

A BRIEF SOCIAL-BELONGING INTERVENTION IN THE WORKPLACE: EVIDENCE FROM A FIELD EXPERIMENT

SANAZ MOBASSERI
Boston University

SAMEER B. SRIVASTAVA
LAURA J. KRAY
University of California, Berkeley



Brief interventions that strengthen an individual's sense of social belonging have been shown to improve outcomes for members of underrepresented, marginalized groups in educational settings. This paper reports insights based on an attempt to apply this type of intervention in the technology sector. Adapting a social-belonging intervention from educational psychology, we implemented a quasi-random field experiment, spanning 12 months, with 506 newly hired engineers (24% of the sample was female) in the R&D function of a West Coast technology firm. We did not find a statistically significant effect of the treatment on a core attainment outcome—bonus relative to base salary—that exhibited a significant gender gap, with women receiving proportionally lower bonuses than men. We did not find anticipated gender gaps in promotion rates or social network centrality, and we also did not find a statistically significant effect of the treatment of women on these outcomes. Drawing on meaningful differences between educational versus workplace settings, we identify four theoretical moderators that might influence the efficacy of social-belonging interventions adapted from educational settings into the workplace. Finally, based on the limitations of our study design, we provide four recommendations that future researchers might adopt.

Please direct all correspondence to Sanaz Mobasseri (sanazm@bu.edu, 595 Commonwealth Avenue, Boston, MA, 02215). We thank the representatives from TechCo, who facilitated research access and helped in the design and implementation of the intervention. We also thank Don Moore, Leif Nelson, Nicole Stephens, András Tilcsik, and participants of the INSEAD Women at Work

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Gender inequalities persist in science, technology, engineering, and math (“STEM”) fields, with women being less likely than men to pursue advanced degrees and rise to the senior ranks of leading technology firms (Ceci & Williams, 2007; National Science Foundation, 2018). In response, firms have invested heavily in diversity and inclusion programs (Kalev, Kelly, & Dobbin, 2006)—for example, adding more structure to performance evaluations (Correll, 2017), hiring diversity specialists (Williams & Wade-Golden, 2013), and launching formal mentoring and training programs to reduce the social isolation of women (Kalev, 2009; Srivastava, 2015). Yet, our understanding of which programs ultimately prove effective and under what conditions remains incomplete (Cheryan, Ziegler, Montoya, & Jiang, 2017; Dobbin, Schrage, & Kalev, 2015).

Separately, research in educational psychology has demonstrated the success of interventions that influence minority students’ sense of social belonging when they enter a new academic setting. Such interventions buffer minorities from social identity threat and equip them to successfully navigate an environment that might otherwise feel unwelcoming (Kizilec, Saltarelli, Reich, & Cohen, 2017; Walton & Cohen, 2007, 2011; Walton, Logel, Peach, Spencer, & Zanna, 2015). For example, a one-hour social-belonging intervention consisting of three parts—participants (a) learning about older students’ experiences in overcoming doubts about their belongingness, (b) writing a self-reflection to facilitate internalization of the message, and (c) filming a video message directed at hypothetical others to help them internalize the message that doubts about belongingness are common but can be overcome (Cooper & Fazio, 1984)—eliminated gender differences in grade point average (GPA) at a selective university engineering program (Walton et al., 2015). A similar social-belonging intervention targeting first-year students’ sense of social belonging at a university raised Black students’ GPAs and halved the ethnic minority achievement gap (Walton & Cohen, 2011).

Building on these insights, we conducted a 12-month field experiment at a large West Coast technology firm in the United States to assess whether a brief social-belonging intervention—analogue to the one used in educational settings but adapted to a corporate context—could positively shape a newly hired female engineer’s subjective experience and thereby enable her to achieve higher levels of attainment and occupy more central positions in the workplace social network. However, we did not find that a comparable intervention in a workplace setting had an effect on women’s bonuses as a percentage of their base salaries, where women’s bonuses as a percentage of their base salaries were, on average, 1.3 and 1.2 percentage points lower than men’s bonuses as a

percentage of men’s base salaries in our study period’s Years 1 and 2. Surprisingly, we did not find the predicted gender gaps in promotion rates, and we also did not find a statistically significant effect of the treatment of women on this outcome. Additionally, in contrast to prior research that lead us to expect a priori gender differences in social networks (Ibarra, 1992, 1993; Kleinbaum, Stuart, & Tushman, 2013), we did not find that women’s and men’s social network centrality differed among our sample of newcomers at the organization, and we again found no significant treatment effect of the intervention. To contextualize these results and inform future research, we have identified four potential theoretical moderators that may influence the effectiveness of social-belonging interventions in the workplace relative to educational settings. Finally, recognizing certain limitations in our research design, we conclude by offering four suggestions for how to modify the design in order to increase the likelihood of more successfully adapting social-belonging interventions to workplace settings.

THEORY

Although newcomers generally experience uncertainty about the extent to which they belong to a new setting, this uncertainty is heightened for, and threatens the social identities of, members of marginalized groups (Walton & Cohen, 2007). Experiencing a sense of social belonging through positive interactions and supportive relationships improves subjective well-being, health, and cognitive and emotional processes (Baumeister & Leary, 1995). In educational environments, a brief social-belonging intervention targeted to first-year college undergraduates can have lasting positive consequences for learning and achievement—as manifested in course grades, overall GPA, and graduation rates (Walton & Cohen, 2011). Such interventions have positive consequences because they buffer students from social identity threat and encourage them to seek support and persist in the face of obstacles.

Three similarities between the experience of an underrepresented ethnic minority student entering a new school and that of a woman joining a technology firm motivated our study of a social-belonging intervention. First, just as non-White students are numerical minorities in elite educational institutions, women are significantly underrepresented in technology firms—particularly in core research and development functions (National Science Foundation, 2018). Simple differences in numerical proportions can adversely affect how others perceive underrepresented people and how these individuals perceive themselves, thereby threatening minority

group members' social identities and eroding their sense of social belonging (Good, Rattan, & Dweck, 2012). Thus, a priori, this appeared to be a promising context for extending research on social-belonging interventions.

Second, just as non-White or first-generation college and university students at elite educational institutions face a dominant culture that they often experience as unfamiliar or unwelcoming (Fordham & Ogbu, 1986; Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012), women entering technology firms must contend with so-called "bro" cultures that can be chilly and unreceptive. Women in technology, as minority group members, are likely to experience a variety of subtle and explicit cues that make their gender salient and highlight ways in which they are not welcome. Such cues range from "humor" that stigmatizes their gender or feminine characteristics, sexually predatory behavior that reinforces hegemonic masculinity, and stereotypically masculine objects in the environment that signal that the workplace is better suited to men (Cheryan, Plaut, Davies, & Steele, 2009; Cheryan et al., 2017; Logel, Walton, Spencer, Iserman, von Hippel, & Bell, 2009). These experiences can reinforce self-perceptions of being an outsider and lead women to feel that they do not belong.

Finally, attainment in both the educational and corporate realms relies, in part, on accessing valuable resources such as task advice, support, and mentorship through social relationships (Burt, 2005; Srivastava, 2015; Stephens, Hamedani, & Destin, 2014). Yet minority ethnic students in educational settings and women in technology may also be more likely to be structurally excluded from networks that could serve as conduits to such resources (Ibarra, 1992; Mehra, Kilduff, & Brass, 1998). They may also lack access to the cultural knowledge needed to successfully build and activate these relationships (Erickson, 1996; Turco, 2010).

Given the commonalities between the experiences of marginalized newcomers to educational and corporate settings, our study explores whether a brief social-belonging intervention—adapted to a corporate context—could improve attainment for women entering a technology firm. Consistent with the pattern in many technology firms, women in our empirical setting earned lower starting salaries and received smaller performance-based bonuses as a proportion of their salary in their first two years after hire. Thus, there was a gender gap in one key indicator (performance-based bonus in Years 1 and 2)—though, surprisingly, not in another key indicator (promotion rate)—that the intervention could potentially have addressed. However, despite not finding a gender difference in untreated newcomers'

likelihood of promotion, the low representation of women in senior ranks of the technology company provides evidence of a broader gender gap within the organization. Moreover, educational psychology researchers have conjectured that brief social-belonging interventions might also prove effective in the workplace (Walton et al., 2015: 481), and other brief interventions—for example, ones that emphasize a newcomer's authentic individual identity—have been shown to change attitudes toward women in the workplace, boost job performance, and reduce turnover in corporate settings (Cable, Gino, & Staats, 2013; Chang et al., 2019).

We therefore implemented a social-belonging intervention that aimed to make female participants more likely to encode the difficulty of joining a new organization as routine and common to all newcomers rather than as evidence of non-belonging. We investigated the possibility that women receiving such an intervention would therefore stay more engaged, be more inclined to seek out help and support, and ultimately receive higher performance-based bonuses and get promoted at a higher rate (and thereby receive higher base salaries) than women receiving a neutral intervention. Despite not finding a difference in social network centrality between women relative to men in the control group as well as in the entire sample, we also examined whether women receiving the social-belonging intervention would experience a lift that women and men in the control group did not because the social-belonging intervention strongly emphasized reaching out to colleagues for help and advice. If women's professional networks were bolstered by the intervention, it would enable them to build more social connections, thereby propelling them to a more central position in the workplace social network. We therefore assessed, in supplemental analyses, whether the intervention might have especially affected women's propensity to connect with their colleagues.

METHOD

Empirical Setting and Sample

Our research site was a large technology company on the West Coast (hereafter referred to as "TechCo"). Our intervention included all 506 full-time engineers (24% of whom were women) hired into TechCo's research and development (R&D) function

Author's voice:
What motivated you to undertake
this research?



between January and December 2014.¹ The intervention took place during the R&D function's orientation for newly hired full-time employees. TechCo held these orientations each month and strongly encouraged new hires to attend the first orientation scheduled after their start date (i.e., within their first month of employment). Newcomers joining in odd months received a social-belonging intervention, while those joining in even months received a control intervention. The result was quasi-random assignment to experimental condition, with 271 newly hired engineers assigned to the social belonging (treatment) group and 235 assigned to the control group ($n = 506$).²

Research Design

We began by conducting and filming 24 interviews with seasoned TechCo employees. In these interviews, which ranged between 30 and 90 minutes in length, we learned about TechCo's working environment, how employees described the environment, the challenges they faced in integrating into the organization, and the strategies they used to overcome obstacles. We structured our interview protocol in the form of a life story interview in order to facilitate learning the psychosocial constructions that existing employees used to make sense of their integration into and subsequent success at TechCo. Appendix A presents our interview protocol.

Closely paralleling past social belonging research (Walton & Cohen, 2011), our design included treatment and control conditions with three components: (a) watching a video, (b) writing a brief self-reflection about the video, and (c) filming a video message directed at receptive hypothetical others. The social-belonging (treatment) intervention made salient that

internal job challenges facing newly hired engineers at TechCo were widespread and could be overcome, while the customer service (control) intervention focused on how TechCo managed external customer relationships. Both interventions were implemented during the onboarding module on organizational culture by the same TechCo employees who facilitated the overall onboarding program, to ensure consistency across interventions and to avoid potential demand effects from having external researchers implement the intervention.

Interventions

Watching a video. In the first of the intervention components, newly hired employees watched a 10-minute video that we had produced based on our interviews of TechCo employees. Individuals featured in the video (more than half of whom were women) described the challenges they initially faced at their jobs, explained how and when they overcame their concerns and began to feel that they fitted into TechCo, and provided their own advice for future organizational entrants.³ For example, one woman featured in the video described how she felt after overcoming her initial difficulties at TechCo as follows:

I felt like I was part of the team when I could recognize patterns and problems, and I would speak up, and I was able to help decide what the right solutions were. I could tell at that point that my team valued my opinion and welcomed having me at the table.

Closely following prior research, the interview clips selected for the social belonging video also contained advice that tenured employees had for newcomers (Walton, 2014; Walton & Cohen, 2007,

¹ We agreed with TechCo to run the study for a year, a timeframe during which they expected to hire about 500 new engineers.

² Although we alternated treatment and control groups in successive months, we cannot rule out the possibility of cross-contamination between the two groups. For example, if a treatment group employee revealed details of what she observed during orientation to a struggling control group colleague, the latter would effectively receive a (perhaps diluted) form of the treatment. TechCo staff who helped to implement the intervention monitored forums on ChatTool for mentions of the orientation program or either intervention, but did not find any evidence of such discussions taking place among employees. Yet, we cannot rule out the possibility that these conversations took place in person or in other communication modes. Of course, cross-contamination is also a risk faced by social-belonging interventions in educational settings, and this risk would be arguably greater if a given cohort of newcomers was randomly assigned to treatment and control conditions in the same month.

³ Although the design of our social-belonging intervention was broadly in line with those used in prior studies, we acknowledge the possibility that its effectiveness was diluted by including a relatively large proportion of senior women in the video (relative to the actual proportion of women to men in senior positions). We conjecture that an intervention featuring fewer tenured women in the social belonging video might have proven to be more effective. For example, Ely (1994) found that women who work in firms such as TechCo that have a low proportion of women in the senior ranks may be less likely to experience gender as a positive basis for shared and positive identification. In line with this finding, it is possible that newly hired women in TechCo were less likely to experience positive identification with women featured in the video, and, consequently, less likely to internalize social-belonging content from them. A useful avenue for future research would be to examine how changing the composition of majority versus minority group members in a social belonging video might influence the intervention's efficacy.

2011; Walton et al., 2015). In addition, employees in the social belonging video emphasized persistence, patience for learning, tolerance for discomfort, navigating awkwardness, and reaching out to unfamiliar others. Appendix B presents illustrative quotes from the interview clips used in the social-belonging intervention video.

The control intervention began with a 10-minute video of TechCo customers describing their experiences using various TechCo products. The structure of the control condition video was similar to that of the treatment condition, in that customers (a) described their technological problems, (b) detailed implementation and adoption processes for TechCo products, and (c) made recommendations to future TechCo users based on their experience. In sum, whereas the social-belonging intervention focused on intrapsychic factors related to fitting into the organization, the control video focused on customer experiences with TechCo's products.

Written reflection. After watching the video associated with their experimental condition, newcomers were instructed to complete a 15-minute written individual reflection task. In the social belonging condition, newcomers were asked to think about what challenges they would personally face in their new jobs, how employees in the video had overcome similar challenges, and how their past experience and skills could serve them in their new roles. The control group instead reflected on how customers gained from using TechCo's technology and services. Both groups answered the same number of questions for the written reflection and were allocated the same amount of time.

Filming a video message intended for future newcomers. The last component of the intervention was a video-filming task in semi-private booths (similar to voting booths). To encourage newcomers to see themselves as advocates rather than just beneficiaries of the intervention content, newcomers in the treatment group were asked to provide advice about overcoming challenges at TechCo to future new employees, based on their written reflections. Newcomers in the control group were asked to describe what they had learned about how TechCo best served its customers. Across both groups, filmed video messages ranged in length from one to 14 minutes. Both interventions lasted approximately one hour and were nearly identical in format, structure, order, and length. They differed only in the underlying content: social belonging or customer experience.

While our approach was substantively similar in procedure and content to past research, we identified aspects of belonging that were particularly relevant to women engineers at TechCo and adapted the intervention accordingly. In addition to a focus on overcoming social adversity in new environments, we highlighted

specific challenges facing new engineers at TechCo, such as learning and understanding various acronyms and jargon related to TechCo's products and software development process, as well as identifying and knowing how to solicit help from technical experts on other TechCo teams. We included this engineering-specific content, alongside content related to concerns about social isolation and exclusion, because both sets of challenges were consistently emphasized by the TechCo employees we interviewed in the study's design phase.

DATA COLLECTION AND SAMPLE

After the intervention was completed, we collected data from TechCo's human resources department ("HR") and from their online social collaboration tool ("ChatTool"). We had access to a variety of HR data from 2014 to 2016, including base salary, bonus, promotion date, nomination for an internal recognition award, departure date and reason for exit (voluntary or involuntary), and restricted stock units. Although TechCo is similar to other large technology firms in that women are underrepresented in its senior ranks and paid comparatively less than men, our analyses were limited to cohorts of newcomers to TechCo and their attainment outcomes that could be observed during our study period. It is important to note that the attainment outcomes that we observed among newcomers may be less pronounced than one would find in the company as a whole.

Unfortunately, due to internal legal policy, the firm determined after data collection had already ended that they could not provide us with HR data for the 140 newly hired engineers who joined offices outside the United States. Thus, for analyses related to employee attainment, our sample consists of the 366 newly hired engineers (27% of whom were women) who worked in U.S. offices. Our sample for analyses related to social network position includes all 506 newly hired engineers (24% of whom were women).

Key Dependent Variables

After consulting with the HR team about how performance is recognized and rewarded in the organization, we decided to focus on two indicators of post-hire achievement where gender differences were detected: (a) bonus as a proportion of base salary and (b) the likelihood of being promoted during our observation window.

Author's voice:
How did you get access to your data
or site?



Bonus as a proportion of base salary. Bonus as a proportion of base salary corresponds most closely to how performance is evaluated and ultimately rewarded in the organization. Everyone in our sample was eligible for a performance-based bonus and in the risk set to get promoted during this period. Bonus as a proportion of base salary ranged from 0% to 30% across both years and women received lower bonuses relative to their base salaries than their male counterparts.

Promotion rate. In contrast, women in our sample were promoted at higher, rather than lower, rates than men. This was likely a reflection of the fact that women entered at lower hierarchical levels and corresponding salary bands. In our sample, 28% of employees earned a promotion during this time period. Because promotion rates tend to be higher at lower rungs of an organizational career ladder, it is important to control for rank in models that estimate a person's likelihood of promotion. When we included a proxy for rank (starting base salary) in promotion models, there were no significant differences in the promotion chances of men versus women. Although women entered the organization at lower starting salaries than men did, this difference could have existed for a variety of reasons—such as job-relevant skills, past work experiences, negotiation strategy, or salary discrimination—that we could not observe in our data.

Potential Dependent Variables that Proved to Be Infeasible

Nomination for internal recognition programs and turnover.⁴ Although nomination for internal recognition programs and both voluntary and involuntary exits are also meaningful indicators of positive and negative attainment, respectively, these were relatively rare events during our observation period. Thus, there was not enough variance in these outcomes to detect a statistically significant gender difference or statistically significant effect of the intervention on these outcomes. Only 14 employees (6 of whom were women) were nominated for the internal recognition program, and only 16 (4 women) departed involuntarily.

Exploratory Dependent Variable

Social network centrality. In addition to the career attainment measures of bonus as a proportion of

base salary and promotion rate described above, we also analyzed social network data that were sourced from the complete record of public communications among all employees from January 2014 to January 2016 on TechCo's primary social collaboration tool, ChatTool. We did so under the premise that newcomers who experienced a greater sense of social belonging would engage more with their fellow employees on this public communication platform. Social organizational platforms, such as Slack, are comparable to ChatTool in terms of design, user interface, and function.

ChatTool, which accounts for the lion's share of internal communications (relative to email and text messaging), afforded three advantages as a research tool. First, TechCo management strongly encourages and normatively reinforces widespread employee use of ChatTool, because it ensures that knowledge is publicly available beyond local team members and stored in a central location, minimizing concerns about the loss of valuable information when employees depart. Second, ChatTool encompasses communication for both work-related and social reasons. For example, special interest groups, such as recreational sports and hobby groups, are frequently formed and managed through ChatTool. Lastly, following broader trends in the industry toward transparency and a shift away from formal hierarchy, ChatTool fosters collaborative idea generation and problem-solving that transcends formal subunit boundaries.

By design, ChatTool enables seven different types of communication between employees, encompassing posting information on individual or group pages, commenting on others' posts on individual or group pages, liking others' posts or comments, receiving likes, following other employees, and acquiring followers of their own. Our main results are based on aggregate ChatTool communications to both individuals and groups; however, the results are materially unchanged when we consider each of these types of communication tools to different audiences separately. Despite TechCo's qualitatively informed belief that gender difference in social networks existed, we were unable to detect a gap between women and men's network centrality in our sample of newcomers on ChatTool. Extant research argues that gender differences in women's and men's social networks stem from organizational constraints that limit women's access to valuable network ties and gendered differences in preferences and network development patterns (Ibarra, 1992, 1993). Thus, it is surprising that we found no evidence of gender differences in social network characteristics based on a comprehensive and widely used online communication platform such as ChatTool. However, because of the rich and unique nature of the ChatTool data, we report the results from

⁴ Initial restricted stock unit grants were driven primarily by pre-hire negotiations. Subsequent restricted stock unit grants were based in part on group (rather than individual) success, and were not consistently available to everyone. Thus, we ascertained and TechCo HR strongly advised us that restricted stock units were not a meaningful outcome variable.

these analyses to help guide future researchers toward other types of network measures wherein effects of a social-belonging intervention may be more detectable.

To explore the intervention's potential effects on employees' social belonging, we focused on centrality in the ChatTool communication network, reasoning that newcomers who felt a sense of belonging at TechCo may alter their network development patterns in ways that resulted in more central—and, consequently, more valuable—social network positions in TechCo. We first constructed a person-week network for all employees in the sample.⁵ We focused our analyses on two social network measures of centrality: (a) degree centrality and (b) eigenvector centrality. Whereas degree centrality measures the sheer number of people one is in contact with, eigenvector centrality accounts for the centrality of each contact that one is communicating with.

Independent Variables

Our two key independent variables were *Female* and *Treated*.⁶ *Female* was set to 1 for women based on responses to a self-report in a health insurance questionnaire. *Treated* was set to 1 for employees who received the social-belonging intervention and to 0 for those who received the control intervention. The variable of interest is the interaction term: *Female* × *Treated*. Given that one's likelihood of getting promoted is higher at lower rungs of the hierarchy (where there are more open positions for advancement) than in the upper echelons, we included log base starting salary as a proxy for rank in models of an employee's promotion chances.

⁵ We also analyzed employees' social network position in the network defined by interactions between just the 506 newly hired engineers (rather than all employees in the organization). Results based on these measures were comparable to what we report below.

⁶ Despite developing and piloting manipulation checks to examine whether our treatment condition led people to draw different inferences about social belonging relative to our control condition, TechCo decided not to use any manipulation checks. In pilots, TechCo newcomers were alarmed by manipulation check items and concerned about whether and how their responses would be used in an evaluative capacity. After concluding the experiment, we conducted a supplemental study involving 224 Amazon Mechanical Turk participants who recognized that the content provided in our study's treatment condition emphasized more content pertaining to the challenges of fitting in at TechCo, building relationships with co-workers, and tips for success as a new employee than did the content in our study's control condition. Data and results from this supplemental study are available upon request.

Estimation

For analyses of bonus as a proportion of base salary, we estimated ordinary least squares (OLS) models with no control variables (given quasi-random assignment and the fact that all employees were hired into the same R&D function). For analyses of promotion rates, we estimated linear probability models, rather than logit models, given that our key variable of interest was an interaction term (Mize, 2019). Importantly, logistic regression analyses of promotion, *t* tests for proportions, and analyses of average marginal effects for women produce substantively similar results. Finally, for analyses of network centrality, we estimated OLS models that included week fixed effects to account for vacations and potential seasonality in online activity.

RESULTS

Table 1 provides key descriptive statistics for the overall sample of newly hired employees, as well as the subgroups of female and male newcomers in treatment and control. We report descriptive statistics for base salary in Years 1 and 2, bonus as a proportion of base salary in Years 1 and 2, promotion rates, degree centrality, and eigenvector centrality. Results from OLS regression models reported that, on average, women earned \$15,359 less ($p < .001$) in Year 1 and \$14,150 less ($p < .001$) in Year 2 than their male counterparts. Women were awarded bonuses as a proportion of their base salary that were 1.3 percentage points ($p < .01$) lower in Year 1 and 1.2 percentage points lower ($p < .05$) in Year 2 than those of their male counterparts. In contrast, women were 11.8% ($p < .05$) more likely to earn a promotion during our study than their male colleagues were.

The gender differences we detected were fewer overall and, at least for promotion rates, in the opposite direction than we would expect based on prior research on gender differences in career attainment (Ceci & Williams, 2007; National Science Foundation, 2018) and in social network centrality (Ibarra, 1992, 1993). To summarize, women received statistically significantly lower bonuses relative to their base salaries than their male counterparts, and were promoted at statistically significantly higher, rather than lower, rates than men. We did not detect statistically significant gender gaps in the following outcomes: likelihood of receiving nominations for internal recognition programs, turnover, and social network centrality. Despite these unanticipated patterns, we examined whether the social-belonging intervention had differential effects on women versus men, reasoning that, in an environment such as this in which women are thriving on key metrics,

TABLE 1
Descriptive Statistics (Means and Standard Deviations) for All Dependent Measures

	All Newcomers (n = 355; 310)^{a,b}	Female Newcomers in Treatment (n = 61; 56)^a	Male Newcomers in Treatment (n = 129; 114)^a	Female Newcomers in Control (n = 34; 27)^a	Male Newcomers in Control (n = 131; 113)^a
Year 1 base salary (\$, starting salary)	143,055 (32,893)	131,467 (35,772)	149,033 (31,366)	132,413 (25,214)	145,326 (33,051)
Year 2 base salary (\$)	151,511 (33,554)	143,028 (38,010)	155,668 (30,287)	137,258 (29,039)	154,927 (34,075)
Year 1 bonus relative to base salary (%) ^c	14.2 (4.1)	13.3 (4.4)	14.7 (4.0)	13.4 (2.9)	14.4 (4.2)
Year 2 bonus relative to base salary (%) ^c	14.8 (4.0)	14.3 (4.6)	15.1 (3.7)	13.1 (3.7)	15.1 (4.0)
Promoted newcomers (%) ^{d,e}	28.4 (45.2)	42.9 (49.9)	26.3 (44.2)	26.5 (44.8)	24.3 (43.0)
	All Employees (n = 10,489)^f	Female Newcomers in Treatment (n = 73)^f	Male Newcomers in Treatment (n = 175)^f	Female Newcomers in Control (n = 42)^f	Male Newcomers in Control (n = 176)^f
Degree centrality	89.2 (183.8)	160.4 (217.8)	153.6 (219.7)	157.3 (193.7)	178.6 (270.9)
Eigenvector centrality	0.008 (0.039)	0.004 (0.025)	0.006 (0.044)	0.004 (0.024)	0.006 (0.040)

Note: Standard deviations reported in parentheses following means.

^a n = n in Year 1; n in Year 2.

^b Due to turnover, the sample sizes were 355 and 310 at the end of Years 1 and 2, respectively.

^c Results from OLS regression show that women received a 1.3% lower bonus as a percentage of base in Year 1 ($p = .009$) and a 1.2% lower bonus as a percentage of base in Year 2 ($p = .021$) compared to their male counterparts.

^d Sample sizes for promotions were 366, 63, 133, 34, and 136 (left to right columns, respectively).

^e Results from logistic regression and linear probability models show that women were 11.8% ($p = .027$) more likely to be promoted than their male counterparts.

^f n = number of people.

women's career attainment might benefit especially from a message affirming the normalcy of career challenges as one adjusts to working at TechCo.

Table 2 reports results related to the intervention's effects on bonus as a proportion of base salary in the first and second years after hire. Due to turnover, the sample size was 355 after the first year of employment and 310 after the second year of employment. In Models 1 and 4, the main effect of the variable *Female* is negative and statistically significant for Years 1 and 2, suggesting that women receive lower performance-related bonuses than their male counterparts. Consistent with past research, the main effect of the variable *Treated* (in Models 2, 3, 5, and 6) is not statistically significant across model specifications (Walton & Cohen, 2007, 2011; Walton et al., 2015). Moreover, the interaction term *Female* × *Treated* (in Models 3 and 6) fails to reach significance (all $ps > .27$). Thus, we were unable to detect a statistically significant effect of the intervention on female newcomers' performance-related bonuses.⁷

Table 3 reports results of models that estimate how the social-belonging intervention affected an employee's promotion chances. In Model 1, consistent with expectations, we find that an employee's promotion chances are greater at lower levels of the hierarchy: newcomers entering with higher starting salaries are less likely to be promoted than those who join with lower starting salaries ($p < .001$). In Models 2 and 4, we do not find evidence of a main effect of *Female* on the probability of promotion (all $ps > .80$); we also did not find evidence of a main effect of *Treated* on promotion rates ($p = .094$). Finally, *Female* × *Treated* does not reach statistical significance in Model 5 ($p = .27$). Thus, using linear probability and logistic regression models, we did not find support for the expectation that the social-belonging intervention would improve female newcomers' likelihood of being promoted. Despite the lack of statistically significant effects in these models, simple means by gender and condition reported in Table 1 demonstrate a trend such that women in the treatment group experienced a higher promotion rate (42.9%), as compared to all other groups (26.5% for women in the control group; 26.3% for men in the treatment group; 24.3% for men in the control condition), a finding that we explore

⁷ We also used alternative model specifications to test this by regressing Year 2 salaries on Year 1 salaries, treatment, gender, and the interaction term, but did not find statistically significant evidence for the treatment effect or the interaction term ($ps > .20$). We also logged Year 1 and Year 2 salaries and ran the same regression models, but also did not detect a statistically significant effect for the treatment or the interaction term ($ps > .11$).

Author's voice:

Was there anything that surprised you about the findings?



further using post hoc contrast analyses reported below.

To offer insights from online social network behaviors, we report results related to network outcomes in Table 4, despite not finding a gender gap in social network centrality as measured on ChatTool. Models 2, 3, and 5 report the main effect of the social-belonging intervention on employee's social network centrality as measured in two ways (degree centrality and directed eigenvector centrality). *Treated* is not statistically significant across all models. In Models 3 and 6, the interaction term *Female* × *Treated* fails to reach significance (all $ps > .30$). Thus, the intervention did not appear to have statistically significant effects on female newcomers' centrality as measured in ChatTool.

While our main analyses did not find evidence in support of the social-belonging intervention having a beneficial effect on women's attainment measures, we conducted post hoc exploratory contrast analyses, which enabled us to vary the comparison group, to look for suggestive evidence of where and for what outcomes the intervention might have had some impact. First, based on the logic that women in the treatment group might disproportionately benefit from the intervention relative to all other participants and that low statistical power might prevent an omnibus two-way interaction to emerge, we compared women in the treatment group to everyone else (i.e., including women in the control group and men in both the treatment and control groups). Thus, these contrast analyses conflate any potential effects of gender in TechCo with the effect of the treatment. Women in the treatment group were indeed more likely to receive promotions than all other groups, $\chi^2(1, N = 366) = 7.34, p = .006, d = 0.39$.

Turning next to bonus as a proportion of base salary, we find that women in the treatment group received lower bonuses as a proportion of base salary in the first year, $F(1, N = 355) = 4.15, p = .042, d = 0.29$; this difference was mitigated entirely in Year 2. If women enter similar job roles at TechCo with lower salaries than their male counterparts, then one

Author's voice:

How did the paper evolve and change as you worked on it?



TABLE 2
OLS Models Estimating Intervention Effects on Year 1 and Year 2 Bonuses as Proportion of Base Salary

	(1)	(2)	(3)	(4)	(5)	(6)
	Year 1 Bonus as Prop. of Base	Year 1 Bonus as Prop. of Base	Year 1 Bonus as Prop. of Base	Year 2 Bonus as Prop. of Base	Year 2 Bonus as Prop. of Base	Year 2 Bonus as Prop. of Base
Female	−0.0126** (0.00483)		−0.0105 (0.00778)	−0.0119* (0.00513)		−0.0198* (0.00857)
Treated		0.000510 (0.00433)	0.00301 (0.00501)		0.000735 (0.00460)	−0.000450 (0.00531)
Female × Treated			−0.00405 (0.00999)			0.0118 (0.0108)
Constant	0.146** (0.00250)	0.142** (0.00317)	0.144** (0.00353)	0.151** (0.00265)	0.148** (0.00341)	0.151** (0.00376)
Observations	355	355	355	310	310	310
Adjusted R^2	.016	−.003	.012	.014	−.003	.012

Notes: Standard errors in parentheses. Sample size varies across models due to employee attrition during the study.

* $p < .05$

** $p < .01$

possible interpretation of this pattern of results is that the social-belonging intervention may have had more of a boosting effect on women than an attenuating effect on a baseline deficit. Alternatively, earning a promotion may be jointly determined by performance evaluations and newcomers' expression of interest in receiving a promotion—unlike compensation decisions, which may not rely on newcomers' individual actions as much.

Second, based on the logic that the intervention might mitigate gender differences in social belonging such that only women in the control group would show evidence of a lack of belonging in their network (while women in the treatment group appear to experience comparable levels of belonging as men in general), we compared women in the control group to everyone else (i.e., including men in the control group plus women and men in the treatment group). There were no statistically significant differences in the likelihood of promotion or bonus as a proportion of base salary in Year 1. However, in Year 2, women in the control group received lower bonuses as a proportion of base salary, $F(1, N = 310) = 4.98, p = .026, d = 0.45$.

Lastly, we conducted further post hoc analyses to assess whether the intervention was more effective with certain subgroups or particular outcome measures. Specifically, we examined separately the effects of the intervention for the most junior newcomers and the most senior newcomers; we also examined one-to-one and one-to-group communications separately. On the one hand, a sense of social belonging might be most malleable at junior levels before employees' beliefs about the extent to which they belong are fortified. On the other hand, more senior employees may experience greater threats to their sense of social belonging, which

could have led them to benefit most from the intervention. Along the same lines, we explored whether particular modes of communication were more likely to be influenced by the intervention: more private one-to-one communication or more public, visible messages that were sent to entire working groups. Table 5 summarizes our supplemental analyses investigating possible heterogeneous treatment effects. Given the data available to us, we could not detect robust statistically significant evidence that the intervention had a positive impact on any identified subgroups or particular types of social network behaviors based on different modes of ChatTool communications.

DISCUSSION

The results from this investigation motivate further reflection on how social-belonging interventions, which prior work has linked to positive outcomes in educational contexts (Yeager & Walton, 2011), can be more effectively adapted to organizational settings and on the methodological limitations of this study that future research can aim to overcome. Although there was clear a priori reason to expect that significant gender differences would emerge across multiple measures of career attainment, we observed differences between men and women in some but not all attainment indicators. We identified statistically significant gaps between women and men in bonus amounts as a percentage of base salary and likelihood of promotion (in the opposite direction than we expected), but not in social network centrality, nomination for performance awards, or turnover. Given this peculiar pattern of baseline gender differences present at TechCo, we acknowledge that care must be taken in

TABLE 3
Linear Probability Models Predicting Promotion

	(1)	(2)	(3)	(4)	(5)
	Promotion	Promotion	Promotion	Promotion	Promotion
Year 1 base salary (logged)	-0.894** (0.0962)	-0.888** (0.0990)	-0.894** (0.0960)	-0.894** (0.0988)	-0.888** (0.0989)
Female		0.0130 (0.0505)		0.00174 (0.0508)	-0.0657 (0.0791)
Treated			0.0729 (0.0434)	0.0727 (0.0439)	0.0443 (0.0507)
Female × Treated					0.113 (0.101)
Constant	10.88** (1.140)	10.81** (1.176)	10.85** (1.137)	10.84** (1.173)	10.79** (1.174)
Observations	355	355	355	355	355
Adjusted R^2	.194	.192	.198	.196	.197

Note: Standard errors in parentheses.

** $p < .01$

drawing inferences from this single study about the likely efficacy of social-belonging interventions in organizational contexts more generally. Moreover, it may be useful to target social-belonging interventions to organizations that display more consistent gender gaps than we observed at TechCo and to check for the presence of these gaps, as well as evidence that women newcomers feel they do not belong in the organization, before investing in such an intervention.

We proceed by identifying four key differences between typical educational settings and the specific context of TechCo that might have contributed to the results of our study. Given potentially significant differences between school and work settings, we anticipate that organizations more closely resembling typical educational settings on these four dimensions and outcome measures that more closely correspond to those used in educational institutions are more likely to be contexts in which researchers can successfully adapt social-belonging interventions.

Proposed Moderators

Differences in evaluation frequency and number of evaluators. The frequency of evaluations and number of evaluators in TechCo differ from those in educational settings in potentially critical ways. A student's GPA—a dependent variable used in past research—reflects performance ratings in multiple classes over time. In contrast, newcomers receive performance evaluations at one point in time (annually) at TechCo, which drive their bonus percentages and promotion chances. It is possible that

more frequent evaluations reflect a more accurate measure of performance than do annual evaluations, which might be biased by recency effects and other forms of measurement error. If so, then a post-intervention performance measure based on multiple instances of evaluation might more accurately detect increases in social belonging than an annual performance measure. Through an iterative process, the behaviors driving early successes are positively reinforced, increasing the likelihood of future successes. Multiple evaluations might also provide people with more opportunities to develop a sense of social belonging and more practice in buffering their social identity threats in the environment.

In organizational settings, future research could instead measure more common performance metrics, such as employees' time to completion of frequent and routine tasks, instead of holistic, annual performance evaluations. Studying more proximal measures of day-to-day performance might shed light on mediating mechanisms of gender differences for more consequential but infrequent outcomes such as salary and promotion. In addition to multiple evaluations of performance, there are also multiple raters in schools as compared to organizations. For example, students' GPA is based on evaluations from numerous instructors, whereas one supervisor primarily shapes employees' performance evaluations at TechCo. Future research may benefit from studying intervention outcomes in evaluations wherein performance measures are based on multiple evaluators instead of just one supervisor, such as 360-degree, team, or peer review processes.

Differences in performance evaluation content. The content of performance evaluations in

TABLE 4
Models Estimating Effects of Treatment on Social Network Centrality with Week Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Degree Centrality	Degree Centrality	Degree Centrality	Eigenvector Centrality (directed)	Eigenvector Centrality (directed)	Eigenvector Centrality (directed)
Female	-6.776 (13.40)		-21.44 (21.04)	-0.00144 (0.00115)		-0.00209 (0.00157)
Treated		-13.47 (12.97)	-24.46 (16.20)		-0.000683 (0.00133)	-0.00100 (0.00183)
Female × Treated			28.46 (27.28)			0.00119 (0.00234)
Week fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	121.7** (32.31)	156.5** (36.17)	170.2** (39.59)	0.148** (0.0214)	0.155** (0.0231)	0.171** (0.0240)
Observations	31,024	32,054	30,458	31,024	32,054	30,458
Adjusted R^2	.013	.015	.016	.201	.202	.208

Note: Standard errors in parentheses.

** $p < .01$

organizations may also differ from assessments in classrooms in terms of standardization and objectivity. The links between social belonging and performance may be stronger in educational environments, where expectations about the content of performance evaluations are more standardized than in TechCo. For example, all students in a course complete the same assignments, whereas newcomers at TechCo work on different projects where the specific tasks of their job vary. Subjective evaluations of non-standardized tasks, which are often inputs to performance evaluations that determine bonus payouts, may introduce other pernicious forms of bias that might be too difficult for social-belonging interventions to overcome (Castilla & Benard, 2010; Reskin, 2000; Ridgeway & Correll, 2004).

We speculate that the objectivity of performance metrics may prove to be an important moderator, with the effects of social-belonging interventions being perhaps easier to detect when performance outcomes are more objectively measured. Future research studies can utilize more standardized measures of employee performance that align well with the context. In large technology firms such as TechCo, examples of such measures include the number and importance of bugs an employee fixes, burn rates, and the number and quality of the product features they help to develop. In other organizational settings, examples of such measures may include billable hours, the rate at which investment opportunities are evaluated, and project timeliness.

Participants' age and prior work experience in relevant industries. Newcomers to TechCo are likely older and more experienced than students

entering a university setting, raising the possibility that demographic characteristics such as age or years of work experience might influence the extent to which participants benefit from such interventions. For example, the intervention may have been less likely to affect seasoned TechCo newcomers with more extensive work experience, whose beliefs about social belonging in STEM could be more intractable.⁸ Moreover, we note that recent evidence of the effectiveness of brief psychological interventions in closing the gender achievement gap among MBA students suggests that such interventions can also work for participants who are somewhat older than first-year undergraduates (Kinias & Sim, 2016). Even in organizational settings where brief online diversity trainings shaped attitudes toward women in the workplace (which could be regarded as a manipulation check), interventions with similar aims produced mixed effects on more consequential behavioral outcomes (Chang et al., 2019). Future researchers may target newcomers in internship programs, newcomers hired directly after completing undergraduate or masters' degree programs, or newcomers who transition into STEM roles with little prior experience in the industry.

Intervention content alignment with broader organizational culture. Just like broader organizational cultures of innovation, collaboration, or psychological safety can shape employee productivity,

⁸ Although we do not have the data to test this proposition directly, our post hoc analyses revealed no differences in the intervention's effectiveness for more senior (and likely older and more experienced) versus more junior employees.

TABLE 5
Exploring Heterogeneous Treatment Effects by Subgroups and Outcome Measures

Subgroup and Specific Outcome Measure and Method	Rationale	Result
Subgroup: Junior employees (those with bottom quartile, third, and half of Year 1 earnings), using OLS and logistic regression	Junior newly hired employees with the lowest starting salaries (and presumably the least prior experience) are closest in age to university freshmen, which was the sample group used in prior work (Walton & Cohen, 2007, 2011; Walton et al., 2015).	Null
Subgroup: Senior employees (those with top quartile, third, and half of Year 1 earnings), using OLS and logistic regression	The gender wage gap is often more pronounced at senior levels (reflecting the cumulative disadvantage women often face) than at the entry levels.	Null
Specific outcome measure: one-to-one communication on ChatTool, using OLS with week fixed effects	One-to-one communication may be more reflective of help-seeking behavior and thus more susceptible to influence from a social-belonging intervention.	Null
Specific outcome measure: one-to-group communication on ChatTool, using OLS with week fixed effects	One-to-group communication is more public and potentially higher stakes than one-to-one communication. The intervention might have emboldened participants to engage in this riskier but potentially more valuable form of communication.	Null

an organization's broader culture may also shape an individual's sense of social belonging. For example, organizational cultures—which are characterized by norms and rooted in core beliefs—can endorse more fixed or growth mindsets (Chatman & O'Reilly, 2016; Canning, Murphy, Emerson, Chatman, Dweck, & Kray, 2020; Schein, 2010). If individuals perceive that their organization endorses more of a fixed mindset—the notion that individual talent and ability are fixed and cannot be changed—then such a core belief may conflict with social belonging content, which emphasizes that obstacles facing new members are common, transient, and surmountable. To the extent that participants, during their first two years of employment, experienced broader organizational cultural content that conflicted with our study's social belonging content, such as a fixed mindset, this may have reduced the efficacy of the intervention. Unlike STEM fields, where the concept of geniuses can be idealized (Leslie, Cimpian, Meyer, & Freeland, 2015), some academic disciplines and settings are fundamentally rooted in the core belief of learning, which may serve to reinforce participant's internalization of social-belonging intervention content. Applying this distinction to organizational settings, future research can gather firm-wide data on organizational culture—for example, by utilizing Organizational Cultural Profiles (O'Reilly, Chatman, & Caldwell, 1991)—to investigate whether particular dimensions of an organization's culture across teams and departments moderate the effects of a social-belonging intervention. It may be that a learning orientation is needed for the positive effects of social-belonging interventions to take hold.

In addition to targeting social-belonging interventions to the types of organizations and organizational outcomes where they are more likely to be effective, we also acknowledge certain limitations in

our study design that might have limited our capacity to detect the intervention's effects at TechCo. In particular, we highlight below four key adjustments we would recommend making to our research design.

Recommendations for Future Research

Ensure adequate statistical power. It is possible that we lacked sufficient statistical power to detect the effects of the social-belonging intervention. Previously published literature reports standardized effect sizes (Cohen's *d*) of the treatment effect for minority group members' post-intervention behaviors (e.g., GPA, hours spent studying, achievement behaviors) ranged from 1.07 to 1.47 (Walton & Cohen, 2007: 91–92; Walton & Cohen, 2011; Walton et al., 2015: 476–477). In this study, an effect size of 1.07 represents a shift of approximately 4.35% in bonus as a percentage of salary (an increase from the observed 14.2% in Year 1 to 18.6% and an increase from the observed 14.8% in Year 2 to 19.1%). Assuming a Type I error rate of 5%, and two-tailed tests, our sample had sufficient statistical power to detect effects in line with previously published research (99.9% statistical power) and to detect minimum simple effects of the treatment ranging from 0.38 to 0.41 in effect size for bonus as a proportion of base salary in Years 1 and 2 in the full sample.⁹ In contrast, we acknowledge that our sample of 355 newcomers may have been underpowered for

⁹ Assuming a reasonable amount of power (80%), a Type I error rate of 5%, and conservative two-tailed tests, our sample had sufficient statistical power to detect a minimum simple effect of the treatment on social network centrality of 0.33 in effect size and a simple effect of the treatment of women on social network centrality of 0.55.

analyses related to our second binary dependent variable: whether or not an employee was promoted during the observation period. For example, a sample size of 825 would have been needed to have sufficient (80%) statistical power to detect a one standard deviation effect of the social-belonging intervention on newcomers' probabilities of promotion.

Although this study was an extension rather than a direct replication of past social belonging research, we anticipated at the time we designed the study that our sample size for analyses related to bonus as a percentage of base salary would be reasonable, given that our sample was 2.5 times larger than the samples reported in foundational papers on the social-belonging intervention (e.g., Walton & Cohen, 2007, 2011; Simonsohn, 2015). Yet, contemporary research guidelines suggest that an interaction driven by a significant effect for one group and not another requires a sample size four times as large as the sample needed to detect the simple effect. Thus, based on these modern research recommendations, an ideal future study would need 96 participants per cell to detect such an interaction, in contrast to the 34 to 175 participants per cell that we had.

Better target the intervention to subgroups that are most likely to benefit. We do not know if certain subgroups might have benefited more than others from our intervention. Given that longitudinal field experiments of the kind we implemented can take a long time to set up and entail significant opportunity costs for researchers and organizational leaders alike, it may be useful to conduct lab experimental or qualitative research in advance to identify particular subgroups (e.g., employees from different racial or ethnic, sexual orientation, parental status, or socioeconomic status groups within the setting). It may also be helpful for researchers to identify particularly problematic teams within the organization or particular moment's in employees' career trajectories (e.g., after they return from parental leave or when they first take on a supervisory role) that may be especially likely to benefit from such interventions.

Use more subtle manipulation checks. Manipulation checks are often a critical component of research design. However, in practice, introducing a new assessment into an organizational environment proved to be more precarious than we had

Author's voice:

What was the most difficult or challenging aspect of this research project?



anticipated. When we piloted our experimental materials, TechCo employees were anxious about completing survey items related to their feelings and subjective experience, despite TechCo's emphasis about the anonymous and non-evaluative nature of the items in the manipulation check. To address this limitation, we conducted a follow-up study on Amazon Mechanical Turk to confirm that the content of the videos used in the treatment and control conditions were statistically significantly different as intended. Future attempts to implement social-belonging interventions in the field might benefit from the use of brief post-orientation surveys that can gather feedback on the orientation program and check participants' understanding of the content. Future research can also find other more subtle ways to conduct manipulation checks—for example, by collaborating with individual managers who can gather data about orientation content during weekly check-ins with their subordinates, or collecting free text responses from participants and coding the responses for clues of social belonging (e.g., the use of “we” rather than “I”) (Doyle, Goldberg, Srivastava, & Frank, 2017).

Collect egocentric network data. Finally, our network analyses were limited to data derived from ChatTool, which primarily reflects task-based employee communication. Yet, it is possible that social-belonging interventions affect not a participant's position in the task-coordination network but instead her position in the network of advice-seeking, social support, or mentorship communication, which might largely occur outside of the public ChatTool platform. Past research suggests that social network characteristics of women and people from ethnic minority groups differ from those of White men in part because of limited access to informal networks in organizations (Ibarra, 1992, 1993). Online communication options such as ChatTool that are more accessible and visible than email, text messaging, or private in-person communications may serve to ameliorate gender gaps stemming from historically limited network access. We anticipate that future research will benefit from tapping into multiple forms of network data—including surveys that can distinguish between the exchange of instrumental (e.g., task advice) and expressive (e.g., social support) resources (Lin, Fu, & Hsung, 2001)—that are

Author's voice:

If you were able to do this study again, what if anything would you do differently?



collected through a variety of data collection techniques (e.g., network surveys, sociometric badges, archived electronic communications). Future research can more closely examine whether targeting women newcomers' sense of social belonging in STEM changes their perception of their socially supportive relationships at work instead of their relationships based on actual communication patterns.

CONCLUSION

Notwithstanding its limitations and potential differences between workplace and educational settings, the current study makes several novel contributions to the growing body of work that examines the effects of diversity and inclusion programs, which are rapidly proliferating across organizations (Barak, 2016; Dobbin et al., 2015; Kalev et al., 2006). The effects of this hour-long intervention in one organization's onboarding program may be, at best, small in size (and non-significant overall), yet small or null effects can still be clinically or practically significant (Cohen, 1992)—especially in providing guidance for future research. The “file drawer problem” can skew effect size estimates based on published literature if it is biased in favor of significant effects (Rosenthal, 1979), and it is therefore important to publish null results for this reason alone. Lastly, one of our post hoc contrast analyses provides suggestive evidence that women in the treatment group were more likely to receive promotions than men and women in the control group. Unlike compensation decisions or performance evaluations that are heavily shaped by managerial evaluations of performance, promotion decisions are also likely shaped by whether an employee expresses a desire to ascend in the organization and gain more responsibility. Thus, it is possible that our social-belonging intervention may have influenced women by encouraging them to express their interest in receiving promotions—a possibility worth investigating further in future research.

Whereas much of the work to date has focused on cross-organization comparisons of various programs, we report results from a unique, longitudinal quasi-experiment implementing a social-belonging intervention in one specific firm (Dobbin et al., 2015; Kalev et al., 2006). That we are unable to detect a robust, statistically significant impact on women's attainment outcomes from a social-belonging intervention, which was designed to mirror one previously reported to have been effective in educational settings, suggests the need for a more nuanced understanding of how practices that were successful in one social context can be effectively imported to the workplace. Further research, using longitudinal study designs of the kind we

implemented, along with multiple different types of performance metrics, is needed to compare diversity and inclusion programs, and to determine when, where, and how such programs are most likely to be effective at ameliorating workplace inequities.

Understanding when and how diversity practices work across different contexts is a critical step in deciding how to allocate scarce resources to policies and programs that seek to address workplace inequality. Gleaning theoretical and empirical insights about what types of organizations are best suited to conduct social-belonging interventions and which components of research design are critical, such as the ones we offer here, can be just as important as positive results in building collective knowledge about the efficacy of diversity and inclusion programs. In sum, this study highlights the value of a cumulative body of research that uses well-designed, longitudinal field experiments to identify “best practices” in the design of such programs (Kalev et al., 2006).

REFERENCES

- Barak, M. E. M. 2016. *Managing diversity: Toward a globally inclusive workplace* (4th ed.). Thousand Oaks, CA: SAGE.
- Baumeister, R. F., & Leary, M. R. 1995. The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3): 497–529.
- Burt, R. S. 2005. *Brokerage and closure: An introduction to social capital*. Oxford, U.K.: Oxford University Press.
- Cable, D. M., Gino, F., & Staats, B. R. 2013. Breaking them in or eliciting their best? Reframing socialization around newcomers' authentic self-expression. *Administrative Science Quarterly*, 58(1): 1–36.
- Canning, E. A., Murphy, M., Emerson, K. T. U., Chatman, J. A., Dweck, C. S., & Kray, L. J. 2020. Cultures of genius at work: Organizational mindsets predict cultural norms, trust, and commitment. *Personality and Social Psychology Bulletin*, 46(4): 626–642.
- Castilla, E. J., & Benard, S. 2010. The paradox of meritocracy in organizations. *Administrative Science Quarterly*, 55(4): 543–576.
- Ceci, S. K., & Williams, W. M. 2007. *Why aren't more women in science? Top researchers debate the evidence*. Washington, DC: American Psychological Association.
- Chang, E. H., Milkman, K. L., Gromet, D. M., Rebele, R. W., Massey, C., Duckworth, A. L., & Grant, A. M. 2019. The mixed effects of online diversity training. *Proceedings of the National Academy of Sciences of the United States of America*, 116(16): 7778–7783.

- Chatman, J. A., & O'Reilly, C. A. 2016. Paradigm lost: Reinvigorating the study of organizational culture. *Research in Organizational Behavior*, 36: 199–224.
- Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. 2009. Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, 97(6): 1045–1060.
- Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, K. 2017. Why are some STEM fields more gender balanced than others? *Psychological Bulletin*, 143(1): 1–35.
- Cohen, J. 1992. A power primer. *Psychological Bulletin*, 112(1): 155–159.
- Cooper, J., & Fazio, R. H. 1984. A new look at dissonance theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, vol. 17: 229–266. Orlando, FL: Academic Press.
- Correll, S. J. 2017. Reducing gender biases in modern workplaces: A small wins approach to organizational change. *Gender & Society*, 31(6): 725–750.
- Dobbin, F., Schrage, D., & Kalev, A. 2015. Rage against the iron cage: The varied effects of bureaucratic personnel reforms on diversity. *American Sociological Review*, 80(5): 1014–1044.
- Doyle, G., Goldberg, A., Srivastava, S. B., & Frank, M. C. 2017. Alignment at work: Using language to distinguish the internalization and self-regulation components of cultural fit in organizations. In R. Barzilay, M.-Y. Kan, T. Matsuzaki, T. Ito, H. Iwane, H. Anai, & N. H. Arai (Eds.), *Proceedings of the 55th annual meeting of the Association for Computational Linguistics*, vol. 1: 603–612. Stroudsburg, PA: Association for Computational Linguistics.
- Ely, R. K. 1994. The effects of organizational demographics and social identity on relationships among professional women. *Administrative Science Quarterly*, 39(2): 203–238.
- Erickson, B. H. 1996. Culture, class, and connections. *American Journal of Sociology*, 102(1): 217–251.
- Fordham, S., & Ogbu, J. U. 1986. Black students' school success: Coping with the "burden of" acting white. *Urban Review*, 18(3): 176–206.
- Good, C., Rattan, A., & Dweck, C. S. 2012. Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology*, 102(4): 700–717.
- Ibarra, H. 1992. Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative Science Quarterly*, 37(3): 422–447.
- Ibarra, H. 1993. Personal networks of women and minorities in management: A conceptual framework. *Academy of Management Review*, 18(1): 56–87.
- Kalev, A. 2009. Cracking the glass cages? Restructuring and ascriptive inequality at work. *American Journal of Sociology*, 114(6): 1591–1643.
- Kalev, A., Kelly, E., & Dobbin, F. 2006. Best practices or best guesses? Assessing the efficacy of corporate affirmative action and diversity policies. *American Sociological Review*, 71(4): 589–617.
- Kinias, Z., & Sim, J. 2016. Facilitating women's success in business: Interrupting the process of stereotype threat through affirmation of personal values. *Journal of Applied Psychology*, 101(11): 1585–1597.
- Kizilec, R. F., Saltarelli, A. J., Reich, J., & Cohen, G. L. 2017. Closing global achievement gaps in MOOCs. *Science*, 355: 251–252.
- Kleinbaum, A. M., Stuart, T. E., & Tushman, M. L. 2013. Discretion within constraint: Homophily and structure in a formal organization. *Organization Science*, 24(5): 1316–1336.
- Leslie, S. J., Cimpian, A., Meyer, M., & Freeland, E. 2015. Expectations of brilliance underlie gender distributions across academic disciplines. *Science*, 347: 262–265.
- Lin, N., Fu, Y.-C., & Hsung, R.-M. 2001. The position generator: Measurement techniques for investigations of social capital. In N. Lin, K. S. Cook, & R. S. Burt (Eds.), *Social capital: Theory and research*: 57–81. New York, NY: Aldine de Gruyter.
- Logel, C., Walton, G. M., Spencer, S. J., Iserman, E. C., von Hippel, W., & Bell, A. E. 2009. Interacting with sexist men triggers social identity threat among female engineers. *Journal of Personality and Social Psychology*, 96(6): 1089–1103.
- Mehra, A., Kilduff, M., & Brass, D. J. 1998. At the margins: A distinctiveness approach to the social identity and social networks of underrepresented groups. *Academy of Management Journal*, 41(4): 441–452.
- Mize, T. D. 2019. Best practices for estimating, interpreting, and presenting nonlinear interaction effects. *Sociological Science*, 6: 81–117.
- National Science Foundation. 2018. *Science and engineering indicators 2018*. Retrieved from <https://www.nsf.gov/statistics/2018/nsb20181>
- O'Reilly, C. A., Chatman, J., & Caldwell, D. F. 1991. People and organizational culture: A profile comparison approach to assessing person–organization fit. *Academy of Management Journal*, 34(3): 487–516.
- Reskin, B. F. 2000. The proximate causes of employment discrimination. *Contemporary Sociology*, 29(2): 319–328.

- Ridgeway, C. L., & Correll, S. J. 2004. Unpacking the gender system: A theoretical perspective on gender beliefs and social relations. *Gender & Society*, 18(4): 510–531.
- Rosenthal, R. 1979. The “file drawer problem” and tolerance for null results. *Psychological Bulletin*, 86(3): 638–641.
- Schein, E. H. 2010. *Organizational culture and leadership* (4th ed.). San Francisco, CA: Jossey-Bass.
- Simonsohn, U. 2015. Small telescopes: Detectability and the evaluation of replication results. *Psychological Science*, 26(5): 559–569.
- Srivastava, S. B. 2015. Network intervention: A field experiment to assess the effects of formal mentoring on workplace networks. *Social Forces*, 94(1): 427–452.
- Stephens, N. M., Fryberg, S. A., Markus, H. R., Johnson, C. S., & Covarrubias, R. 2012. Unseen disadvantage: How American universities’ focus on independence undermines the academic performance of first-generation college students. *Journal of Personality and Social Psychology*, 102(6): 1178–1197.
- Stephens, N. M., Hamedani, M. G., & Destin, M. 2014. Closing the social-class achievement gap: A difference-education intervention improves first-generation students’ academic performance and all students’ college transition. *Psychological Science*, 25(4): 943–953.
- Turco, C. J. 2010. Cultural foundations of tokenism: Evidence from the leveraged buyout industry. *American Sociological Review*, 75(6): 894–913.
- Walton, G. M. 2014. The new science of wise psychological interventions. *Current Directions in Psychological Science*, 23(1): 73–82.
- Walton, G. M., & Cohen, G. L. 2007. A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology*, 92(1): 82–96.
- Walton, G. M., & Cohen, G. L. 2011. A brief social-belonging intervention improves academic and health outcomes of minority students. *Science*, 331: 1447–1451.
- Walton, G. M., Logel, C., Peach, J. M., Spencer, S. J., & Zanna, M. P. 2015. Two brief interventions to mitigate a “chilly climate” transform women’s experience, relationships, and achievement in engineering. *Journal of Educational Psychology*, 107(2): 468–485.
- Williams, D. A., & Wade-Golden, K. C. 2013. *The chief diversity officer: Strategy, structure, and change management*. Sterling, VA: Stylus Publishing.
- Yeager, D. S., & Walton, G. M. 2011. Social-psychological interventions in education: They’re not magic. *Review of Educational Research*, 81(2): 267–301.



Sanaz Mobasseri (sanazm@bu.edu) is an assistant professor of management & organizations and sociology (by courtesy) at Boston University. Her research investigates race and gender inequalities in organizations using field experimental and computational methods. She earned her PhD at the University of California, Berkeley’s Haas School of Business.

Sameer B. Srivastava (srivastava@haas.berkeley.edu) is associate professor and Harold Furst Chair in management philosophy and values at the Haas School of Business. His research unpacks the interrelationships between the culture of social groups, the cognition of individuals within them, and the network ties they form. He codirects the Computational Culture Lab and the Berkeley Culture Initiative.

Laura J. Kray (ljkray@berkeley.edu) is professor and Ned and Carol Spieker Chair in leadership at Haas School of Business. She studies the effects of gender stereotypes and mindsets on workplace behavior. Her work has been supported by the National Science Foundation and has been recognized with multiple best research awards from the Academy of Management and the International Association of Conflict Management.



APPENDIX A

LIFE STORY INTERVIEW PROTOCOL

We'd like to ask you a few questions about your experiences at TechCo. We want to learn more about your personal experiences and attitudes in order to provide future employees with more accurate expectations about working here. If it is helpful, you can think about this interview as an opportunity to share the story of your time at TechCo. There are no right or wrong answers to these questions. We are interested in hearing your story as you remember it.

Career History and New Hire Experiences at TechCo

1. Let's start by talking about your career history prior to joining TechCo. What did you study/what was your major? Can you tell us a bit about your career trajectory leading up to your employment here? How long have you been working at TechCo, and what brought you here?
2. Thinking back to when you first started your job here, what were your expectations about working at TechCo? . . . About your job or colleagues at TechCo? What, if anything, did you find surprising about working at TechCo? What types of uncertainties did you face/[doubts did you have]? Can you think of any examples?
3. Have there been times when you felt as though you didn't fit in? Can you please provide examples of what this felt like?
4. Please identify what you now consider to be the greatest challenge you faced at TechCo.

The Turning Point at TechCo

1. In looking back over your time at TechCo, it may be possible to identify certain key moments that stand out as turning points—episodes that marked an important change in your career. Please identify a particular episode in your time at TechCo that you now see as a turning point. Can you tell us about the point at which you really knew that you belong at TechCo? Where were you, what did you feel, what did you experience?
2. Please describe how you established relationships at work to help you succeed.
3. Can you describe how you worked to achieve your social position in the organization?

Current Experiences at TechCo

1. How would you describe the culture at TechCo? What are the core values of TechCo as you see it? How have you personally adapted to the culture at TechCo?
2. Is there anything else you'd like to tell us about your experiences at TechCo?

APPENDIX B

TABLE B1
ILLUSTRATIVE QUOTES FROM PILOT INTERVIEWS

<i>Describing their experience as a newly hired employee:</i>	<p>“I was scared shitless, um [<i>chuckle</i>]. . . College was... you go into a computer cluster, you sit down there, you’re there for 12 hours; when you leave, it’s four in the morning and you’re this haggard, zombie person who can barely walk and is kind of drooling out of the side of their mouth, and, um, I <i>really</i> hated doing <i>that</i>, and so I was really afraid, when I got here, that it would be more of <i>that</i>.”</p> <p>“I really didn’t know what TechCo did, um, even when I started working.”</p> <p>“I was worried that I would have to know all the answers . . . I had a lot of trouble speaking up in our bug triage meetings . . . There were a lot of very complicated problems. There was a lot of working with people to figure out what the problems <i>are</i>.”</p> <p>“I think the hardest transition points were . . . not knowing people . . . suddenly, I was completely back to square one, and I didn’t know who to go to. And, not only that, I didn’t know the lingo. I mean, I remember going with my notepad to product reviews and just writing down all these questions: what is [acronym], what is this, what is that? And just kind of wanting to push the fast forward button so that I’d be in a position to, like, know everything and be what I was at the earlier company, but I guess, you know, that just wasn’t practical. <i>So</i>, you know, it was overwhelming and there was that feeling of, you know, am I ever going to be able to be successful here, because it has taken me <i>so</i> long to come up to speed with things.”</p>
<i>Describing their turning points at TechCo:</i>	<p>“I felt . . . I have a way to get people to hear what I’m saying instead of just being the noise in the background.”</p> <p>“I think the epiphany for me was learning that my contributions are just as valuable even if I’m not the most technical in the room.”</p> <p>“At other companies, they expect you to ramp up in one month or three months, but, at TechCo . . . it can take six months. And, at that point, I think I was four months in, and so I thought I was already behind, but it turned out I was pretty far ahead.”</p> <p>“I felt like I was part of the team when I could recognize patterns and problems, and I would speak up, and I was able to, you know, help decide what the right solutions were. I could tell at that point that my team valued my opinion and welcomed having me at the table.”</p> <p>“Kinda the key tipping point for me . . . was . . . making the choice to get more involved in different groups and go to different meetings.”</p>
<i>Reflecting on their new hire experience:</i>	<p>“New hire mentality. . . is like, ‘Yeah, I know what I’m doing; alright, we are gonna go make things happen,’ which is just a bunch of garbage.”</p> <p>“Don’t worry that you are not going to be able to pick up things straightaway . . . so give yourself that time.”</p> <p>“Meet . . . the people around you, in the next aisle, on that other floor, in the kitchen, wherever it might be, because those are the people that you are gonna need help from.”</p> <p>“As new hires, we often feel skeptical about reaching out, so that would be one very crucial piece of advice, like, I could give, is to just reach out and make an effort and you’ll be very surprised at the number of responses you’ll get and the amazing feedback and insights you’ll have.”</p>

Note: Illustrative quotes from pilot interviews featured in Part 1 of the social-belonging intervention (video).