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Explaining the gender gap in negotiation performance: Social network ties outweigh internal barriers

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Abstract

Gender disparities in negotiation outcomes contribute to inequality in the workplace and beyond. Explanations of gender gaps in negotiation often focus on internal barriers women face as a consequence of contending with stigma in the workplace and other historically male-dominated environments, such as stereotype threat and apprehension about negotiating. However, stigma is also associated with relational consequences that may influence success in negotiations. This research compared internal and relational mechanisms for gender disparities in negotiation performance. Seventy-seven MBA executives reported their apprehension about negotiating, stereotype threat in negotiations, mindset about negotiation-related stress, and class social networks. Participants were then randomly paired to complete a series of one-on-one negotiations based on real-world scenarios. Overall, men outperformed women in negotiations. Significant gender differences emerged in stereotype threat, stress mindset, and social network centrality. However, only network centrality—specifically number and strength of ties—significantly mediated the relationship between gender and negotiation performance. Position in informal social networks may play an important role in negotiation outcomes,

particularly in a shared social environment like the workplace. Although efforts to explain the gender gap in negotiation performance often center internal psychological mechanisms, this research suggests that relational explanations, such as disparities in social networks, merit further attention. Limitations and recommendations for future research and policy are discussed.

INTRODUCTION

Negotiating is critical to professional and personal advancement. Negotiations in the workplace are particularly important in shaping one's career and quality of life, whether negotiating with higher ups over compensation, promotion, and benefits, or with team members over project direction, day-to-day management, and resource allocation. However, the bargaining table can also be a barrier to advancement for socially stigmatized groups. Decades of research suggest that women fare worse in negotiations than men: From negotiating salary to the price of a car, women receive fewer returns from negotiation on average, ultimately earning less and paying more (Ayres, 1990; Gerhart & Rynes, 1991; Mazei et al., 2015; Stuhlmacher & Walters, 1999). Over time, these differences in outcomes of individual negotiations can accumulate into substantial gaps in compensation, promotion, and opportunity, reinforcing inequality in the workplace and beyond (Bowles et al., 2005; Gerhart & Rynes, 1991; Sturm, 2009).

Explanations for gender gaps in negotiation performance have largely centered on women's internal thoughts, beliefs, and feelings about negotiating. These explanations suggest that, whether due to gender differences in socialization or women's experiences of stigma in historically male-dominated contexts like the workplace, women experience internal barriers to negotiation success. For example, prior work has suggested that women achieve worse negotiation outcomes because they are more apprehensive about asking for what they want (Babcock & Laschever, 2009). Other work suggests that women's experience of stereotype threat at the bargaining table, including worries about being judged through the lens of gender stereotypes (e.g., being perceived as weak, emotional, or ineffective), undermines their negotiation performance (Kray et al., 2001). Popular media has similarly focused on women's internal barriers to success in negotiation and professional advancement, encouraging women to "lean in" to overcome their fears and insecurities about asserting themselves in the workplace (Sandberg, 2013).

In this research, we compared these types of internally-focused explanations for the gender gap in negotiations to a potential relational mechanism: negotiators' positions in informal social networks. In doing so, we move outside women's minds to examine how disparities in social connectedness may shape negotiation performance, broadening focus from the intrapersonal consequences of gender stigma in the workplace to also consider its possible interpersonal manifestations (Doyle & Barreto, 2022). We examined this comparison in the context of negotiation with others in a shared social environment, where negotiators are members of the same network (e.g., workplace negotiations about promotion, work assignments, or internal resource allocation). This type of negotiation is growing in both prevalence and importance as companies increasingly transition from traditional top-down hierarchal organizational structures to flatter

"agile" structures, where employees are grouped into self-governing teams that negotiate project direction and management amongst themselves (Aghina et al., 2017).

Specifically, we tested three potential internal mechanisms of the gender gap in negotiations, two of which have gained traction in the literature: women's apprehension about negotiating (e.g., Babcock & Laschever, 2009) and stereotype threat in negotiations (e.g., Kray et al., 2001). We also examined men and women's mindset about stress related to negotiating, specifically beliefs about whether stress related to negotiating is helpful or harmful for performance (Crum et al., 2013), as a third internal mechanism. Finally, for the relational mechanism of negotiators' positions in social networks, we examined men's and women's network centrality. We briefly review the evidence for each of these four potential mechanisms below.

Apprehension about negotiating

A common explanation for the gender gap in negotiations is that women are more apprehensive about negotiating than men. In prior research, women have reported greater anxiety, discomfort, and nervousness about negotiating (Babcock et al., 2006; Bowles et al., 2005; Guthrie et al., 2009). In other studies, women selected adjectives like "scary" and metaphors like "going to the dentist" to describe negotiating, whereas men more often chose adjectives like "exciting" and "fun," and metaphors like "wrestling match" or "winning a ballgame" (Babcock et al., 2006; Babcock & Laschever, 2009; Gelfand & McCusker, 2004). In turn, this apprehension may lead women to ask for less in negotiations or not to initiate negotiations at all (Babcock et al., 2006). Many popular books have thus encouraged women to push past their apprehension to negotiate and ask for more at work (Babcock & Laschever, 2009; Frankel, 2014; Sandberg, 2013).

Women may be more apprehensive than men about negotiating for several reasons. Women may generally feel more apprehensive about engaging in competition, less confident about their ability to perform well in competitive tasks, and less confident about their negotiation ability in particular (Babcock et al., 2006). Women may also be more concerned than men about how negotiating will affect their relationships (Gelfand et al., 2006; Greig, 2010). This greater apprehension may reflect that women tend to be socialized to be more relationally oriented than men (Kray & Thompson, 2005) and that women contend with social stigma in negotiation, including a greater likelihood of facing social backlash for negotiating due to violation of gender norm expectations (Amanatullah & Morris, 2010; Bowles et al., 2007).

Stereotype threat

Women are stereotyped as less effective at negotiating than men, in part due to overlap between gender stereotypes and traits that are valued in negotiations (Kray et al., 2001; Kray & Thompson, 2005). Gender stereotypes associate women with being weak, submissive, accommodating, and emotional—characteristics that are also associated with being an *ineffective* negotiator (Kray & Thompson, 2005). In contrast, gender stereotypes associate men with being strong, dominant, assertive, and rational—characteristics that are associated with being an *effective* negotiator. This overlap creates an implicit link whereby women are viewed as less effective negotiators than men (Kray & Thompson, 2005). People tend to believe that men are more likely to perform better in negotiations than women (Kray et al., 2001). When asked why they thought men would come out ahead, participants relied on gender stereotypes: They cited men's greater assertiveness, strength,

and firmness, compared to women's tendency to be emotional and accommodating (Kray et al., 2001).

In turn, these negative stereotypes about women's ability to negotiate may undermine women's performance in negotiations through stereotype threat. Stereotype threat occurs when stigmatized group members worry that they could inadvertently confirm or be judged through the lens of negative stereotypes during stereotype-relevant tasks (Steele, 1997). These concerns, while situationally driven, can manifest internally through increased stress, depleted cognitive resources, and reduced performance expectations, and can impair performance as a result (Beilock et al., 2006, 2007; Croizet et al., 2004; Johns et al., 2008; Schmader & Johns, 2003; Steele, 1997). For example, activation of stereotypes that Black Americans have low intellectual ability, women have low mathematical ability or poor driving skills, and older individuals have poor memory can impair the performance of these groups on tests framed as diagnostic of these respective abilities (Mazerolle et al., 2012; Nguyen & Ryan, 2008; Walton & Spencer, 2009; Yeung & von Hippel, 2008).[1] Researchers have observed similar patterns among female negotiators. For example, women performed worse (i.e., gained less profit in dollars) than men in a negotiation when told that performance was diagnostic of their negotiating skills, but not when the negotiation was framed as non-diagnostic (Kray et al., 2001). Similarly, when gender stereotypes were activated by telling participants that negotiators who are rational and assertive perform better than negotiators who are accommodating or emotional, or when existing gender stereotypes of negotiating ability were not explicitly negated, women also performed worse than men (Kray et al., 2001, 2002). This work suggests that stereotype threat at the bargaining table may at least in part explain gender gaps in negotiation performance (Kray & Thompson, 2005).

Stress mindset

Many negotiators, regardless of gender, experience "nerves," or heightened physiological arousal, before and during negotiations (Brooks & Schweitzer, 2011; Brown & Curhan, 2013). This arousal can have different effects on negotiation performance depending on how it is interpreted by the negotiator. For example, research has shown that when negotiators felt negatively about negotiating, they were more likely to interpret their pounding hearts and sweating palms as negative affect (e.g., dread, nervousness); in contrast, when negotiators felt positively about negotiating, they were more likely to interpret their arousal as positive affect (e.g., excitement, enthusiasm; Brown & Curhan, 2013). In turn, these attributions about arousal predicted negotiation outcomes: Negotiators who interpreted their arousal positively gained more objective and subjective value in negotiations than those who interpreted their arousal negatively. Similarly, negotiators who appraised the stressor of an upcoming negotiation as threatening reached lower quality deals

[1] Notably, debates have emerged regarding the present-day replicability of stereotype threat effects. Some suggest that recent replication failures (e.g., Flore et al., 2018) do not threaten the robustness of decades of stereotype threat research (Spencer et al., 2016), others suggest that these failures bring to light methodological issues that have been rampant in stereotype threat research all along (Stoet & Geary, 2012), and still others suggest that these recent failures may arise from changes in social context (e.g., reductions in societal stereotypes about women in STEM, given that most recent replication failures have concerned stereotype threat among this group; Lewis & Michalak, 2019). Meta-analyses of published and unpublished studies generally find significant stereotype threat effects, with inconsistent evidence on the existence and influence of publication bias (Flore & Wicherts, 2015; Ryan & Nguyen, 2017; Zigerell, 2017). We are not aware of research challenging the role of stereotype threat among women in negotiations in particular, but readers may wish to keep in mind the ongoing debates about stereotype threat more broadly.

than those who appraised the same upcoming negotiation as a challenge (O'Connor et al., 2010). Finally, when negotiators were told that experiencing anxiety while negotiating could be beneficial to their performance, increases in cortisol (a physiological indicator of stress) during the negotiation were positively associated with negotiation performance (Akinola et al., 2016). In contrast, cortisol increases were negatively associated with performance among negotiators who were not encouraged to appraise their negotiation anxiety as beneficial.

Together, this research suggests that viewing stress and arousal related to negotiating in a positive light may enhance negotiation performance, while construing the same stress and arousal as negative may undermine negotiation performance. These findings dovetail with the more general theory of *stress mindset*, which suggests that when people believe that stress enhances performance, productivity, and growth (a "stress-is-enhancing" mindset), they are more likely to experience positive cognitive outcomes, affect, and performance under stress than when they believe that stress is debilitating (a "stress-is-debilitating" mindset; Crum et al., 2013). For example, in workplace settings, employees who have stress-is-enhancing mindsets (either naturally or induced via experimental manipulation) show better task performance and greater engagement, focus, vigor, and generation of new ideas than those with stress-is-debilitating mindsets (Casper et al., 2017; Crum, 2011).

Initial evidence suggests that men and women may hold diverging stress mindsets about negotiation, such that men may be more likely to view stress related to negotiating as enhancing whereas women may be more likely to view stress related to negotiating as debilitating. In a prior study, men were more likely to interpret physiological arousal they experienced before negotiations as excitement, whereas women were more likely to interpret this arousal as anxiety (Brooks & Schweitzer, 2011). Such gender differences in beliefs about stress related to negotiating could contribute to gender gaps in negotiation performance, even without underlying differences in how stressful men and women perceive negotiating to be.

Social network position

Social networks represent the social ties among members of a group. Group members each hold a position within the network, indicating how socially involved, or "central," they are in the group. Central individuals are highly socially involved, such as having many friends or being a "social hub" who connects many others in the group together, whereas more peripheral individuals are less involved and well-connected. Much research has found that holding central positions in informal social networks is advantageous, independent of formal position (e.g., job position in a workplace hierarchy). For example, individuals who hold central positions in social networks tend to perform better than those who hold more peripheral social positions on a variety of metrics, including general performance (e.g., job performance: Mehra et al., 2001; Sparrowe et al., 2001; business school and college grades: Baldwin et al., 1997; Stadtfeld et al., 2019), leadership (Moolenaar et al., 2010), and innovation (Obstfeld, 2005).

Although there are several potential mechanisms by which network centrality may enhance performance, we highlight three that are especially relevant to negotiation in shared environments. First, having maximal information is critical to achieving the best result in negotiations (Rubin & Brown, 1975; Thompson et al., 1995; Van Boven & Thompson, 2003), and network centrality may provide access to information through social ties (Borgatti & Foster, 2003; Haythornthwaite, 1996). For example, individuals who have many (vs. few) friends at work may be able to find out more information about coworkers' salaries and promotions, helping them

determine when to initiate negotiations and how much to ask for—information that can greatly improve negotiation outcomes (Loschelder et al., 2016). Additionally, these highly connected individuals may gain a greater understanding of coworkers' and supervisors' norms, values, and priorities through their relationships, which may allow them to negotiate more effectively (Thompson et al., 1995). In contrast, people with few social ties may have less access to these types of advantageous information, limiting their ability to make informed asks and cater their negotiation approach to what they know the individual or organization across the table would find persuasive.

Second, aside from actual advantages their positions may afford them, such as more information, people who hold central positions in networks are often *perceived* as more influential, powerful, and competent (Brass, 1984; Brass & Burkhardt, 1993; Kilduff & Krackhardt, 1994). This greater perceived power could give them an advantage in negotiations with individuals who are aware of their social position (Kim et al., 2005). For example, a negotiation between two team members about the direction of a project or how to allocate resources may tilt toward the team member who is highly connected in the workplace social network, because they are perceived as more powerful or competent than the team member that holds a more peripheral social position.

Finally, having many social ties is thought to reduce an individuals' dependency on any one relationship, giving central individuals greater freedom to act assertively with less concern about how that assertion will affect a particular relationship (Brass & Burkhardt, 1993). Even if a central individual experiences backlash that damages one relationship, they have others that they can still rely on. Recent research shows that this affordance provided by network centrality may reduce central individuals' sense of professional and social risk, as well as encourage more assertive behavior (e.g., confronting sexism; Brands & Rattan, 2020). Network centrality could similarly reduce concern about social consequences in negotiation, affording more assertive negotiating tactics.

Given these links between network centrality and negotiation success, findings that members of stigmatized groups frequently hold less central network positions than members of dominant groups (for a review, see Ibarra & Deshpande, 2007) suggest a possible relational mechanism conferring disadvantage to stigmatized groups in negotiation. Research on gender differences in network centrality suggests that women often hold less central positions than men in informal social networks in workplaces (Fang et al., 2020; Ibarra, 1992; McGuire, 2000, 2002; Singh et al., 2010) and related settings (e.g., graduate programs in historically male-dominated fields; Stockard et al., 2021). In turn, several researchers have theorized that gender disparities in social network positions may partially explain gender gaps in negotiation performance, primarily focusing on differential access to information and social capital as mechanisms (Babcock & Laschever, 2009; Belliveau, 2005; Kolb, 2009; Small et al., 2007). Although this idea has not been empirically tested to our knowledge, one study showed that racial disparities in salary negotiations were largely explained by racial minority group members' fewer social ties to the organization relative to majority group members (Seidel et al., 2000). This finding supports the idea that disparities in social network positions between stigmatized and dominant groups may contribute to divergent negotiation outcomes.

Overview of current study

In the current study, we compared the negotiation performance of men and women in an MBA managerial negotiations class. This sample provided a number of advantages for testing our

research questions, including that all participants had prior work and negotiation experience and were motivated to perform well on negotiations. Most importantly, the course offered an opportunity to study negotiations within a shared social environment, as in a workplace, without the potential confounding effects of a formal workplace hierarchy. Participants completed a series of one-on-one negotiations based on real-world scenarios (e.g., determining a compensation package, negotiating a business deal), allowing for overall relative performance to be calculated across multiple negotiations and match ups.

Our objectives were threefold. First, we compared the negotiation performance of men and women. We expected to replicate prior findings suggesting that women underperform relative to men. Second, we examined gender differences in apprehension about negotiating, stereotype threat, negotiation stress mindset, and social network centrality. Prior work suggested that, compared to men, women would report greater apprehension about negotiating and greater concern about being perceived in line with gender stereotypes in negotiation. We also expected that women would believe that negotiating stress was more debilitating (vs. enhancing) and hold less central positions in the MBA class social network relative to men, given the research reviewed above.

Finally, we examined whether these four constructs predicted negotiation performance, and the extent to which these variables explained the gender gap in negotiation performance, if a gap emerged. We expected that apprehension about negotiating and stereotype threat would be negatively associated with negotiation performance, while negotiation stress-is-enhancing mindsets and social network centrality would be positively related to performance. We also examined whether social network centrality predicted negotiation performance over and above personality traits indicating general sociality, given that social orientations (e.g., extraversion, agreeableness) could influence both social network centrality and negotiation performance. We next examined each of the four constructs as a mediator of the relationship between gender and performance in both separate and simultaneous mediation analyses to compare their explanatory value. All data, materials, and code are publicly available in an Open Science Foundation repository (https://osf.io/q9bx3/).

METHODS

Participants

Of 80 MBA students enrolled in a managerial negotiations course at an elite private U.S. business school, 77 volunteered to participate in this research (96.3% participation; aged 23–37 with four participants not reporting age, M_{age} = 28.53 years; 32 women, 45 men, none of whom identified as transgender; 16 Asian, 12 Latinx, 45 White, 4 Multiracial).[2] The three most common industries in which participants were employed before (and sometimes during) business school were consulting (n = 24), banking and finance (n = 17), and communications and media (n = 6).

[2] The demographics of the sample were closely representative of the demographics of the business school, with the exception that there were no Black students in the sample and there were proportionally more Latinx students in the sample compared to in the MBA program (see Supplementary material for comparison between sample and MBA program demographics).

TABLE 1 Sample size and, where applicable, model fit statistics from confirmatory factor analysis for study measures (calculated using "lavaan" R package version .6–7)

	n (n_{men})	χ^2	$p_{\chi 2}$	RMSEA	p_{RMSEA}	CFI	SRMR
Apprehension about negotiating	75 (44)	8.334	.139	.094	.219	.989	.022
Stereotype threat concerns[a]	76 (45)	–	–	–	–	–	–
Negotiation stress mindset	60 (34)	21.833	.350	.039	.524	.990	.051
Network centrality measures	77 (45)	–	–	–	–	–	–
Ten-item personality inventory	77 (45)	15.621	.926	.000	.976	1.000	.058

Note: Thresholds to determine acceptable fit were $p \geq .05$ for χ^2 and RMSEA (failing to reject hypotheses of perfect fit and RMSEA $\leq .05$), CFI > .90, and SRMR < .10.

[a]Model fit indices could not be computed as the model was just identified with only three items. However, evidence suggested a single factor model was a better fit for the remaining three items (AIC = 819.779) than for the original four items (AIC = 1115.761).

Procedure

The present research was integrated unobtrusively into existing course procedures. As a standard part of the 12-week course, students completed questionnaires shortly before the course began and during the first, fifth, and penultimate weeks of the course. These four questionnaires included a variety of measures pertinent to the course, such as conflict styles and approach to negotiating, the results of which were shared with students and used as educational tools in the class. Measures relevant to the present research, described below, were added to the first, second, and third questionnaires (with the majority added to the first and second). The questionnaires had 97.4%, 100%, and 77.9% completion rates, respectively. All analyses were conducted using pairwise deletion to maximize sample size (see Table 1 for sample sizes by measure). Correlations between all measures are reported in the Supplementary materials (Table S5).

In addition to completing questionnaires, students participated in five one-on-one negotiations with randomly assigned classmates in the first half of the course. For each negotiation, members of each pair were randomly assigned to negotiate one side of the deal. For example, students took on the roles of a senior manager versus employee to negotiate a compensation package, a buyer versus seller to negotiate the price of a car, and an owner of a small business versus an account manager of an advertising agency to negotiate the cost of an advertising campaign. Each member of the pair received private instructions detailing their sides' finances and goals, such as the highest amount they could afford to pay or accept.

Based on the information provided to each member of the pair, each negotiation had a "zone of possible agreement," or bargaining range, within which both negotiators could agree upon an amount. For example, in the compensation negotiation, if the senior manager knew that the highest salary the company was willing to pay was $95,000 and the employee knew the lowest salary they were willing to accept was $85,000, the zone of possible agreement was between $85,000 and $95,000—a range of $10,000 dollars that could be negotiated. This range was unknown to participants, because each received only their own instructions.

Using this zone of possible agreement and the final amount negotiators agreed to, the winner of each negotiation was determined based on the share of the zone of possible agreement claimed by each negotiator in the pair. For example, if the senior manager and employee agreed to a salary of $90,000, the negotiation was a tie because both sides claimed $5000 of the zone of possible agreement. If instead the decided salary was $88,000, the senior manager won because they claimed

$7000 of the zone of possible agreement, whereas the employee claimed only $3000. The results of each of the five negotiations were determined using this procedure.

Measures

Negotiation performance

Using the recorded information about wins, losses, and ties in each paired negotiation, we calculated relative scores of overall negotiation performance using David's scores (David, 1987; Gammell et al., 2003). In this context, David's scores reflect the overall success of a particular student at winning negotiations relative to the success of other students. Scores are calculated by first determining the dyadic proportion of wins and losses for each student *i* in negotiations with another student *j*. Each student's wins and losses are then summed and weighted by the proportion of wins and losses of their opponents. Through this procedure, David's scores take into account the strength of the negotiation partner when calculating ratings of negotiation performance (e.g., losing a negotiation to an opponent who has won 90% of negotiations damages a student's rating less than if they lose to an opponent who has won only 20% of negotiations). A David's score below 0 represents a negotiator who loses more than they win against the average opponent, whereas a score above 0 represents a negotiator who wins more than they lose against the average opponent. By using this rating procedure as opposed to, for example, pure value claimed, we were able to account for differences across the multiple negotiations (e.g., some negotiations had a much larger zone of possible agreement and therefore more potential value to claim than others), as well as interdependencies in negotiation outcomes (e.g., in the compensation example above, if one partner claims $3000, the other necessarily claims $7000). We calculated David's scores using the 'compete' package in R (Curley, 2016).

Apprehension about negotiating

Immediately before the course began, we measured apprehension about negotiating using the Apprehension subscale of the Propensity to Initiate Negotiations scale (Babcock et al., 2006). Participants responded to five items such as "I feel anxious when I have to ask for something I want" on a scale from 1 = *Strongly disagree* to 7 = *Strongly agree*. Internal consistency of these items was excellent ($\alpha = .93$) and confirmatory factor analysis suggested that a single factor was a good fit for the five items as expected (see Table 1 for all model fit indices).

Stereotype threat concerns

We operationalized stereotype threat as the extent to which negotiators were concerned about others perceiving them as meek and ineffective, in line with stereotypes of women at the bargaining table. We measured these concerns in the first week of the term with three items: "I worry that I will not be taken seriously in negotiations," "I worry that people will not see me as an effective

negotiator," and "I worry that I will be perceived as too nice or meek in negotiations."[3] Participants rated their agreement with these items from 1 = *Strongly disagree* to 7 = *Strongly agree*. The items had good internal consistency ($\alpha = .80$).

Negotiation stress mindset

We measured the extent to which participants felt that experiencing stress related to negotiating was enhancing or debilitating using the Stress Mindset Measure–Specific scale (Crum et al., 2013) during the fifth week of the term. First, participants were asked in a single item to indicate the degree to which they found negotiating stressful (1 = *Not at all stressful*, 5 = *Extremely stressful*). Next, participants were asked to indicate agreement with eight statements about their beliefs that this stress was either enhancing (e.g., "experiencing this stress enhances my performance and productivity") or debilitating (e.g., "experiencing this stress debilitates my performance and productivity") on a scale from 1 = *Strongly disagree* to 5 = *Strongly agree*. The four items reflecting a "stress-is-debilitating" mindset were reverse-coded, such that higher values of stress mindset indicated greater belief that stress related to negotiating was enhancing. Internal consistency was good ($\alpha = .88$) and a single factor was a good fit for the eight items as expected.

Social network centrality

To assess students' friendship network in the managerial negotiations course, participants listed the full names of up to ten students in the class whom they considered to be their friends and provided a rating of how close they felt to each friend listed (1 = *Not very close* to 5 = *Very close*) in the first week of the course. These responses allowed for the generation of a valued, directed friendship network. We then calculated the centrality of each participant's position in the network, quantifying how socially involved and well-connected each participant was within the network at the start of the term before negotiations began.

We calculated four measures of centrality: degree, strength, closeness, and betweenness. Together, these measures address two overarching types of social integration in networks. On the one hand, degree and strength centrality assess the extent to which individuals have *strong personal relationships* within the network. Degree centrality is the number of direct ties each participant has in the network (Freeman, 1978), in this case, the total number of friendship nominations an individual made and received (i.e., the sum of out-degree, the number of peers a participant nominated as friends, plus in-degree, the number of peers who nominated the participant). Strength centrality is essentially a weighted version of degree centrality, taking into account not only the number of ties, but also the strength of those ties (Barrat et al., 2004). Here, the strength of ties is operationalized as the interpersonal closeness ratings participants gave to each friend they nominated. Strength centrality is thus the total sum of the interpersonal closeness

[3] A fourth survey item sought to assess concerns about backlash for behaving incongruently with stereotypes of women in negotiations, as opposed to concerns about being perceived in line with stereotypes (see e.g., Amanatullah & Morris, 2010): "I worry that I will be perceived as too aggressive or demanding in negotiations." This item was not included in the scale due to its conceptual distinctiveness and failure to load with the other three items at ± .40. We did not explicitly mention gender in these items (e.g., by adding "because of my gender") due to concerns that explicitly mentioning gender could cause stereotype reactance (as in Kray et al., 2001, 2004).

ratings of friendship nominations individuals made and received in the network (i.e., the sum of out-strength, interpersonal closeness of outgoing nominations, plus in-strength, the interpersonal closeness of incoming nominations). Higher strength indicates greater total interpersonal closeness of friendships. We calculated total degree and strength centrality, as well as their outgoing and incoming components (out- and in-degree, out- and in-strength),[4] in R using the 'igraph' package (Csardi & Nepusz, 2006), with wrapper functions from the 'sneasy' package (Turetsky, 2021).

On the other hand, closeness and betweenness centrality assess the extent to which individuals are *advantageously positioned relative to the network as a whole*—the extent to which they are well-connected social hubs with wide reach in the network through both direct and indirect ties (e.g., friends of friends). Closeness centrality is a measure of average distance between a participant and each of the others in the network (Freeman, 1978). We used a variant of closeness centrality adapted for use in disconnected networks, calculated by summing the inverse of the shortest path lengths between the participant and all others (i.e., harmonic closeness centrality; Opsahl et al., 2010; Rochat, 2009). Higher closeness centrality indicates less distance from the participant to others in the network, meaning that a participant requires few intermediaries to reach all other group members. Betweenness centrality is a measure of how often a participant connects others in the network together who would otherwise be more distantly connected or not connected at all. Specifically, betweenness centrality measures how often participants sit on the shortest path between each pair of other network members (Freeman, 1978). Higher betweenness centrality indicates that the participant holds more of a "connector" position in the network. We calculated closeness centrality using the 'CINNA' package (Ashtiani et al., 2018) and betweenness centrality using the 'igraph' package (Csardi & Nepusz, 2006), with wrapper functions from the 'sneasy' package (Turetsky, 2021).

Sociality

We measured extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience during the first week of the term using the Ten-Item Personality Inventory (Gosling et al., 2003). Participants rated themselves on two opposing items for each of the five facets (e.g., extraversion: "I see myself as extraverted, enthusiastic" and "I see myself as reserved, quiet") from 1 = *Disagree strongly* to 7 = *Agree strongly*. Inter-item reliabilities were largely acceptable (extraversion: Spearman–Brown $\rho = .84$; agreeableness: $\rho = .43$; conscientiousness: $\rho = .63$; emotional stability: $\rho = .79$; openness: $\rho = .58$) and a five-factor solution was a good fit for the items as expected. We were particularly interested in extraversion and agreeableness as indicators of general sociality, given prior work showing consistent associations between these dimensions and social orientations and outcomes (Selfhout et al., 2010).

RESULTS

We first conducted a series of linear regression analyses to determine the effects of gender (dummy coded with 0 = woman, 1 = man) on negotiation performance, apprehension about negotiating,

[4] The correlation between out-degree and in-degree was .33 and the correlation between out-strength and in-strength was .37, so the outgoing and incoming components of degree and strength centrality were positively correlated but not redundant.

stereotype threat, negotiation stress mindset, and network centrality. Next, we examined whether gender differences in the latter four constructs could explain the effects of gender on negotiation performance. To do so, we ran an additional set of bivariate models regressing negotiation performance on these four measures, and tested whether these measures statistically mediated the relationship between gender and negotiation performance using nonparametric bootstrap mediation analyses with 10,000 draws.[5]

Because individual-level network observations are non-independent, we used nonparametric permutation tests to assess statistical significance in regression models containing network centrality measures as either the predictor or dependent variable (Hanneman & Riddle, 2005; Farine, 2017). In these models, we calculated the likelihood of the observed effects occurring by chance (reported p_{perm}-values) by comparing the focal regression coefficient from the linear model fitted to the observed data to the coefficients from models fitted to 20,000 permutations of the network (see Supplementary material for details). The negotiations class friendship network is displayed in Figure 1.

Gender effects

Gender differences in all measures are shown in Figure 2.

Negotiation performance

Gender significantly predicted performance in in-class negotiations, $b = 1.67$, $SE = .69$, 95% CI = [.28, 3.05], $p = .019$, $f^2 = .08$. Men performed better in negotiations overall than women.

Apprehension about negotiating

Although men reported slightly less apprehension about negotiating, gender did not significantly predict apprehension about negotiating, $b = -.13$, $SE = .35$, 95% CI = [−.83, .56], $p = .707$, $f^2 = .002$, contrary to prior findings.

Stereotype threat concerns

Gender significantly predicted stereotype threat concerns, $b = -.88$, $SE = .32$, 95% CI = [−1.52, −.23], $p = .008$, $f^2 = .10$, such that women were more likely than men to report concern that they would not be taken seriously and would be perceived as ineffective and meek in negotiations.

[5] We ran single mediation models using the 'mediation' R package version 4.5.0. Because the 'mediation' package did not support multiple mediators, we ran simultaneous mediation models using the 'psych' R package version 1.8.12 (and additionally confirmed that the 'psych' package produced comparable results for the single mediation models; code and results are posted on the project's OSF page). Note that confidence intervals and p-values for the mediation analyses are computed via bootstrapping; similar to the reported p_{perm}-values for the network centrality analyses, the mediation p-values thus represent the probability of observing an effect as large as the effect observed based on a constructed null model, rather than the null hypothesis in a normal theory approach.

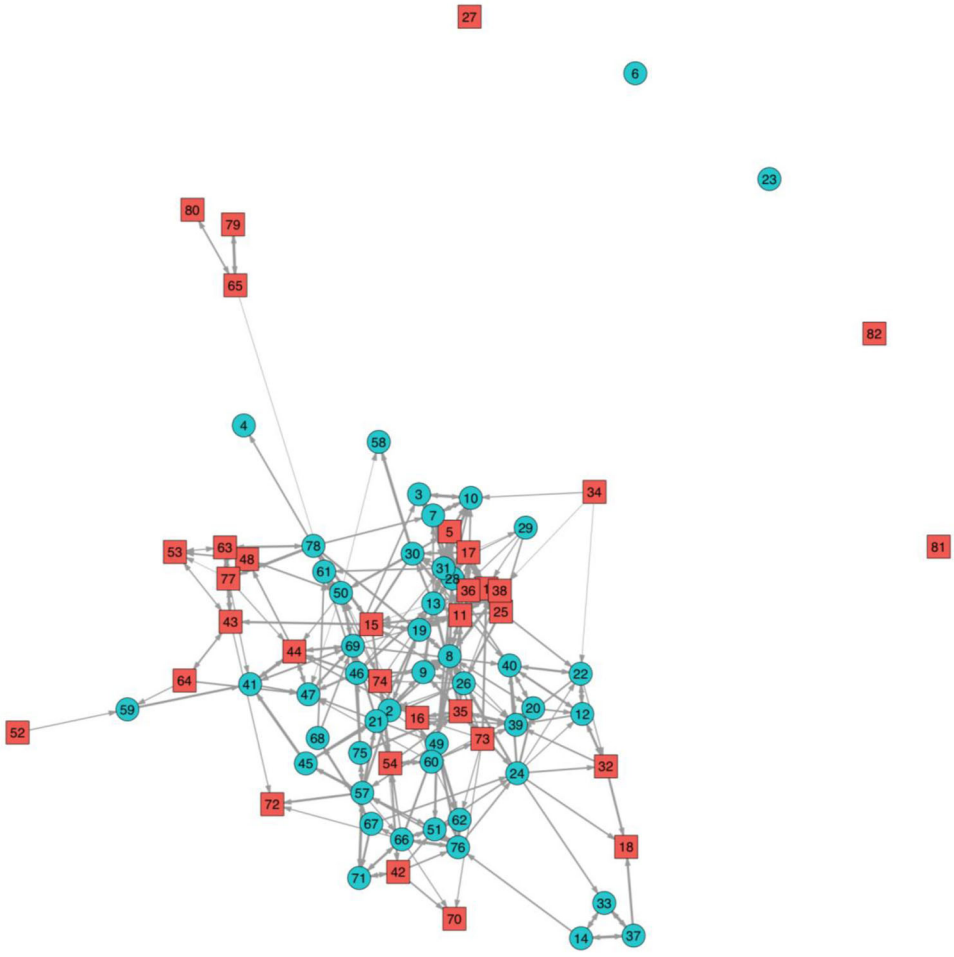

FIGURE 1 Directed, weighted friendship network of 80 MBA students in managerial negotiations course, with 329 ties (graph density = .05). Network data was provided by 77 participants, but all 80 students are included in the network because the three students who did not participate in the study were nominated by participants. Color and shape denote gender; red squares represent women and blue circles represent men. Arrow weight represents interpersonal closeness ratings of each tie (1–5), with thicker arrows representing closer friendships [Color figure can be viewed at wileyonlinelibrary.com]

Negotiation stress mindset

Men and women did not differ significantly in how stressful they found negotiating, $b = -.30$, $SE = .21$, 95% CI = [−.73, .13], $p = .168$, $f^2 = .03$. However, gender significantly predicted negotiation stress mindset, $b = .42$, $SE = .17$, 95% CI = [.08, .75], $p = .015$, $f^2 = .11$, indicating that men were more likely to believe that their stress related to negotiating was enhancing (vs. debilitating) compared to women.

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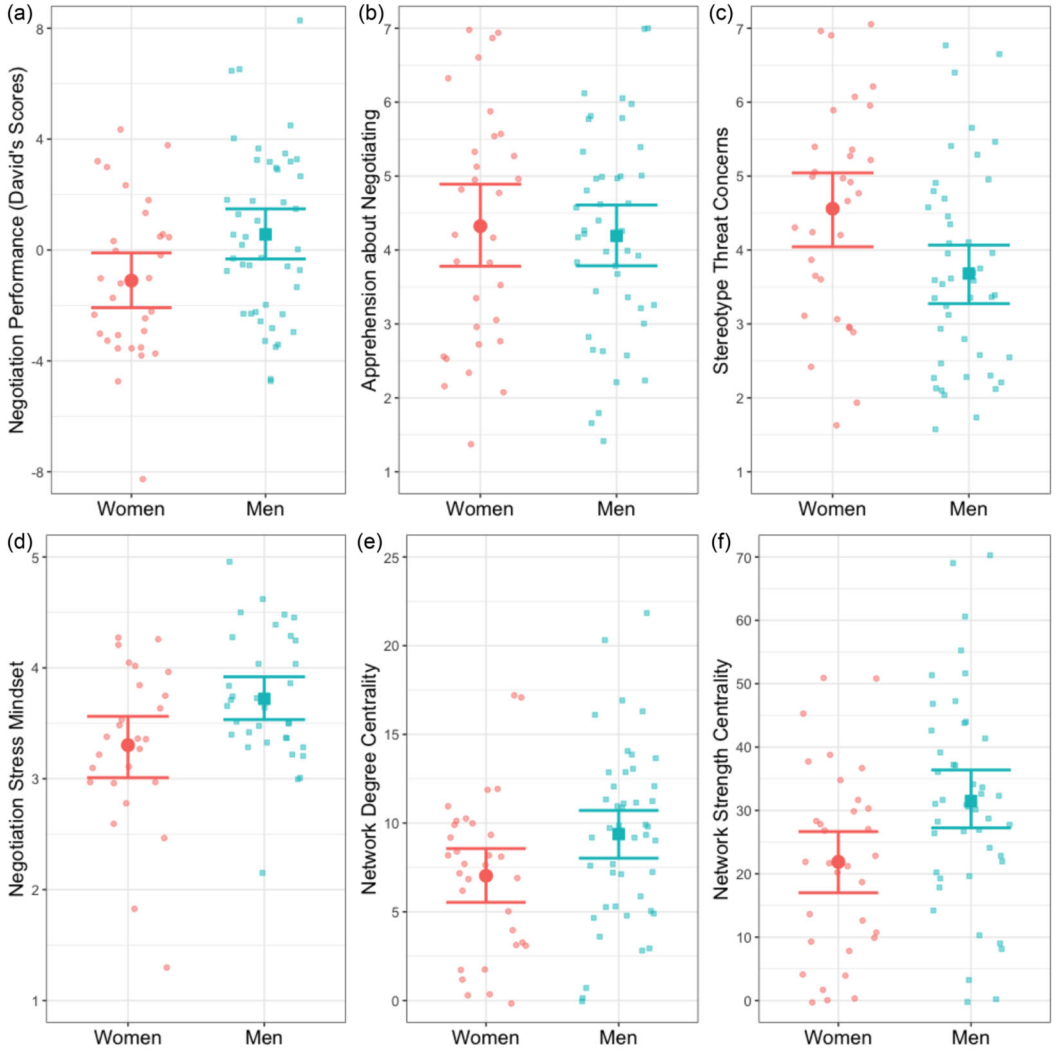

FIGURE 2 Gender differences in (a) overall negotiation performance across five negotiations, (b) apprehension about negotiating, (c) stereotype threat concerns, (d) negotiation stress mindset (higher values indicate greater endorsement of "stress-is-enhancing" mindset), (e) friendship network degree centrality, and (f) friendship network strength centrality. Differences between men and women are significant on all displayed variables except for apprehension about negotiating. Error bars represent 95% confidence intervals of the mean [Color figure can be viewed at wileyonlinelibrary.com]

Network centrality

Gender did not significantly predict either of the measures of advantageous positioning relative to the whole network, closeness centrality: $b = .88$, $SE = .95$, 95% CI [−1.02, 2.78], $p_{perm} = .347$, $f^2 = .01$; betweenness centrality: $b = 6.67$, $SE = 48.26$, 95% CI [−89.46, 102.80], $p_{perm} = .893$, $f^2 < .001$. However, gender significantly predicted both measures of strong personal relationships within the network. Men had higher degree centrality than women, $b = 2.35$, $SE = 1.09$, 95% CI [.17, 4.52], $p_{perm} = .035$, $f^2 = .06$, indicating that men began the course with significantly more

friends in the class. Men also had higher strength centrality than women, $b = 9.59$, $SE = 3.64$, 95% CI [2.33, 16.85], $p_{perm} = .010$, $f^2 = .09$, indicating that men also came into the course with greater interpersonal closeness to friends.

Examining the outgoing and incoming components of degree and strength centrality separately suggested that disparities in both outgoing and incoming ties contributed to overall gender differences in centrality. For example, the average man nominated 1.11 more friends in the class and was nominated by 1.24 more peers in the class compared to the average woman, according to model estimates. Based on the magnitude of estimates and effect sizes, the gender difference in degree centrality was larger for incoming ties than outgoing ties, out-degree: $b = 1.11$, $SE = .68$, 95% CI [−.25, 2.46], $p_{perm} = .118$, $f^2 = .04$; in-degree: $b = 1.24$, $SE = .67$, 95% CI [−.10, 2.58], $p_{perm} = .065$, $f^2 = .05$. In contrast, the gender difference in strength centrality was larger for outgoing ties than incoming ties, out-strength: $b = 5.09$, $SE = 2.22$, 95% CI [.67, 9.50], $p_{perm} = .027$, $f^2 = .07$; in-strength: $b = 4.51$, $SE = 2.25$, 95% CI [.02, 8.99], $p = .047$, $f^2 = .05$. However, these differences were small, suggesting overall that the gender disparities in strong personal relationships were driven by men both nominating more (and closer) friends and being nominated as (closer) friends more often by others in the network.

Explanations of gender gap in performance

Apprehension about negotiating

Apprehension about negotiating did not significantly predict negotiation performance, $b = -.15$, $SE = .24$, 95% CI [−.64, .33], $p = .529$, $f^2 = .01$. Given that gender did not significantly predict apprehension and apprehension did not significantly predict performance, we did not further examine this construct as a mediator of the relationship between gender and negotiation performance.

Stereotype threat concerns

Stereotype threat concerns significantly predicted negotiation performance, $b = -.57$, $SE = .24$, 95% CI [−1.05, −.09], $p = .02$, $f^2 = .08$. The more concerned participants were about being taken seriously and being perceived as ineffective and meek, the worse they performed in negotiations overall. However, threat concerns did not significantly mediate the relationship between gender and negotiation performance, although the indirect effect trended in the expected direction, estimated indirect effect (ab) = .40, 95% CI [−.09, .94], $p = .103$; estimated direct effect (c') = 1.27, 95% CI [−.02, 2.60], $p = .055$; estimated 24% mediated.

Negotiation stress mindset

The degree to which participants found negotiating stressful did not significantly predict negotiation performance, $b = -.12$, $SE = .49$, 95% CI [−1.10, .86], $p = .806$, $f^2 = .001$. However, participants' mindset about stress related to negotiating did significantly predict negotiation performance, $b = 1.30$, $SE = .58$, 95% CI [.14, 2.47], $p = .029$, $f^2 = .09$. The more participants believed their stress related to negotiating was enhancing (vs. debilitating), the better they performed in negotiations. However, stress mindset did not significantly mediate the relationship between gender and

negotiation performance, although again the indirect effect trended in the expected direction, $ab = .43$, 95% CI [−.09, 1.16], $p = .106$; $c' = 1.20$, 95% CI [−.19, 2.64], $p = .093$; estimated 26% mediated.

Network centrality

Of the two measures of advantageous positioning relative to the whole network, closeness centrality did not significantly predict negotiation performance, $b = .12$, $SE = .09$, 95% CI = [−.06, .30], $p_{perm} = .186$, $f^2 = .02$, and betweenness centrality marginally predicted negotiation performance, $b = .003$, $SE = .002$, 95% CI = [.00, .01], $p_{perm} = .054$, $f^2 = .05$, such that students who held positions linking together more peers in the network performed marginally better in negotiations. In contrast, both measures of strong personal relationships within the network significantly predicted negotiation performance, degree: $b = .24$, $SE = .07$, 95% CI = [.11, .38], $p_{perm} = .001$, $f^2 = .17$; strength: $b = .07$, $SE = .02$, 95% CI = [.03, .11], $p_{perm} = .0004$, $f^2 = .18$, as did their directional components, out-degree: $b = .31$, $SE = .12$, 95% CI [.08, .54], $p_{perm} = .009$, $f^2 = .10$; in-degree: $b = .33$, $SE = .12$, 95% CI [.10, .56], $p_{perm} = .006$, $f^2 = .11$; out-strength: $b = .11$, $SE = .03$, 95% CI [.04, .17], $p_{perm} = .002$, $f^2 = .13$; in-strength: $b = .09$, $SE = .03$, 95% CI [.03, .16], $p_{perm} = .009$, $f^2 = .10$. These results suggest that students who had more and stronger personal relationships in the course (as indicated both by their nominations of others and by others' nominations of them) performed significantly better in negotiations.

One possibility is that more sociable individuals are more likely both to be central in social networks and to perform well in negotiations. In that case, the relationship between network centrality and negotiation performance could be explained by sociability as a third variable. We thus repeated the analyses controlling for extraversion and agreeableness. With these covariates, the relationships between network centrality and negotiation performance strengthened: Closeness centrality marginally predicted negotiation performance, $b = .16$, $SE = .09$, 95% CI = [−.02, .33], $p_{perm} = .057$, and betweenness, degree, and strength centrality significantly predicted negotiation performance, betweenness: $b = .004$, $SE = .002$, 95% CI = [.001, .007], $p_{perm} = .017$; degree: $b = .25$, $SE = .07$, 95% CI = [.12, .38], $p_{perm} = .0004$; strength: $b = .07$, $SE = .02$, 95% CI [.03, .11], $p_{perm} < .0001$. Both directional components of degree and strength centrality also still significantly predicted negotiation performance (see Table S1 in Supplementary materials). These results suggest that network centrality—in the form of strong personal relationships, as well as advantageous positioning to some extent—predicts negotiation performance over and above personality traits related to general sociability.[6]

Given that gender significantly predicted degree and strength centrality, which in turn, significantly predicted negotiation performance, we next examined whether these measures of strong personal relationships within the network mediated the relationship between gender and performance. Degree centrality significantly mediated the effect of gender on negotiation performance, $ab = .46$, 95% CI [.001, 1.12], $p = .048$; $c' = 1.21$, 95% CI [−.04, 2.46], $p = .057$; estimated 28%

[6] These results also hold when controlling for all five personality facets. Controlling for extraversion, agreeableness, conscientiousness, openness, and emotional stability, all four network centrality measures significantly predict negotiation performance, closeness: $b = .18$, $SE = .09$, 95% CI [.01, .36], $p_{perm} = .028$; betweenness: $b = .004$, $SE = .002$, 95% CI [.00, .01], $p_{perm} = .029$; degree: $b = .25$, $SE = .07$, 95% CI [.12, .38], $p_{perm} = .0002$; strength: $b = .07$, $SE = .02$, 95% CI [.03, .11], $p_{perm} = .0004$. Both directional components of degree and strength centrality also still significantly predicted negotiation performance. See Table S1 in Supplementary materials.

mediated. Strength centrality also significantly mediated the effect of gender on negotiation performance, $ab = .58$, 95% CI [.07, 1.30], $p = .013$; $c' = 1.09$, 95% CI [−.22, 2.33], $p = .103$; estimated 35% mediated. Compared to total number and strength of ties, number and strength of outgoing and incoming ties separately explained less of the total effect of gender on negotiation performance given that they each made up about half of the overall relational disparity, but results were generally consistent when using either out- or in-degree, or out- or in-strength, as mediators (see Table S2 in Supplementary materials). Again, we ran all analyses a second time controlling for extraversion and agreeableness to examine whether general sociality explained these effects, and the indirect effects of degree and strength centrality remained significant, degree: $ab = .55$, 95% CI [.06, 1.11], $p = .026$; $c' = 1.14$, 95% CI [−.16, 2.59], $p = .085$, estimated 32% mediated; strength: $ab = .62$, 95% CI [.11, 1.20], $p = .013$; $c' = 1.07$, 95% CI [−.24, 2.59], $p = .113$, estimated 37% mediated; see Table S3 in Supplementary materials for out/in-degree and strength results.[7] These results suggest that network centrality—in particular, total number and strength of friendship ties, the measures of strong personal relationships within the network—at least partially explain the gender gap in negotiation performance, over and above indicators of general trait sociality. Additionally, these results are consistent when separately considering students' own friend nominations and others' nominations of them, suggesting that the relationship between gender and negotiation performance was not predominantly explained by either outgoing or incoming ties, but rather by both.

Multiple mediators

Finally, we entered apprehension about negotiating, stereotype threat concerns, stress mindset, and degree centrality as simultaneous mediators of the relationship between gender and negotiation performance. We standardized the mediators before entering them into the model to facilitate comparisons between the magnitudes of their effects. Degree centrality emerged as the strongest mediator and the only indirect effect that did not include 0 in the 95% confidence interval (see Figure 3), degree: $ab = .48$, 95% CI [.02, 1.10]; apprehension: $ab = -.03$, 95% CI [−.32, .24]; threat concerns: $ab = .40$, 95% CI [−.33, 1.00]; stress mindset: $ab = .22$, 95% CI [−.43, .97]. Using strength centrality in place of degree centrality, strength centrality was also the strongest mediator and only indirect effect that did not include 0 in the 95% confidence interval (see Figure 3), strength: $ab = .57$, 95% CI [.09, 1.25]; apprehension: $ab = -.03$, 95% CI [−.29, .24]; threat concerns: $ab = .35$, 95% CI [−.43, .93]; stress mindset: $ab = .23$, 95% CI [−.42, .99]. These results suggest that network centrality (in particular, forms of centrality evincing strong personal relationships in the network) accounted for more of the variance in the association between gender and negotiation performance than the three internal psychological measures.

DISCUSSION

In this research, we sought to examine the gender gap in negotiation performance and possible explanations for this gap. In line with past research, we found that men outperformed women

[7] Effects were also comparable when controlling for all five personality facets (degree: $ab = .52$, 95% CI [.01, 1.07], $p = .046$; $c' = 1.39$, 95% CI [.05, 2.83], $p = .041$, estimated 27% mediated; strength: $ab = .59$, 95% CI [.06, 1.24], $p = .025$; $c' = 1.31$, 95% CI [-.10, 2.78], $p = .067$, estimated 31% mediated; see Table S4 in Supplementary materials for out/in-degree and strength results).

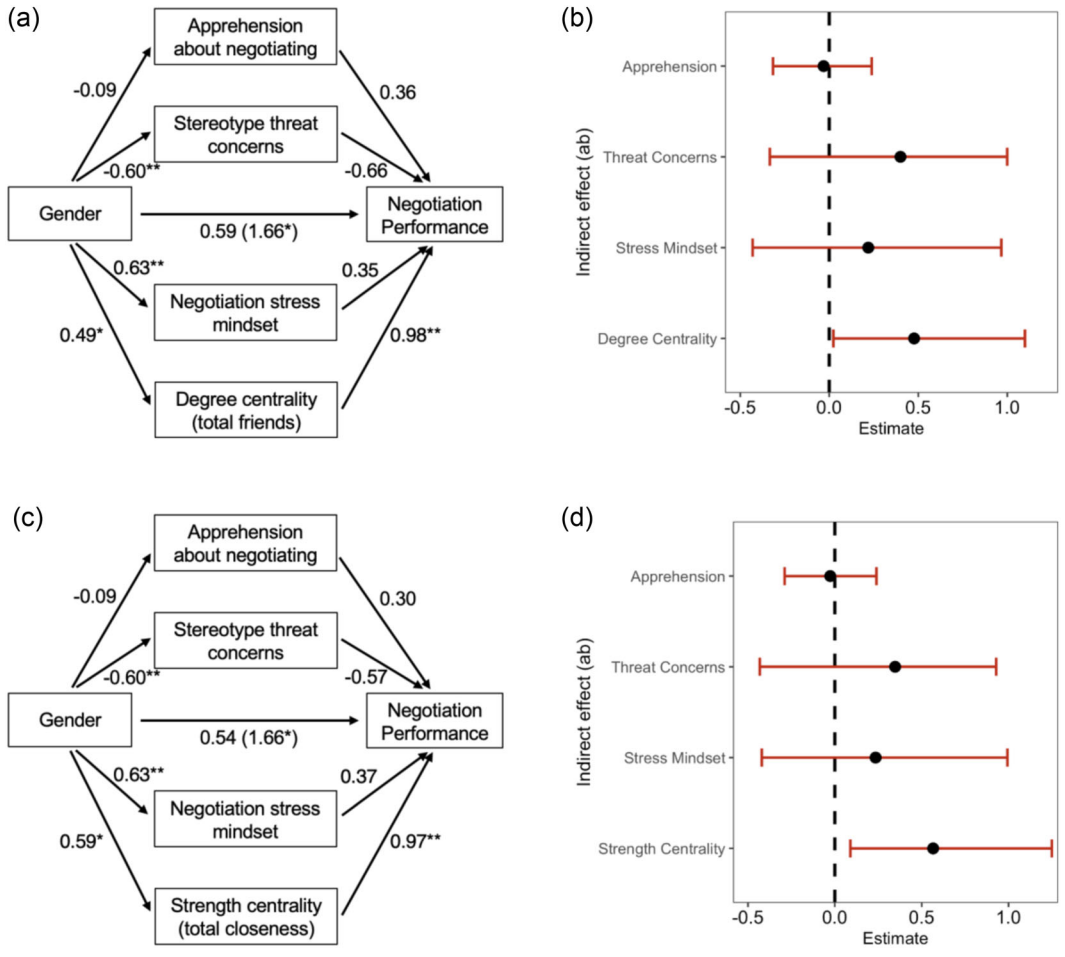

FIGURE 3 Multiple mediation analyses with apprehension about negotiating, stereotype threat concerns, negotiation stress mindset, and either degree centrality (a,b) or strength centrality (c,d) entered as simultaneous mediators. All mediators are standardized. (a,c) Path diagram of multiple mediation analysis. *.05 > p > .01, **.01 > p > .001. (b,d) Coefficient plot of indirect effect (*ab*) for each of the four mediators. Error bars represent 95% confidence intervals [Color figure can be viewed at wileyonlinelibrary.com]

across multiple negotiations. We next compared three internal, psychological mechanisms of this gender gap—apprehension about negotiating, stereotype threat, and mindset about negotiation-related stress—to a relational explanation, negotiators' position in social networks. We found significant gender differences in stereotype threat concerns, negotiation stress mindset, and social network centrality, such that women felt more concerned that their negotiation partners would perceive them as ineffective, were more likely to view negotiation-related stress as debilitating to performance, and were less socially connected in the MBA course network than men. However, only network centrality emerged as a significant mediator of the gender gap in negotiation performance, over and above any general tendency toward sociality. Specifically, although both categories of social network centrality investigated (advantageous positioning relative to the whole network and strong personal relationships within the network) significantly predicted performance when controlling for personality characteristics, only network centrality reflecting

strong personal relationships in the network—number of friends and interpersonal closeness with friends—explained the gender gap in negotiation performance.

Because we collected near-complete network data from the MBA course, we were also able to examine whether these effects were driven primarily by differences in men's and women's self-reported relationships—the friends they themselves nominated—or whether others' nominations of them as friends also contributed to the effects. If men reported more and stronger friendships than women, but were not also nominated as friends more by others in the course, this could suggest that men merely *perceived* themselves as more connected than women, rather than actually having more and stronger relationships (perhaps due to greater perceived social fit in the MBA setting or overconfidence in their social position). Instead, we found that gender disparities in outgoing and incoming ties were of a similar magnitude, suggesting that men both nominated more and stronger friends and were nominated as friends more often and more strongly by others than women. Moreover, network centrality based on outgoing and incoming ties similarly predicted negotiation performance, and similarly mediated the relationship between gender and negotiation outcomes. This finding underscores that it is not simply a gender difference in social perception—another intrapersonal factor—that explains these effects, but rather an interpersonal disparity in the social positions women and men occupy.

This research is unique in empirically comparing multiple possible explanations of the gender gap in negotiation performance, and in particular for exploring both internal and relational mechanisms. Although correlational, the findings support recent research highlighting the importance of the social environment, especially one's position in shared social networks, for performance (Stadtfeld et al., 2019). In particular, this research suggests that individuals' integration into social networks in a certain domain may in some cases be more important for performance in that domain than the internal psychological mechanisms that are more commonly the subject of research. More research is needed, but these findings serve as an initial proof of concept that gender disparities in negotiation may be better understood as a function of not just individual internal processes, but also the social structures in which women and men are embedded.

The contrast between the current study's finding of no gender difference in apprehension about negotiating and findings in prior research (Babcock et al., 2006; Bowles et al., 2007) may reflect a difference in sample; perhaps MBA students at a competitive U.S. business school, particularly those taking a negotiations class as an elective, are already inclined to negotiate and are therefore less apprehensive. However, this seems unlikely given that negotiation apprehension was approximately normally distributed across the full range of the scale for both men and women, rather than skewed toward low apprehension. When considered along with the current findings on stress mindset, as well as other findings of no gender differences in apprehension about negotiating (Brooks & Schweitzer, 2011), these results could suggest that, on the side of internal psychology, it is not the amount of nervousness, anxiety, and stress that separates men and women at the bargaining table, but rather the way in which these feelings are interpreted.

Limitations, generalizability, and future directions

This study is limited primarily by its sample size. Although we were able to recruit over 95% of the MBA class where this research was conducted, allowing us to collect nearly complete network data for the class, the size of the class posed a hard upper limit on the sample size. Given that small samples can produce imprecise and noisy estimates, large-sample replications are needed to determine the robustness of these effects. Larger samples would also afford the statistical power

needed to explore moderation and other interaction effects, opening the door to additional questions such as whether network centrality predicts negotiation outcomes more strongly for men or for women, whether the gender of one's friends moderates the effect of network centrality on negotiation performance, and how the centrality of one's negotiation partner interacts with one's own centrality to predict negotiation outcomes. Recruiting larger samples (especially across a variety of contexts) may also allow for investigation of these patterns in a more diverse range of gender subgroups, including transgender and non-binary individuals.

Although the correlational nature of the study limits causal inference, several features of the design help to counter the most obvious potential alternative causal explanations. For example, we aimed to reduce the possibility of reverse causation through the temporal sequencing of data collection (i.e., by collecting network data and as many of the psychological variables as possible at the beginning of the term, before negotiations began) and to control for potential confounding variables (e.g., personality traits related to sociality, which could have coincided with network position). However, covariates were not exhaustive; future research should collect additional data to attempt to rule out other potential confounds. Although experimental manipulation of positions in real-world social networks is challenging, future research could employ randomly assigned interventions aiming to increase friendship formation and maintenance behaviors (e.g., Turetsky et al., 2020) in order to more closely identify the effects of network positions on negotiation performance.

One question concerns the generalizability of these results to negotiations in everyday life. A strength of the current research was assessing negotiation performance across multiple negotiations that, while still role-play, simulated a variety of real-world negotiations (compared to prisoner's dilemma and other game theory paradigms commonly used in negotiation research). Another feature of the design is that participants negotiated with others within a closed social network, a type of negotiation growing more ubiquitous in the workplace as flattening organizational structures require teams to negotiate project direction and resource allocation amongst themselves (Aghina et al., 2017). We would expect these results to generalize to negotiations where people are negotiating with others within their network, such as workplace negotiations with colleagues and bosses, at least in similar cultural contexts (see, e.g., Gelfand et al., 2012, regarding the uniqueness of U.S. cultural orientations to bargaining and negotiation, particularly among higher socioeconomic strata). In these contexts, based on the current findings, employees who hold more central positions in their workplace social networks may be better able to achieve desirable outcomes in negotiations with others in their organization. Moreover, if there are disparities in social connection in the workplace between men and women, members of different races, or other stigmatized and dominant groups, we would expect to see that more connected groups are more likely to advance and influence the direction of the organization. Future research examining interactions between informal social networks and formal workplace hierarchies will be important, as group disparities in seniority and rank may compound effects of disparities in personal relationships on negotiation outcomes.

Generalizability to negotiations between strangers (e.g., purchasing a car, negotiating a starting salary at a new company) is an interesting open question. Might the benefits of network centrality in one domain "carry over," continuing to provide advantages in a new domain in which an individual is negotiating? The answer may depend on the mechanism by which network centrality influences performance. If centrality largely benefits negotiators through the perception of others—by making highly connected individuals seem more powerful and influential (Brass, 1984; Brass & Burkhardt, 1993; Kilduff & Krackhardt, 1994)—this benefit would be unlikely to carry over to a new context with a negotiation partner who was unaware of the negotiator's

connectedness. However, if network centrality benefits negotiators by providing access to key information and resources, a central individual could continue to reap advantage from this information in a new context. For example, a study of women's starting salaries suggested that, in the absence of information about men's pay, women who graduated from women's colleges negotiated lower salaries than women who had male peers and therefore greater access to information about men's salaries—an example of how the information accessed through networks in one context can affect negotiation outcomes in a different context (Belliveau, 2005). Similarly, someone who is better connected generally may have more opportunities to learn strategic information (e.g., how much others paid for a car, how much others make in salary, what a client values), which could benefit them even in a new context. Finally, if network centrality benefits negotiators by affording the opportunity to be more assertive and ask for more with less concern for social risk, these benefits may also carry over in a new context. For example, an individual centrally positioned in one context may be less worried about a deal or relationship souring if they have ties to many others who can connect them to other possible deal opportunities, and who they can fall back on socially.

Future research can shed light on these potential mechanisms. As a first step, videotaping negotiations would allow researchers to code the behavior of negotiators high and low in network centrality, as well as the behavior of their negotiation partners. If network centrality benefits negotiators through the affordances of their existing ties—that is, centrally positioned individuals feel greater freedom to act assertively and take risks because they have many other connections they can rely on—we would hypothesize that central individuals would use more assertive or riskier negotiation strategies than more peripheral individuals. For example, if they perceive lower social and professional risk than less central individuals (Brands & Rattan, 2020), centrally positioned negotiators might make higher demands, offer fewer concessions, speak more firmly, and express more anger—strategies that can be associated with greater reward, but can also increase the chance of impasse or provoke social consequences (Larrick et al., 2009; Overbeck et al., 2010; Weingart et al., 1996). If instead (or in addition), network centrality benefits negotiators through access to more information and resources, we might expect that more central negotiators will reference more insider information (e.g., knowledge of pay standards, comparable deals made by others, the finances or values of the negotiation partner or their competitors) or display more technical or financial knowledge. Alternatively, if network centrality benefits negotiators by boosting their negotiation partners' perception of their power and influence, we would expect that the primary differences in negotiations undertaken by individuals high versus low in centrality will be in the behavior of their negotiation partners. For example, the negotiation partners of central negotiators may behave in ways characteristic of having lower relative power, such as using more ingratiation and impression management tactics, responding more reactively than proactively, and making more concessions (De Dreu & Van Kleef, 2004; Kim et al., 2005; Overbeck et al., 2010).

Another possible mechanism unique to women (and other stigmatized groups) is that social network centrality may help to counteract bias and discrimination in negotiation. Although much research focuses on differences between the negotiation attitudes and behavior of men and women, there is evidence that bias against stigmatized groups plays a role in disparate negotiation outcomes. For example, in audits of new car purchase negotiations, car dealers made higher initial and final offers to female and Black buyers compared to White men, even when auditors used the same negotiation script and strategies and characteristics like attire, attractiveness, occupation, and home addresses were controlled (Ayres, 1990, 1995; Ayres & Siegelman, 1995). In other types of negotiations, such as raising capital for entrepreneurial ventures, a pitch delivered by a

male voice was more likely to garner investments than an identical pitch delivered by a female voice (Brooks et al., 2014), and women were asked more questions about what could go wrong in their ventures, which lowered the amount of investment they received (Kanze et al., 2018). Some research suggests that strong social ties may especially benefit women in negotiations because these connections can offset the disadvantages they face due to gender bias and stigmatization (Swartz et al., 2016). For example, having a strong relationship with a potential investor can reduce uncertainty about female negotiators' competence and capabilities, whereas, due to gender bias, men's competence is often assumed without further evidence (Tinkler et al., 2015). Holding central network positions—and thereby wielding a web of potential references and resources—may generally give women credibility that they are otherwise assumed to lack, counteracting gender bias and discrimination in negotiations.

Lastly, the present work does not provide insight into *why* women were less centrally positioned than men in the MBA course network. Classic theories of stigma (Goffman, 1986) and empirical work (e.g., Cyr et al., 2021; Fang et al., 2020; Peterie et al., 2019) suggest that this lack of social integration can emerge both due to the exclusion of stigmatized group members by dominant groups and due to stigmatized group members' reduced engagement in proactive relationship-building. Given that we did not find stronger relational disparities in outgoing or incoming ties, either of these mechanisms could have been at play. In addition to examining the specific mechanisms by which network centrality may enhance negotiation outcomes, and how these mechanisms may differ for men and women, continued research into when and why women hold less central positions in informal social networks than men is important for identifying effective interventions to remedy this disparity.

CONCLUSION

This research highlights how the effects of stigma in business settings reverberate not only through intrapersonal processes, such as women's internal thoughts and beliefs about negotiating, but also through interpersonal processes, such as disparities in social networks. Although recognizing the importance of social networks may help women take proactive steps to foster social connections in professional spheres, we urge resistance to interpretations of these results that place responsibility for change and remedying social disadvantage on women (Kim et al., 2018; Kolb, 2009). Our findings that internal mechanisms did not explain gender gaps in negotiations as much as the relational explanation we examined—position in social networks—should underscore that negotiation disparities are not wholly, nor primarily, caused by deficiencies in women's negotiation attitudes and behaviors. We instead believe our results should flag opportunities for structural changes that promote gender parity in social networks. When networks are left to form only through informal social processes, women are often subject to exclusion (Cyr et al., 2021); "boy's clubs" are still prominent features of workplaces and business schools (Cullen & Perez-Truglia, 2021; Johnson, 2009; Kinsey & Fisher, 2014). In turn, these features of informal social networks can influence positions in the formal authority hierarchy of organizations. Organizations and schools can take proactive steps to democratize social connection and capital, such as arranging opportunities for women to build important social ties. These could include instituting formal mentoring and creating or supporting a women's group; increasing representation of women toward 50%, especially in leadership positions; and regularly evaluating workplace or school climate and addressing cultural barriers to women's social integration (Ibarra, 1993; McCarthy, 2004; Srivastava, 2015).

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STATEMENT

The data and code needed to reproduce all analyses are posted publicly in an Open Science Foundation repository (https://osf.io/q9bx3/).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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