not mediate this relationship as hypothesized (Hypothesis 5), this supplementary analysis suggests being subjected to double dominance at work predicts employee silence behaviors agnostic of experiencing social identity threat.

Extant research (Kaiser & Hagiwara, 2011; Schmader, 2002; van Veelan et al., 2019) suggests that gender identification positively predicts social identity threat. A linear regression was conducted using social identity threat as the outcome variable and gender identification as the predictor variable. Controlling for tenure and age, the model was statistically significant, $F(3, 386) = 22.96$, $p < .001$. Gender identification specifically significantly predicted experiencing social identity threat ($B = .34$, $p < .001$), while tenure ($B = -.01$, $p = .08$) and age ($B = -.004$, $p = .30$) did not. Recall, Hypothesis 4 found a significant, positive relationship between experiencing social identity threat and employee silence behaviors. An additional mediation analysis was conducted using employee silence behaviors as the outcome variable, gender identification as the main predictor variable, and social identity threat as the mediator to tie together the established relationships from this study. Controlling for tenure and age, the mediation model shows a significant indirect effect of social identity threat on the relationship between gender

identification and employee silence, (ACME = .15, $p < .001$), no direct effect (ADE = .02, $p = .76$), and a significant total effect (Total Effect = .17, $p = .004$). As indicated, the bootstrapped unstandardized indirect effect was .15, and the 95% confidence interval ranged from .10 to .22. Although there is a lack of consensus over an effect size associated with an indirect effect, the proportion of the effect of gender identification on employee silence behaviors that goes through the mediator of experiencing social identity threat is .86 ($p = .004$). Thus, experiencing social identity threat mediates the relationship between gender identification and employee silence behaviors.

Lastly, a linear regression was conducted using employee voice behaviors as the outcome variable and social identity threat as the main predictor variable. When controlling for age and tenure, the model was statistically significant $F(3, 386) = 5.557$, $p = .001$. Social identity threat specifically significantly predicted employee voice behaviors ($B = -.12$, $p = .006$). Recall that experiencing social identity threat specifically predicted employee silence behaviors ($B = .45$, $p < .001$), demonstrating that experiencing social identity threat more strongly predicts employee silence. These results are in line with Sherf and colleagues (2021) novel framework for predicting employee voice and silence behaviors.

DISCUSSION

The present study aimed to validate prior research findings, which found a significant, positive relationship between being subjected to double dominance at work and experiencing social identity threat (Hall et al., 2015, 2018; van Veelan et al., 2019). This study failed to find a relationship between double dominance and experiencing social identity threat. Additionally, gender identification did not moderate this relationship as seen in extant research (van Veelan et al., 2019). However, gender identification positively predicted experiencing social identity threat ($B = .34$, $p < .001$), suggesting that participants who more strongly identify with being a woman experience more social identity threat. This is in line with prior findings (Kaiser & Hagiwara, 2011; Schmader, 2002; van Veelan et al., 2019).

The present study also sought to extend prior research by attempting to understand the relationship between double dominance, social identity threat, and employee silence behaviors, a well-studied outcome of experiencing negative stimuli in the workplace (Sherf et al., 2021; Hao et al., 2022). The findings suggest that both being subjected to double dominance ($B = .26$, $p = .03$) and experiencing social identity threat positively predict employee silence behaviors ($B = .45$, $p <. 001$). However, social identity threat does not mediate the relationship between double dominance and employee silence as hypothesized. Thus, participants subjected to double dominance at work were more likely to engage in employee silence behaviors, however, this was not due to experiencing social identity threat.

Extending prior research, this study also found that experiencing social identity threat mediated the relationship between gender identification and employee silence behaviors. This suggests that gender identification predicts experiencing social identity threat, which in turn predicts employee silence behaviors. Understanding what spurs employee silence behaviors important, as extant research associates employee silence with negative impacts to individual well-being, job attitudes, and performance-related outcomes such as burnout, stress, turnover intentions, job withdrawal, and deviant behavior (Hao et al., 2022).

Lastly, the present study sought to test Sherf and colleagues (2021) theoretical framework for predicting employee voice and silence behaviors. Supplementary analysis lends support for the authors proposition that exposure to negative stimuli, such as experiencing social identity threat, triggers a behavioral inhibition response in the form of employee silence. Moreover, it was found that experiencing social identity threat predicted employee silence more strongly than employee voice, in line with Sherf and colleagues (2021) findings. Social identity threat has never been explored in this model prior to this study.

Practical Implications

The present study has several practical implications. First, the findings suggest that experiencing double dominance at work spurs defensive/quiescent employee silence behaviors. Just because these women may not be more likely to experience social identity threat, the findings suggest that experiencing double dominance may act as a negative stimulus. Leaders on teams with women subjected to double dominance should ensure

that team members know there are no repercussions for speaking up when opportunities present themselves and encourage these individuals to use their voice. Second, employees who more strongly identify with their gender are more likely to experience social identity threats and subsequently demonstrate employee silence behaviors. As described in a prior section, gender-based stereotypes may be made salient to women through contextual and situational cues such as interactions that signal a lack of acceptance (Hall et al., 2015, 2018), which induces the experience of social identity threat. Organizations should celebrate all identities and the value provided by persons of all backgrounds to alleviate any concerns that certain identities are not valued.

Limitations

The present study has several limitations. First, the present study relied completely on self-report measures. Prior research suggests that research participants want to respond to survey questions in a way that makes them look good and tend to underreport behaviors that they believe seem inappropriate to researchers while overreporting seemingly appropriate behaviors (Donaldson & Grant-Vallone, 2002). Experiencing social identity threat or exhibiting defensive/quiescent employee silence behaviors are negative in nature and may have been seen as inappropriate to participants resulting in underreporting. Similarly, exhibiting employee voice behaviors is positive in nature, and participants may have overreported their tendency to speak up at work.

Second, the present study relied on individuals to indicate whether they characterized their occupation as a STEM (Science, Technology, Engineering, or Math) occupation. Individuals within the same occupation sometimes held different opinions on

whether they felt their occupation qualified as a STEM occupation. For example, some nurses indicated they worked in STEM, while others did not. Unfortunately, this could not be corrected by consulting the Bureau of Labor Statistics (2024) list of STEM occupations, as most participants used simple descriptions of their occupation (e.g., writing "nurse" rather than "Nurse Anesthetist" or "Certified Nurse Assistant"), making it hard to determine whether they truly worked in a STEM occupation. This could have impacted the integrity of the sub-groups within the study, as some participants may have erroneously been put in the wrong category when creating the Double Dominance and Work Category variables. This could have impacted the results, which were largely insignificant. Additionally, the present study limited its definition of double dominance to encompass women in STEM and no other occupations characterized by a culture of normative male dominance (e.g., finance or manufacturing occupations). The simple descriptions given by participants made it difficult to ascertain an exact number of participants working in occupations outside of STEM that are characterized by normative male dominance.

Lastly, the present study was cross-sectional and non-experimental, limiting any ability to make valid mediation inferences among the variables studied (Rosopa & Stone-Romero, 2008). All variables were collected simultaneously, and thus does not provide evidence of true, causal connections. Rather, the relationship is assumed. Additionally, the lack of random assignment presents cause for concern, as there was no method of ensuring there were no systematic differences between groups.

Research Implications and Future Directions

The present study appears to be the first to test the relationship between experiencing social identity threat and employee silence behaviors. Futhermore, the present study appears to be the first singe study to test and provide support for Sherf and colleagues (2021) theoretical framework for predicting employee voice and employee silence behaviors. The only other known study to use this framework is Hao and colleagues (2022) meta-analysis. Future research could continue to investigate unexplored relationships between positive and negative organizational stimuli and employee voice and silence behaviors utilizing Sherf and colleagues (2021) framework.

Future researchers may consider expanding the definition of double dominance to include occupations outside of STEM that are characterized by a culture of normative male dominance (e.g., financial or manufacturing roles). Another important consideration for future research is how the increase in remote work arrangements may reduce the salience of being a minority group member. The inability to see colleagues face-to-face may make it harder to conceptualized how outnumbered someone is in a group. As the saying goes, out of sight, out of mind.

Conclusion

The present study provides important insight into how social identity threat impacts employee silence behaviors, while also providing empirical support for Sherf and colleagues (2021) novel framework for predicting employee voice and silence behaviors. Additionally, the present study bolsters support for the link between the degree one identifies with their gender group and experiencing social identity threats. Although

double dominance did not predict experiencing social identity threat in the present study, findings provide insight into its relationship with employee silence, opening the door for future research into other psychological factors at play surrounding double dominance and employee silence.

APPENDICES

Appendix A

5 Item Stigma Consciousness Scale (Pinel, 1999)

5-point Likert Scale from 1 (“strongly disagree”) to 5 (“strongly agree”)

1. Stereotypes about women have not affected me personally. R
2. I never worry that my behaviors will be viewed as stereotypically female. R
3. When interacting with men, I feel like they interpret all my behaviors in terms of the fact that I am a woman.
4. My being female does not influence how men act with me. R
5. I almost never think about the fact that I am female when interacting with men. R.

Appendix B

4 Item Gender Identification Scale (Luhtanen & Crocker, 1992)

5-point Likert Scale from 1 (“strongly disagree”) to 5 (“strongly agree”)

1. Overall, being a woman has very little to do with how I feel about myself. R.
2. Being a woman is an important reflection of who I am.
3. Being a woman is unimportant to what kind of person I am. R.
4. In general, being a woman is an important part of my self-image.

Appendix C

Four Forms of Employee Silence Scale (Knoll & van Dick, 2012)

5-point Likert Scale from 1 (“strongly disagree”) to 5 (“strongly agree”)

Quiescent Silence

1. I remained silent at work because of fear of negative consequences.
2. I remained silent at work because I fear disadvantages from speaking up.
3. I remained silent at work to not make me vulnerable in the face of colleagues or superiors.

Appendix D

Voice Behavior Scale (Van Dyne & Lepine, 1998)

5-point Likert Scale from 1 (“strongly disagree”) to 5 (“strongly agree”)

1. I develop and make recommendations to my supervisor concerning issues that affect my work.
2. I speak up and encourage others in my work unit to get involved in issues that affect our work.
3. I communicate my opinions about work issues to others in my work unit, even if their opinions are different and they disagree with me.
4. I keep well informed about issues at work where my opinion can be useful.
5. I get involved in issues that affect the quality of life in my work unit.
6. I speak up to my supervisor with ideas for new projects or changes in procedures at work.

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