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A Brief Social-Belonging Intervention in the Workplace: Evidence from a Field Experiment*

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A Brief Social-Belonging Intervention in the Workplace:
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ABSTRACT

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 twelve months, with 506 newly hired engineers (24% 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 for 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.

Keywords: social belonging, STEM, gender, interventions, inequality

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INTRODUCTION

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 et al., 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 et al., 2017; Walton et al., 2015; Walton & Cohen, 2007, 2011). 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 freshmen's sense of social belonging at a university raised black students' GPAs and halved the minority achievement gap (Walton & Cohen, 2011).

Building on these insights, we conducted a twelve-month field experiment at a large west coast technology firm to assess whether a brief social-belonging intervention—analogous to the one used in educational settings but adapted to a corporate context—can 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. We did not find that a comparable intervention in a workplace setting had an effect on women's bonus as a percentage of base, 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 Years 1 and 2. Surprisingly, we did not find predicted gender gaps in promotion rates, and we also did not find a statistically significant effect of the treatment for women on this outcome. Also in contrast to prior research leading us to expect *a priori* gender differences in social networks (Ibarra, 1992; 1993; Kleinbaum, Stuart, & Tushman, 2013), we did not find that women 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 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 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 minority 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 minorities and how minorities perceive themselves, thereby threatening minorities' 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 students at elite educational institutions face a dominant culture that they often experience as unfamiliar or unwelcoming (Fordham & Ogbu, 1986; Stephens et al., 2012), women entering technology firms must contend with so-called "bro" cultures that can be chilly and unreceptive. Women in technology, especially 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 the workplace is better suited to men (Cheryan et al., 2017; Cheryan et al., 2009; Logel et al., 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 non-white 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, we explored whether a brief social-belonging intervention— adapted to a corporate context—would 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 nonbelonging. 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 whether the intervention might have especially affected women's propensity to connect with their colleagues in supplemental analyses.

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% female) hired into

TechCo's Research and Development (R&D) function 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 to facilitate learning the

psychosocial constructions that existing employees used to make sense of their integration into

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[1] We agreed with TechCo to run the study for a year, a timeframe in 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 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.

and subsequent success at TechCo. Appendix A includes our interview protocol.

Closely paralleling past social belonging research, our design included treatment and control conditions with three components: (1) watching a video; (2) writing a brief self-reflection about the video; and (3) 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.

Intervention Part 1: Watching a Video. In Part 1, newly hired employees watched a 10-minute video, which we 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 overcome their concerns and felt that they fit 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: "I felt like I was part of the team when I could recognize patterns and

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[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) finds 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.

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 et al., 2015; Walton, 2014; Walton & Cohen, 2011, 2007). 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 contains 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: (1) described their technological problems; (2) detailed implementation and adoption processes for TechCo products; and (3) 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.

Intervention Part 2: 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.

Intervention Part 3: 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 their 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 is 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 are limited to cohorts of newcomers to TechCo and their attainment outcomes

that can be observed during our study period. It is important to note that the attainment outcomes

that we observe 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 U.S. Thus, for analyses related to employee attainment, our

sample consists of the 366 newly hired engineers (27% women) who worked in U.S. offices. Our

sample for analyses related to social network position includes all 506 newly hired engineers

(24% women).

Key Dependent Variables: Bonus as a Proportion of Base Salary and Promotion Rate

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: bonus as a proportion of base salary and the likelihood of getting

promoted during our observation window. 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.

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. 28% of employees in our sample 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, this difference could have existed for a variety of reasons—such as job-relevant skills, past work experiences, negotiation strategy, salary discrimination—that we cannot 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 (6 women) employees were nominated for the internal recognition program and only 16 (4 women) departed involuntarily.

Exploratory Dependent Variables: 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

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[4] Initial restricted stock unit (RSU) grants were driven primarily by pre-hire negotiations. Subsequent RSU 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 RSUs are not a meaningful outcome variable.

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 experience a greater sense of social belonging would engage more with their

fellow employees on this public communication platform. Appendix C provides examples of

other social organizational platforms that are comparable in terms of design, user interface, and

function to ChatTool.

ChatTool, which accounts for the lion's share of internal communications (relative to

email and text messaging) affords 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: 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 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 find 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 these analyses to help guide future

researchers towards other types of network measures where 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

feel 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: degree centrality and 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.

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[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.

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.

Estimation

For analyses of bonus as a proportion of base salary, we estimated 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 is 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.

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[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 coworkers, 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.

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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 ($p < 0.001$) in Year 1

and \$14,150 less ($p < 0.001$) in Year 2 than their male counterparts. Women were awarded

bonuses as a proportion of their base salary that were 1.3 percentage points ($p < 0.01$) lower in

Year 1 and 1.2 percentage points lower ($p < 0.05$) in Year 2 than their male counterparts. In

contrast, women were 11.8% ($p < 0.05$) more likely to earn a promotion during our study than

their male colleagues.

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, women's career attainment might benefit especially from a message

affirming the normalcy of career challenges as one adjusts to working at TechCo.

Insert Table 1 about here

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 is 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 > 0.27). Thus, we were unable to detect a statistically significant effect of the

intervention on female newcomers' performance-related bonuses.[7]

Insert Table 2 about here

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 < 0.001). In Models 2 and 4, we do not find evidence of a main effect

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[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).

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 ($p = 0.094$). Finally, *Female × Treated* does not reach

statistical significance in Model 5 ($p = 0.27$). 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 getting 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), which we explore further using post-hoc contrast analyses

reported below.

Insert Table 3 about here

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 $ps >$

0.30). Thus, the intervention did not appear to have statistically significant effects on female

newcomers' centrality as measured in ChatTool.

Insert Table 4 about here

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 2-way interaction to emerge, we compared women in the treatment group to

everyone else (that is, 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 ($\chi^2(1, N = 366) = 7.34, p = 0.006, d = 0.39$).

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 ($F(1, N = 355) =$

$4.15, p = 0.042, d = 0.29$); 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 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 (that is, 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 ($F(1, N = 310) = 4.98$, $p = 0.026$, $d = 0.45$).

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 communication 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.

Insert Table 5 about here

DISCUSSION AND CONCLUSION

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 in this organization, we acknowledge that care must be taken in 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 Moderator #1: 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 grade point average, 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 where performance

measures are based on multiple evaluators instead of just one supervisor, such as 360-degree,

team, or peer review processes.

Proposed Moderator #2: Differences in performance evaluation content

The content of performance evaluations in 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 may 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.

Proposed Moderator #3: 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 towards 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.

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[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.

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Proposed Moderator #4: Intervention content alignment with broader organizational culture

Just like broader organizational cultures of innovation, collaboration, or psychological safety can shape employee productivity, 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 (Schein, 2010; Chatman & O'Reilly, 2016; Canning, Murphy, Emerson, Chatman, Dweck, & Kray, in press). If individuals perceive 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, then 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.

Recommendation for future research #1: 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 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

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[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 for women on social network centrality of 0.55.

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 study would need 96 participants per cell to detect such an interaction, in contrast to the 34-175 participants per cell that we had.

Recommendation for future research #2: 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 race and ethnicity, 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; when they first take on a supervisory role) that may be especially likely to benefit from such interventions.

Recommendation for future research #3: 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 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 et al., 2017).

Recommendation for future research #4: 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 minorities differ from those of white men, in part, because

of limited access to informal networks in organizations (Ibarra 1992, 1993). Online

communication 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,

2001)—that are 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, Schrage, & Kalev, 2015; Kalev, Kelly,

& Dobbin 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, Schrage, & Kalev, 2015; Kalev, Kelly, & Dobbin, 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 are 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 scare 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, Kelly, & Dobbin, 2006).

TABLE 1
Descriptive Statistics (Means and SD) for All Dependent Measures[1]

(n = n in year 1; n in year 2)	All Newcomers (n = 355; 310)[2]	Female Newcomers in Treatment (n = 61; 56)	Male Newcomers in Treatment (n = 129; 114)	Female Newcomers in Control (n = 34; 27)	Male Newcomers in Control (n = 131; 113)
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 (%)[3]	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 (%)[3]	14.8 (4.0)	14.3 (4.6)	15.1 (3.7)	13.1 (3.7)	15.1 (4.0)
Promoted Newcomers (%)[4,5]	28.4 (45.2)	42.9 (49.9)	26.3 (44.2)	26.5 (44.8)	24.3 (43.0)

(n = number of people)	All Employees (n =10,489)	Female Newcomers in Treatment (n = 73)	Male Newcomers in Treatment (n = 175)	Female Newcomers in Control (n = 42)	Male Newcomers in Control (n = 176)
Degree Centrality	89.2 (183.8)	160.4 (217.8)	153.6 (219.7)	157.3 (193.7)	178.6 (270.9)
Eigenvector Centrality	.008 (.039)	.004 (.025)	.006 (.044)	.004 (.024)	.006 (.040)

Notes: 1. Standard deviations reported in parentheses below means.
2. Due to turnover, the sample size is 355 and 310 at the end of years 1 and 2, respectively.
3. Results from OLS regression show that women received 1.3% lower bonus as a percentage of base in Year 1 ($p = 0.009$) and 1.2% lower bonus as a percentage of base in Year 2 ($p = 0.021$) than their male counterparts.
4. Sample sizes for promotions are 366, 63, 133, 34, and 136 (from left to right in Table 1).
5. Results from logistic regression and linear probability models show that women are 11.8% ($p = 0.027$) more likely to be promoted than their male counterparts.

TABLE 2

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

	(1) Year 1 Bonus as Prop of Base	(2) Year 1 Bonus as Prop of Base	(3) Year 1 Bonus as Prop of Base	(4) Year 2 Bonus as Prop of Base	(5) Year 2 Bonus as Prop of Base	(6) 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	0.016	-0.003	0.012	0.014	-0.003	0.012

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

Note: Sample size varies across models due to employee attrition during the study.

TABLE 3
Linear Probability Models Predicting Promotion

	(1) Promotion	(2) Promotion	(3) Promotion	(4) Promotion	(5) Promotion
Year 1 Base Salary (logged)	-0.894**	-0.888**	-0.894**	-0.894**	-0.888**
	(0.0962)	(0.0990)	(0.0960)	(0.0988)	(0.0989)
Female		0.0130		0.00174	-0.0657
		(0.0505)		(0.0508)	(0.0791)
Treated			0.0729	0.0727	0.0443
			(0.0434)	(0.0439)	(0.0507)
Female × Treated					0.113
					(0.101)
Constant	10.88**	10.81**	10.85**	10.84**	10.79**
	(1.140)	(1.176)	(1.137)	(1.173)	(1.174)
Observations	355	355	355	355	355
Adjusted R^2	0.194	0.192	0.198	0.196	0.197

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

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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		-21.44	-0.00144		-0.00209
	(13.40)		(21.04)	(0.00115)		(0.00157)
Treated		-13.47	-24.46		-0.000683	-0.00100
		(12.97)	(16.20)		(0.00133)	(0.00183)
Female × Treated			28.46			0.00119
			(27.28)			(0.00234)
Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	121.7**	156.5**	170.2**	0.148**	0.155**	0.171**
	(32.31)	(36.17)	(39.59)	(0.0214)	(0.0231)	(0.0240)
Observations	31,024	32,054	30,458	31,024	32,054	30,458
Adjusted R^2	0.013	0.015	0.016	0.201	0.202	0.208

Standard errors in parentheses
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$

TABLE 5
Exploring Heterogeneous Treatment Effects by Subgroups and Outcome Measures

Subgroup / 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

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 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. Are there 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

5. 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?
6. Please describe how you established relationships at work to help you succeed.
7. Can you describe how you worked to achieve your social position in the organization?

Current Experiences at TechCo

8. 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?
9. Is there anything else you'd like to tell us about your experiences at TechCo?

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APPENDIX B
Illustrative Quotes from Pilot Interviews
(Featured in Part 1 of Social-Belonging Intervention - Video)

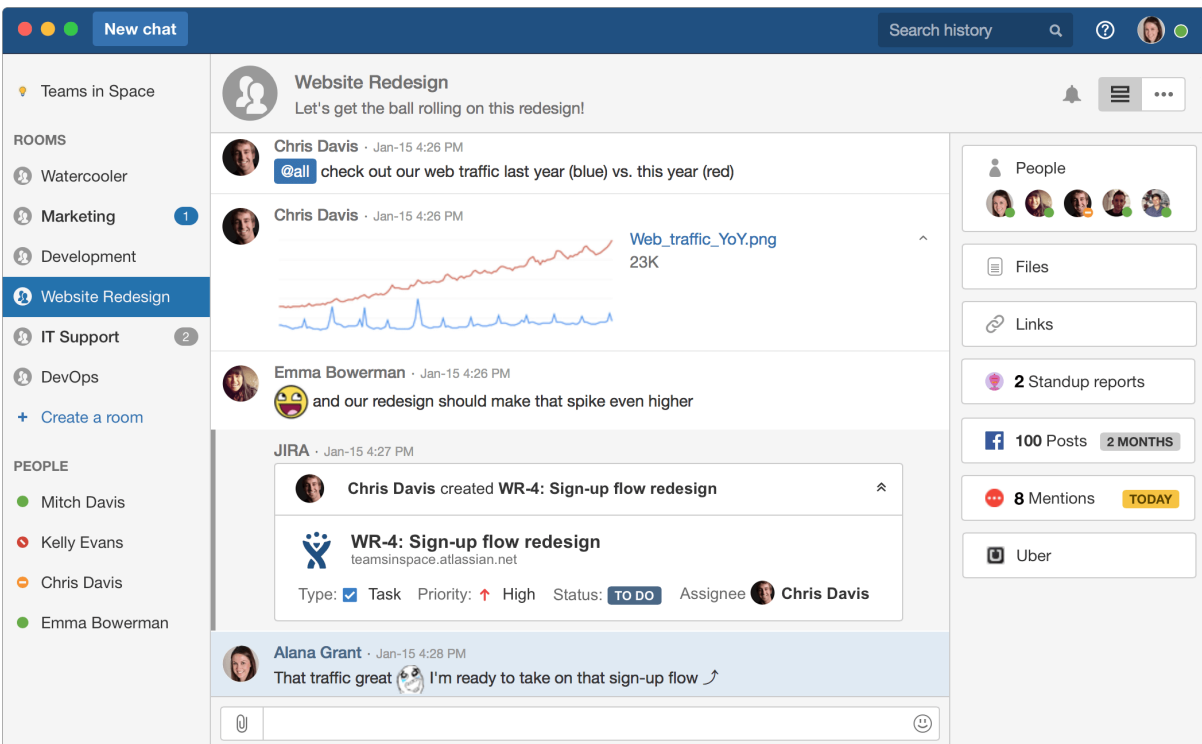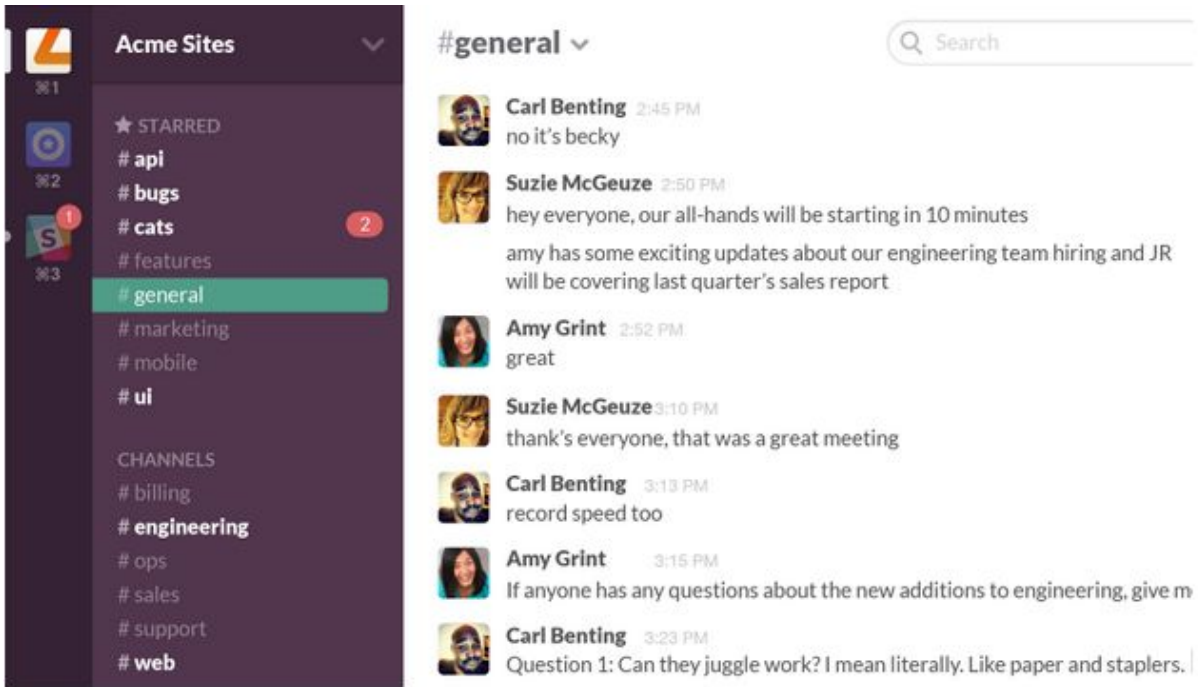| |
|---|
| ***Describing their experience as a newly hired employee*** |
| "I was scared shitless, uhm (chuckle)… College was .. you go into a computer cluster, you sit down there, you're there for twelve hours, when you leave its four in the morning and you're this haggard, zombie person who can barely walk and is kind of drooling out of the side of their mouth, and, uhm, I REALLY hated doing THAT, and so I was really afraid when I got here that it would be more of THAT." |
| "I really didn't know what TechCo did, uhm, even when I started working." |
| "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 ARE." |
| "I think the hardest transition points were (A) 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. SO, 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 SO long to come up to speed with things." |
| ***Describing their turning points at TechCo*** |
| "I felt … I have a way to get people to hear what I'm saying instead of just being the noise in the background." |
| "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." |
| "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." |
| "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." |
| "Kinda the key tipping point for me … was … making the choice to get more involved in different groups and go to different meetings." |
| ***Reflecting on their new hire experience*** |
| "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." |
| "Don't worry that you are not going to be able to pick up things straightaway … so give yourself that time." |
| "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." |
| "As new hires, we often feel sceptical 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." |

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APPENDIX C
Examples of Social Collaboration Tools

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