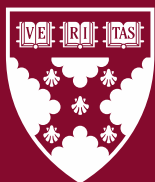


Working Paper 21-125

Virtual Water Coolers: A Field Experiment on the Role of Virtual Interactions on Organizational Newcomer Performance

Prithwiraj Choudhury
Jacqueline N. Lane
Iavor Bojinov



**Harvard
Business
School**

Virtual Water Coolers: A Field Experiment on the Role of Virtual Interactions on Organizational Newcomer Performance

Prithwiraj Choudhury
Harvard Business School

Jacqueline N. Lane
Harvard Business School

Iavor Bojinov
Harvard Business School

Working Paper 21-125

Copyright © 2021, 2022, 2023 by Prithwiraj Choudhury, Jacqueline N. Lane and Iavor Bojinov.

Working papers are in draft form. This working paper is distributed for purposes of comment and discussion only. It may not be reproduced without permission of the copyright holder. Copies of working papers are available from the author.

Funding for this research was provided in part by Harvard Business School.

Virtual Water Coolers: A Field Experiment on the Role of Virtual Interactions on Organizational Newcomer Performance

Abstract

Designing management practices to better onboard organizational newcomers working remotely is a key priority for firms. We report results from a randomized field experiment conducted at a large global firm that estimates the performance effects of different types of virtual interactions for remote summer interns. Findings indicate that virtual water coolers—or videoconference sessions for small groups of interns and a senior manager—may yield higher performance and career outcomes when they facilitate a demographic match between interns and senior managers or occur at regular intervals during the internship. No other virtual interactions, including an asynchronous Q&A discussion forum, an intern-only water cooler, and an intern group project, enhanced job productivity compared to the control condition. An abductive exploration of mechanisms using surveys, machine learning, and an online laboratory study suggests a tradeoff: while the virtual interactions may offer opportunities for newcomer socialization, they also introduce greater constraints on interns' time. The relative outperformance of the senior manager virtual water cooler with a demographic match can be explained by their potential to foster improved organizational commitment among treated interns, which may have led to their higher job performance and career outcomes.

Keywords: remote work; virtual water coolers; social interactions; performance; careers; field experiment

1. Introduction

Firms across industries and countries are adopting remote work and hybrid-remote work models at an unprecedented rate (Barrero, Bloom and Davis, 2020). Improvements in communication technology, leading to an increase in tasks that can be performed digitally and remotely (Seamans and Raj, 2018; Brynjolfsson et al., 2020), nonpecuniary incentives to offer geographic flexibility (Choudhury, Foroughi, and Larson, 2020b), and large-scale experimentation with remote work during the COVID-19 pandemic (Barrero, et al., 2020), have led firms such as Facebook, Deloitte, Salesforce, Ford, Siemens, ITC Infotech, BRAC, and the United States Patent and Trademark Office (USPTO) to adopt hybrid work, work-from-home (WFH) and work-from-anywhere (WFA) arrangements (Choudhury *et al.*, 2020b; Courtney, n.d.; Henry, 2022). The emergence of these trends has several implications for the study of strategic human capital, especially the ability of firms to hire individuals with strong geographic preferences (Campbell, Coff, and Kryscynski, 2012). Despite these trends, a particular criticism of remote work from CEOs, such as David Solomon at Goldman Sachs, is the lack of “direct contact” and “direct mentorship” for organizational newcomers being onboarded virtually (McKeever, 2021).

Prior research has theorized that social interactions between newcomers and experienced mentors are a crucial aspect of the onboarding process, whereby employees become socialized into the firm and “acquire the knowledge, skills, behaviors, and attitudes required for effective participation in the organization” (Allen, McManus, and Russell, 1999: 456). Newcomers tend to experience uncertainty, anxiety, and social isolation when joining a new organization (Allen, 2006; Choudhury *et al.*, 2020a). They have relatively unstructured cognitive maps and there is often ambiguity around how to make sense of their place within their new environment (Allen, 2006). Interactions with experienced employees facilitate socialization by enabling newcomers to learn the behaviors, attitudes, and knowledge necessary for assuming their roles within the organization. Yet traditional scholarly research on socialization presumes face-to-face interactions in the physical office (Allen, 1977; Bernstein and Turban, 2018), and prior research on remote work suggests that the use of communication technologies between organizational newcomers working remotely and incumbents might negatively affect opportunities for remote workers to interact with peers and supervisors

(Golden 2006). This dearth of social interactions can lead remote newcomers to miss out on mentoring opportunities and other forms of information exchange, which might hamper their performance (Cooper and Kurland 2002, Nardi and Whittaker 2002).

It is, however, important to point out that advances in communication technologies such as Zoom, Microsoft Teams, Slack, Google Hangouts, etc., now allow for different types of virtual social interactions. Increasingly, managers in remote and hybrid-remote workplaces have turned to novel management practices involving different forms of synchronous and asynchronous communication technologies to facilitate social interactions among employees across hierarchical roles in the firm (Yang *et al.*, 2021). One type of virtual interaction called “virtual water coolers”—which we define as videoconferencing sessions between small groups of employees—has become a popular way for managers to promote social interactions and camaraderie among firm personnel in remote or hybrid-remote work arrangements (Ascalon, 2022).¹ Despite their ubiquitous use, there is limited causal evidence on whether and to what extent virtual water coolers are effective in socializing newcomers being onboarded remotely into the firm and in improving their job productivity (Comer, 1991; Filstad, 2004; Morrison, 1993). On one hand, if orchestrated effectively, virtual water coolers have the potential to foster social interactions that can socialize newcomers into the firm successfully and improve their job productivity (Ashforth and Saks, 1996; Dufour, Escribano, and Maoret, 2021). On the other hand, if they are not designed effectively to help newcomers “learn the ropes”, virtual water coolers are likely to be a time sink that detracts newcomers away from their work.

In other words, despite the evidence that social interactions in the physical office improve job productivity and innovation outcomes (Catalini, 2018; Lane *et al.*, 2021; Roche, Oettl, and Catalini, 2022), we have limited knowledge of whether and to what extent different types of social interactions are effective in remote workplaces. While synchronous technologies, such as videoconferencing tools, facilitate the transmission of visual, physical, and verbal among interlocutors (Dennis, Fuller, and Valacich, 2008), and may promote relationship formation among remote colleagues (Bleakley *et al.*, 2022), they also have potential downsides in a remote workplace. Synchronous communication needs to be scheduled in advance and does

¹ See Neeley (2015) for a discussion on the importance of structuring unstructured time on virtual calls.

not necessarily bode well with the constraints of a remote workplace, such as the temporal and geographic distribution of employees (Berry, 2006). There is emerging evidence indicating that the transition to remote work has led to employees spending more time in virtual meetings, leading to the blurring of work-life boundaries (DeFilippis *et al.*, 2022; O'Dowd and Hagan, 2021). It is possible that virtual, yet synchronous interactions may create additional constraints on people's time, by reducing the amount of focus time available during the workday to complete work tasks (Gibbs, Mengel, and Siemroth, 2021). In contrast, asynchronous communication, such as discussion forums, offers greater flexibility for individuals to interact across geographic and temporal boundaries, thereby reducing the need to schedule these types of interactions in advance. It also tends to promote more egalitarian communication and creates time for additional reflection and thought by participants due to the permanent record of the original discussion (Berry, 2006). However, the typed and persistent format of asynchronous communication may restrict the kind of information that people exchange with one another (Neeley and Leonardi, 2018).

Beyond considerations of synchronicity, the design of virtual social interactions for newcomers should also consider whether information exchanges with peers and senior firm personnel result in similar benefits for the newcomer (Morrison, 1993, 2002). The ability to form expressive or friendship ties can provide newcomers with a sense of social support and belonging (Brass, 1984; Ibarra, 1992), which may be essential in remote organizations to counteract feelings of isolation (Bartel, Wrzesniewski, and Wiesenfeld, 2012; Cooper and Kurland, 2002). In this regard, newcomers may benefit more from virtual interactions that promote relationship formation at the same level, as opposed to senior managers, who are less likely to provide the same kind of camaraderie as among hierarchically similar individuals (Sias *et al.*, 2012). On the flip side, senior firm personnel tend to offer newcomers feedback, coaching, counseling, and informal advice (Louis, 1980; Morrison, 1993; Ostroff and Kozlowski, 1992, 1993), which can enable newcomers to identify problems in their task performance and make adjustments if needed during their earliest experiences in the organization (Ashford, Blatt, and VandeWalle, 2003; Louis, 1980). Hence, it is not immediately clear, based on prior literature, how remote and hybrid-remote organizations ought to structure virtual interactions among newcomers and firm personnel to improve newcomers' job productivity. This leads to our research question:

How can managers in remote workplaces organize social interactions to improve the performance and career outcomes of organizational newcomers?

Given the importance of the underlying phenomenon, we set up our research as an exploratory study in the spirit of “red-state papers” (Mitchell and Tsui, 2012). Specifically, we investigate whether and which types of virtual interactions might enhance the performance and career outcomes of remote newcomers. We also heed the call for more experiments in strategy research (Di Stefano and Gutierrez, 2019)—which is considered particularly advantageous when undertaking question-driven research to identify causal relationships (Chatterji *et al.*, 2016). In summary, we leverage a field experiment at a large global firm (“GLOBAL”) (study 1) to test the causal relationships between virtual interactions and job outcomes, as well as an online laboratory study to test plausible mechanisms for our treatment effects (study 2). We build on the spirit of recent work that advocates for a mixed methods approach to solve the problem of testimony (King, Goldfarb, and Simcoe, 2019), in which no single empirical study can provide a sufficient basis for inference (King and Berchicci, 2021). Our field experiment enables us to capture causal treatment effects in a natural setting, promoting high ecological validity (Chatterji *et al.*, 2016) while our laboratory experiment provides causal evidence of underlying mechanisms that can be generalized beyond the context of our field experiment (Di Stefano and Micheli, 2022).

Our field site, GLOBAL, employs over 39,000 staff across 67 global offices and 18 divisions. The firm offers an annual internship program that brings together up to 3,000 undergraduate and MBA students each year and is a key pipeline for new talent. Due to the COVID-19 pandemic, the firm created a five-week virtual internship program during the summer of 2020. We collaborated with the firm to design a field experiment that examines the effects of different types of virtual interactions on the performance and career outcomes of 1,370 remote interns distributed across eight divisions and 16 program cities. The intervention focused on exogenously varying the interns’ access to different types of synchronous and asynchronous opportunities for formal and informal interactions with peers and senior managers.² We worked with the firm

² While the field experiment was engineered by the partner organization, and the focal firm retained final decision-making authority on the experimental design, the researchers were allowed to provide input on the design of the experiment. The researchers were also allowed to suggest ways to ensure the experiment was conducted in an

to inform the design of different types of virtual interactions to facilitate intern onboarding and socialization into the firm. Interns were exogenously assigned to one of five experimental conditions: (i) a weekly asynchronous question and answer (Q&A) discussion forum between interns and senior managers in which interns were given opportunities to ask senior managers questions at the end of each week and exogenously selected to receive replies, (ii) an intern group project for three to four interns to work together each week for the duration of their internship program, (iii) a weekly intern-only water cooler (i.e., videoconference) for three to four interns, and (iv) a weekly intern-senior manager water cooler (i.e., videoconference) for three to four interns and a senior manager, and (v) a control condition that was not assigned any additional opportunities for virtual interactions beyond the firm's regular programming of activities for interns.

There are three unique features of the study design to highlight. First, interns (and senior managers) were exogenously assigned to an experimental condition according to a randomized block design at the division level. Randomization is critical to the study design as it allows us to make causal estimates between different types of virtual interactions and newcomer performance and precisely measure our constructs of interest (Di Stefano and Gutierrez, 2019; Imbens and Rubin, 2015). Second, for each intern-senior manager pair in the intern-senior manager water cooler, we can examine whether sharing a demographic match in terms of gender *and* ethnicity with an assigned senior manager has differentiated effects on the interns' performance and career outcomes compared to non-demographically matched intern-senior manager pairs. Third, one noteworthy innovation of the experimental design is the implementation of a cutting-edge panel experiment structure (Bojinov, Rambachan, and Shephard, 2021) that exogenously varied the water cooler treatment *dose* for each intern by altering the frequency that the interns were scheduled to attend the virtual water cooler sessions. This enables us to examine whether assigning more water coolers to an intern's schedule leads to differentiated effects in terms of intern performance and career outcomes.

A particularly attractive feature of the setting is the ability to measure two near-term, objective outcomes: (i) the interns' final performance ratings from their direct supervisors and (ii) the interns' likelihood

academically robust manner (explained later in the paper) and were given access to anonymized data after the experiment was conducted. In abundance of caution, the researchers secured Institutional Review Board (IRB) approval from their home institution to use the anonymized data.

of receiving a full-time job offer at the end of the program. We complement these measures with survey data on the interns' end-of-program attitudes toward their remote internship experience as well as the interns' weekly open-ended responses commenting on the highlights and lowlights of their week. It is important to note that the interns' direct supervisors, who were primarily middle managers in the organization, did not attend the virtual water coolers. Interns worked closely with middle managers during the internship and *did not* virtually interact with senior managers in small groups as part of the regular virtual internship.

Our main finding from the field experiment at GLOBAL suggests that virtual interactions for remote newcomers do not necessarily lead to improved near-term performance and career outcomes without significant investment in time and resources from senior management and other firm personnel. Compared to the control condition, which was not assigned scheduled sessions for virtual interactions, both the asynchronous Q&A discussion forum and intern group project directionally underperformed in terms of job performance and career outcomes, and there is no difference between the intern-only water cooler condition and the control condition or between the intern-senior manager water cooler condition and the control condition. In contrast, we find that interns exogenously assigned to the intern-senior manager water cooler condition benefit from higher performance and career outcomes when they share a demographic match in terms of gender and ethnicity with the senior manager in their water cooler, and when they were invited to attend a high dose of water cooler sessions (e.g., weekly) with senior managers. More specifically, demographically matched intern-senior manager pairs are 8.7 percentage points (pp) more likely to receive a job offer than the control condition, and 5.4 pp more likely to receive a job offer than the control condition when they were assigned to a high dose of water cooler sessions.

Guided by prior theory, and recent calls to apply abductive explanations to empirical patterns (King *et al.*, 2019), we aim to offer plausible explanations of our main findings.³ We attempt to rule in two plausible abductive explanations for (i) the null effect of the virtual interactions treatment conditions—or the absence

³ To quote King *et al.* (2019, p. 24), “research that uses abduction to develop plausible explanations is well suited to the management research setting. . . . Pre-specification is impractical for most research conducted on archival datasets.” Mitchell and Tsui (2012, p. 2) define red-state research thus: “The focus of red research is on the phenomenon while existing theory or theories provide a means by which to focus on and obtain an understanding of the phenomenon.”

of a difference in performance between interns assigned to one of the virtual interactions treatments and the control condition, and (ii) the positive treatment effect of the senior manager water cooler condition with a demographic match relative to the control condition. First, we posit that the scheduled virtual interactions treatments created a trade-off in the interns' time, giving them less time to complete their work assignments. To create an interactive and dynamic remote internship experience, GLOBAL created a heavily programmed and structured schedule for their interns, which included a range of activities, such as one-on-one (middle) manager check-ins, team meetings, and town halls. Given that GLOBAL prioritizes performance in its full-time hiring decisions, the additional opportunities for virtual interactions might have created conflicting demands on the treated interns' time, leaving them with a feeling of time famine, or insufficient time to meet all the demands on them from work and their lives outside of work (Perlow, 1999); these conflicted demands may have unintentionally undermined the treated interns' performance. Second, to investigate the positive treatment effect of the intern-senior manager virtual water cooler condition with demographic match, we draw on the literature on newcomer socialization and tie formation (Allen *et al.*, 1999; Louis, Posner, and Powell, 1983; Morrison, 1993, 2002) to examine the extent to which the virtual interactions treatment conditions improved newcomer socialization through two plausible pathways: (i) quality of information sharing and advice (Comer, 1991; Louis, 1980; Morrison, 1993) and (ii) organizational commitment (Ostroff and Kozlowski, 1992; Reichers, 1987).

We leverage the interns' end-of-program survey measures and open-text responses, as well as an online laboratory study, to test plausible abductive explanations that might be consistent with our findings. Our abductive findings from the interns' surveys and open-text responses offer evidence to rule in a plausible explanation that the virtual interactions treatment conditions might have introduced conflicting demands on the interns' already heavy workload. First, our survey findings show that the treated interns reported more difficulty managing their work-life balance compared to the control group interns. Second, we use word embedding models (a type of unsupervised machine learning approach) on the interns' open-text comments to examine the frequency of the use of words associated with blurred work-life boundaries. The text analysis

results on the open-text comments offer additional evidence indicating that the treated interns were more likely to report feeling tired and needing to manage conflicting demands relative to the control group interns.

To further examine underlying mechanisms through which the virtual water cooler condition with a senior manager sharing a demographic match led to improved performance and career outcomes, we conduct an online vignette study in the laboratory. This study, with $N = 595$ participants from a large northeastern university, between the ages of 18-32 (68% with prior internship experience), tests two plausible mechanisms theorized in prior literature, related to information sharing and advice, as well as organizational commitment. We randomly assigned each participant to a vignette scenario describing an intern-senior manager water cooler at a large global firm with either an image of a senior manager sharing a demographic match (treatment) or no image (control). Our findings suggest that the demographic match condition led to higher perceptions of organizational commitment, with treated interns indicating that they would be more likely to put in a great deal of effort to performing their work activities to help the organization succeed.

In summary, our results suggest virtual interactions might lead to positive performance and career outcomes for newcomers being onboarded remotely when they are synchronous and informal and involve a demographic match between the senior manager and the intern and/or significant investments of time and resources from senior managers. These investments in developing human capital may yield stronger organizational commitment among newcomers, such as interns, who are then more likely to exert greater effort into performing their job functions. Yet, our findings also shed a cautionary tale on the potential tradeoffs that virtual interactions may create on both the newcomers' and senior managers' time expended on work activities. Our back-of-the-envelope calculation of the shadow price of the senior managers' time indicates that virtual water coolers with senior managers can grow to be quite expensive, especially as the number of scheduled virtual water cooler sessions increases. This is especially a concern for senior managers who belong to underrepresented gender and racial groups, who might be asked to participate in virtual socialization activities at higher levels than senior managers who belong to the majority demographic group. Our study is of interest to both scholars of strategic human capital and managers and can inform how to allocate resources to foster effective interactions among remote employees. From a methodological

perspective, our study also strengthens and advances the field of strategy research by heeding the call to leverage experiments—both field and laboratory—for establishing causality and increasing construct validity (Chatterji *et al.*, 2016; Di Stefano and Gutierrez, 2019), and by showcasing panel experiments (Bojinov *et al.*, 2021) for management research.

2. Study 1: Remote Watercooler Experiment at a Large Global Organization

2.1. Setting and Study Population

To address our research question, we partnered with a large global firm (“GLOBAL”). This organization has more than 39,000 staff members across 67 offices and eight primary divisions. The organization developed opportunities for virtual interactions in its internship program as part of a broader effort to create a remote internship experience for the 2020 summer internship class due to the Covid-19 pandemic. The GLOBAL internship program was a key strategic choice to study remote newcomer socialization and performance. Internship programs represent a type of “tryout” that tends to result in full-time job offers (Sterling and Merluzzi, 2021). More specifically, a 2019 National Association of Colleges and Employers (NACE) internship survey report indicates that 70% of companies offer interns a full-time job and 80% of students accept such offers (de Brey *et al.*, 2019), while cohort studies report that internships are one of the primary ways through which individuals locate employment (Sterling and Fernandez, 2018). In 2019, it is estimated that over 80% of college graduates have done an internship before graduation (de Brey *et al.*, 2019).

In a typical year, the organization’s internship program brings together up to 3,000 undergraduate and MBA students for 8-10 weeks at one of the firm’s locations. The internship program consisted of onboarding/training and then working alongside experienced firm employees via an apprenticeship model that relied on observation, hands-on learning, and upskilling as well as networking and social events. Throughout the program, managers assessed the interns’ weekly performance via an internal review system. At the close of the program, the firm extended job offers to interns based on their performance and firm headcount needs.

Due to the COVID-19 pandemic, the firm decided to conduct the 2020 summer internship virtually over a shortened five-week period. The internship experience leveraged new digital platforms and

incorporated more structured networking and interaction opportunities into the interns' schedules. As firm executives developed a virtual internship program, a key concern was ensuring access to socialization with other interns and senior managers. The firm was particularly concerned that interns would lose a sense of rapport and camaraderie with their cohort and miss out on mentoring opportunities.

We partnered with the firm to advise the design of a randomized controlled trial (RCT) that offered a range of different types of remote social interactions for interns. All 1,370 interns in the firm's North American internship program participated in the RCT during weeks 2-5 of their internship. There was no consent process for the study since the firm executed the experiment (layering it on top of the remote internship program) and administered all surveys.

2.2. Intervention Details

Our experimental design exogenously assigned the 1,370 interns to five experimental conditions according to a randomized block design at the division level. This experimental design ensures that we have balanced assignments within each division, allowing us not to have to estimate division fixed effects and increase our overall power (Cox and Reid, 2000). The firm determined the assignment probabilities based on senior manager availability (see Table A1). There were five experimental conditions: an intern-only water cooler (N = 218 or 15.9%), an intern-senior manager water cooler (N = 219 or 16.0%), an asynchronous Q&A discussion forum (N = 223 or 16.3%), intern group project (N = 192 or 14.0%), and a control condition (N = 518, or 37.8%).

Our intervention details build on the literature on newcomer socialization and tie formation. First, the organizational socialization literature indicates that newcomers tend to benefit from information exchanges with peers *and* senior organizational members (Comer, 1991; Louis, 1980; Morrison, 1993). Whereas peers tend to be critical sources of feedback on the social behavior of newcomers, such as knowledge of the people, values, and norms, senior organizational members tend to be better informed to provide performance feedback on the skills, responsibilities, and demands that newcomers need to execute tasks competently (Comer, 1991; Louis, 1980; Morrison, 2002). In designing experimental conditions, we suggested to GLOBAL's executives that the virtual interactions vary in terms of their *hierarchy* to create

interaction opportunities between interns (i.e., horizontally oriented interactions), and between interns and senior managers (i.e., hierarchical, or vertically oriented interactions).

Second, recent literature documents the increasing use and efficacy of asynchronous communication technologies in remote organizations (Choudhury *et al.*, 2020a; Yang *et al.*, 2021). The asynchronous Q&A discussion forum offered interns the opportunity to seek advice and receive responses from senior managers across space and time, according to their schedules (Hinds and Mortensen, 2005). We suggested to the firm that the virtual interactions intervention vary in terms of their *synchronicity* to offer opportunities for both asynchronous and synchronous virtual interactions. Third, given that relational ties are more likely to form after repeated interactions and shared experiences (Dahlander and McFarland, 2013; Hinds *et al.*, 2000; Uzzi, 1997), we suggested that the experimental conditions vary in terms of their *formality*, offering opportunities for nonprescribed informal interactions, which would be most similar to the face-to-face hallway or water cooler chats people have with one another in the onsite workplace (Allen, 1977; Catalini, 2018; Lane *et al.*, 2021) as well as opportunities for repeated interactions around a task-related project (Tushman and Romanelli, 1983).

Although we were not able to test each dimension (i.e., hierarchy, synchronicity, and formality of communications), which would have resulted in nine experimental conditions, we collaborated with GLOBAL executives to create meaningful variation in the virtual interactions treatments, leveraging both prior theory, the firm's experience with past onsite internships, as well as GLOBAL's internal technology capabilities. Our priors were that virtual informal yet synchronous interactions with peers and senior managers would be most effective in shaping the performance and career outcomes of remote newcomers at GLOBAL. These types of interactions are most analogous to the types of serendipitous and informal encounters that people have with their colleagues—both peers and mentors—outside of formal meetings and work activities (Fayard and Weeks, 2007; Kleinbaum, Stuart, and Tushman, 2013; Lane *et al.*, 2021; Lee, 2019), and are associated with higher worker performance among newcomers due to exposure and potential relationship formation with senior firm personnel (Fang, Duffy, and Shaw, 2011; Jiang, Ashforth, and Li, 2022; Morrison, 2002).

While our research team informed the design of the experimental conditions, GLOBAL had the final say on the design and executed the final experiment. In particular, the firm wanted to test the efficacy of the intern group project, which they believed was a cornerstone of the onsite internship program. Although it was our original intention for all interns who asked a question in the asynchronous Q&A discussion forum condition to receive a typed response, the firm ultimately chose to randomize which interns would receive a response due to constraints on senior manager time and availability. GLOBAL shared the de-identified experimental, demographic, and survey data as secondary data, which received an exempt status as Not Human Subjects Research under the Institutional Review Board protocol number IRB21-0996. Nevertheless, we advised GLOBAL to take two specific measures to ensure the robustness of the experiment. First, there was a manager from the organization who initiated each videoconference (i.e., Zoom) call to ensure attendance and assignments of senior managers and peers into their correct videoconference room assignments (i.e., breakout rooms). Second, as part of their internships, the interns signed declarations to conduct their tasks faithfully. Given that the intervention was an official part of the interns' schedules, conforming to the assigned treatment schedule was a direct part of faithfully executing their internship responsibilities. Figure 1 shows a sample daily schedule for an intern at GLOBAL.

[Figure 1 about here]

In the remainder of this section, we describe the specific details of each experimental condition. The intern-only water cooler and intern-senior manager water cooler conditions offered interns opportunities to attend 30-minute virtual water cooler sessions with three to four other interns and a senior manager (in the intern-senior manager water cooler condition) where they participated in informal yet asynchronous interactions. The virtual water cooler sessions were facilitated via videoconference (i.e., Zoom) and were incorporated directly into the interns' weekly schedules and viewable on their interactive online learning and training platform. For both types of water cooler sessions, the experimental design allowed for a panel experiment that exogenously varied the treatment *dose* for each intern; there was a week-wise lottery (according to a Bernoulli distribution) that was based on a weekly quota of slots available⁴ and determined

⁴ Senior manager availability determined the quota of slots each week.

whether a particular intern would be invited to a session in each week (Bojinov *et al.*, 2021). This meant that the week-wise lotteries were independent of each other, and an intern could be randomly assigned between zero and four water cooler sessions with different interns and/or senior managers during weeks 2-5 of the internship. Each week's assignment (0 (no watercooler assignment) or 1 (watercooler assignment)) was determined based on an independent draw from a Bernoulli random variable. See Table A2 for the number of interns exogenously assigned to the intern-only and senior manager water coolers each week.

The asynchronous Q&A discussion forum condition provided interns with the opportunity to interact asynchronously and informally with senior managers. The firm offered all interns the opportunity at the end of weeks 2-4 to type and submit questions to senior management. The text was the same each week: *“Every week we will ask you to pose a question that you would ideally like to be answered by someone from [the firm]. The one question I would ideally like to be answered this week is...”* Before the start of the internship, interns assigned to the asynchronous Q&A discussion forum condition were randomly selected (according to a Bernoulli distribution) to receive a typed response from a senior manager in their division in a specific week. Senior manager responses were non-anonymous and posted on the discussion forum, and all interns could view the responses, regardless of whether they posed the initial question.⁵ Table A3 shows some examples of intern questions and replies from senior managers.

In the intern group project condition, interns had opportunities to participate in formal yet repeated interactions with the same individuals. Interns in this condition were randomly assigned to work on an “Intern Group Challenge” with three to four other interns in their division. In weeks 2-5, the same group of interns met each week for 30 minutes to work and interact on a collaborative project; these meetings were incorporated directly into the interns' weekly schedules and viewable on the interactive online learning and training platform. In a sense, this treatment represented structured social time. Table 1 provides a summary of the experimental conditions and their structure, in terms of their hierarchy, synchronicity, and formality of interactions. Table A4 shows that the block randomization achieved balance across all covariates to which our research team had access.

⁵ The questions and responses from the interns and senior managers were anonymized before sharing as secondary data.

[Table 1 about here]

2.3. Dependent Variables

2.3.1. Job Offers. Our first main dependent variable is a dummy variable, *Job Offer*, which was coded as either 0 (no offer made) or 1 (offer made). Decisions to extend job offers to interns were based on the interns' performance and the division's hiring needs. We focus our analysis on the job offers decision given that 85% of interns accepted their offers to return as full-time employees.

2.3.2. Final Job Performance. Our second dependent variable, *Final Performance Rating*, captures the interns' performance during the final week (i.e., week 5) of the internship ($M = 2.60$, $SD = 0.59$). The interns' direct supervisors (who did not participate in the virtual interactions treatments) gave ratings at the end of the week based on the intern's performance for the given week (1 = needs improvement, 2 = good, 3 = outstanding). We received final performance ratings on 96.9% of the 1,370 interns. A chi-squared test indicates that there is no statistically significant difference in the missing performance data across the experimental conditions ($\chi^2(4,1370) = 0.623, p = 0.960$). Hence, we assume that the data are missing completely at random (Marini, Olsen, and Rubin, 1980), allowing us to drop these rows from our analyses.

2.4. Treatment Variables

Our treatment variable is *Virtual Interactions Treatment*, a categorical variable corresponding to the intern's randomly assigned experimental condition: control, asynchronous Q&A discussion forum, intern group project, intern-only water cooler, and intern-senior manager water cooler. Figure 2 shows the mean job offer rate (Figure 2 left) and final performance rating (Figure 2 right) by experimental condition.

[Figure 2 about here]

We also estimate two alternate versions of the intern-senior manager water cooler treatment variable to examine heterogeneous treatment effects according to the demographic similarity between the interns and senior managers and the treatment dose, facilitated by the panel experimental design. First, we differentiate between *Intern-senior manager water cooler no-match* vs. *Intern-senior manager water cooler match* to denote demographic unmatched and matched intern-senior manager pairs, where a demographic match was defined in terms of both gender *and* ethnicity. About 13% of the interns in the intern-senior manager water cooler condition were

in the demographic match condition. Also, for interns who were assigned to more than one water cooler session, interns were placed in the demographic match condition if they had at least one water cooler where they shared a demographic match with their randomly assigned senior manager.⁶ Due to the sensitivity of these data, the firm anonymized the gender and ethnicity of the interns before sharing them as secondary data and we only have a record of the de-identified gender and ethnicity memberships, and whether a demographic match was on both dimensions (i.e., gender *and* ethnicity) or none. Second, we differentiate between *Intern-senior manager water cooler low dose vs. Intern-senior manager water cooler high dose* to denote whether the interns were randomly assigned to a low dose (0-2 virtual water coolers during weeks 2-5 of the internship) or high dose (3-4 virtual water coolers during weeks 2-5 of the internship) of the intern-senior manager water coolers.⁷ The purpose of examining heterogeneous effects by treatment dose is to determine how the frequency of water cooler sessions differentially affects the interns' outcomes. Approximately one-fifth of the interns in the intern-senior manager water cooler condition were assigned to the high-dose condition.

2.5. Statistical Analysis

Our main analysis uses a block-specific difference-in-means (BDIM), an approach that accounts for the block (i.e., organizational division) randomization structure to estimate overall treatment effects. The BDIM is the natural estimator for blocked randomized experiments as it is the weighted average (the weights depend on the blocks' size; see Table A1) of the within-block treatment effects (Cox and Reid 2000). We examine the data on an intent-to-treat basis, which means we analyze data from all participants randomized into a condition, regardless of whether they engaged in the activity or conversation (Lachin 2000). Our results are robust to employing ordinary least squares regression models with division fixed effects (see Tables A5-A8). We can leverage OLS models for our analyses despite the block randomization design as the assignment probabilities in six of the eight divisions are the same (see Table A1). We perform the regression analyses with

⁶ Only 2.7% of interns who were invited to attend more than one intern-senior manager water cooler shared more than one demographic match.

⁷ We note that it was possible for interns to be assigned to zero virtual water coolers, due to the panel experimental design, in which that each intern was exogenously assigned to a water cooler each week according to a Bernoulli random variable (Bojinov et al., 2021). This meant that there was a non-zero probability, equivalent to $(1 - \text{division assignment probability})^4$ that an intern would be assigned to no virtual water coolers during the internship. 9.5% of interns in the intern-senior manager water cooler condition were assigned to zero virtual water cooler sessions.

and without the two divisions (divisions 3 and 6; $N = 36$) that had different assignment probabilities to experimental conditions (see Tables A5 and A6).

2.6. Main Results: Virtual Interactions Treatment, Job Offers, and Performance Outcomes

First, we find a null effect of the virtual interactions treatment conditions on job offers and final performance—or the absence of a difference in job offers between interns assigned to a virtual interactions treatment and the control condition (asynchronous Q&A: $BDIM = -0.024, p = 0.29$; intern group project: $BDIM = -0.042, p = 0.11$; intern-only water cooler: $BDIM = 0.00, p = 0.86$; intern-senior manager water cooler: $BDIM = 0.02, p = 0.31$) and final performance (asynchronous Q&A: $BDIM = -0.049, p = 0.31$; intern group project: $BDIM = -0.103, p = 0.06$; intern-only water cooler: $BDIM = 0.00, p = 0.89$; intern-senior manager water cooler: $BDIM = 0.06, p = 0.20$) relative to the control condition. It is worthwhile to note that the intern-senior manager water cooler condition was more likely to receive a job offer than the asynchronous Q&A discussion forum ($BDIM = 0.047; p = 0.05$) and the intern group project ($BDIM = 0.07, p = 0.01$). These differences correspond to a meaningful decrease of 4.9pp and 7.3pp, respectively.

Second, to gain deeper insights into the intern-senior manager treatment condition, we examine heterogeneous treatment effects using BDIM by demographic match and treatment dose on job offers and final performance. As shown in Figure 3 (left), interns who shared a demographic match with the senior managers in their water cooler in terms of gender *and* ethnicity were 9-13 pp more likely to receive an offer than any other experimental condition: control ($BDIM = 0.087, p < 0.001$); asynchronous Q&A ($BDIM = 0.10, p < 0.001$); intern group project ($BDIM = 0.13, p < 0.001$); intern-only water cooler ($BDIM = 0.10, p < 0.001$). Similarly, the treatment dose effects in Figure 3 (right) indicate that interns who were assigned to a high dose (i.e., 3-4 water coolers) of intern-senior manager water coolers were 5-9 percentage points more likely to receive an offer: control ($BDIM = 0.05, p = 0.01$); asynchronous Q&A ($BDIM = 0.08, p = 0.002$); intern group project ($BDIM = 0.09, p = 0.002$); intern-only water cooler ($BDIM = 0.07, p = 0.003$). We note that these findings for demographic match and treatment dose are consistent and robust to final performance, with the demographic match condition outperforming the other experimental conditions by 0.19-0.26 points and the high treatment dose condition outperforming the other experimental conditions by

0.05-0.09 points on a 3-point scale (see Figure A1). We note that the relationships between job offers and the virtual interactions treatment conditions as well as between final performance and the virtual interactions treatment conditions are robust to using OLS models with division dummies (see Tables A5 and A6).

[Figure 3 about here]

2.7. Shadow Price of Senior Managers' Time

To contextualize the amount of investment in senior manager time required to orchestrate the intern-senior manager water coolers, we provide a back-of-the-envelope calculation of the shadow price of the senior manager's time, approximated by their salary, of providing all 1,370 remote interns with one or more intern-senior manager water cooler sessions during the internship program.

In Figure 4, we illustrate the shadow price of the senior managers' time, for different frequencies (i.e., dose) of water cooler sessions (i.e., from once to weekly), and different ranges of average senior manager salary (i.e., \$200,000, \$350,000, \$600,000, \$900,000).⁸ For example, if the average senior manager salary at the firm is \$600,000 (assuming that there are 50 work weeks in a year and 40 hours in each workday) and that each intern is assigned to two intern-senior manager water coolers during their five-week internship, then the shadow price of the senior manager's time is equivalent to the hourly cost of the senior manager's time \times duration of a water cooler session \times number of senior managers \times number of water cooler sessions assigned during internship = $(\$600,000 / 50 \text{ weeks} / 40 \text{ hours per week}) \times (0.5 \text{ hours per water cooler session}) \times (400 \text{ senior managers}) \times (2 \text{ water cooler sessions}) = \$120,000$.⁹ The back-of-the-envelope calculation of the senior manager shadow price indicates that the intern-senior manager water coolers can range from several thousand to several hundred thousand dollars during a five-week internship depending on the average salary of the senior managers involved and the number of water cooler sessions offered during the internship. One key takeaway is that fostering interactions between interns and senior managers can be a costly upfront investment for the firm and that the cost can grow nonlinearly as the number of virtual water cooler sessions

⁸ Our estimates of senior manager salaries at GLOBAL are consistent with ranges reported on Glassdoor.com.

⁹ Our estimate of 400 senior managers assumes that all 1,370 interns are assigned to a water cooler sessions and that there are 3-4 interns per water cooler session.

per intern increases. Hence, it is important to understand when and why opportunities for virtual interactions with senior managers improve newcomer socialization and performance.

[Figure 4 about here]

2.8. Abductive Exploration of Mechanisms

We examine evidence consistent with an abductive explanation, guided by King et al (2019, p. 8-9): “An explanation is a conjecture about an observed pattern of evidence...Abduction allows only a basis for making a ‘promising explanatory conjecture’ which then must be ‘subject to further test.’” We attempt to rule in two likely abductive explanations of our results, namely (i) the null effect of the virtual interactions treatment conditions—or the absence of a difference in performance between interns assigned to a virtual interactions treatment and the control condition, and (ii) the positive treatment effect of the senior manager water cooler condition with a demographic match relative to the control condition. First, we suggest that the null effect between the virtual interactions treatments and the control condition is related to the observation that the virtual interactions created a trade-off on the interns’ time: even though the treated interns might have benefited from greater exposure to peers and/or senior managers at the firm, on balance, the scheduled sessions placed additional demands and constraints on the interns’ already highly scheduled workflows. In other words, virtual interactions may detract from the interns’ focus time on work assignments and create perceptions of “time famine” (Perlow, 1999), described as “insufficient time to meet all of the demands on them from work and their lives outside of work” (Perlow, 1999 p. 57). This feeling of time famine might be especially applicable to remote newcomers in jobs with steep learning curves, due to the dismantling of both temporal boundaries (Perlow, 1998) and physical boundaries between their work and lives outside of work (Ashforth, Kreiner, and Fugate, 2000; Hill, Ferris, and Mårtinson, 2003).

Second, we attempt to rule in two plausible explanations that might explain the outperformance of the intern-senior manager water coolers with a demographic match. Newcomers tend to be information-seekers as they “learn the ropes” of their new organization (Morrison, 1993). Social interactions on work-related matters with peers and senior organizational members can provide newcomers with *information and advice* about their roles and responsibilities, as well as the firm’s culture, structure, and rules (Comer, 1991;

Louis, 1980; Morrison, 1993). Senior organizational members that provide performance feedback and mentorship can enable newcomers to identify problems in their task performance and make any necessary adjustments during their earliest experiences in the organization (Ashford *et al.*, 2003; Louis, 1980).

Moreover, newcomers tend to develop greater *organizational commitment* when they form satisfying social relationships and interpersonal bonds with their peers and senior organizational members (Ostroff and Kozlowski, 1992; Reichers, 1987). Organizational commitment fosters a willingness to exert considerable effort on behalf of the organization due to a strong belief and acceptance of the organization's goals (Angle and Perry, 1981; Caldwell, Chatman, and O'reilly, 1990). If an individual finds membership in an organization to be satisfactory, he or she will most likely desire to maintain this membership, which may lead to higher intentions to stay at the firm (Tsui, Egan, and O'Reilly III, 1992). Hence, we propose that the outperformance of the senior manager condition with a demographic match is due to higher quality information sharing and advice as well as greater organizational commitment, which offsets the time commitment of participating in the scheduled virtual water cooler sessions.

To explore these abductive explanations, we turn to surveys and machine-learning analyses of the interns' open-text comments, as well as leverage a laboratory experiment. Our results, presented in detail in sections 2.8.1 and 2.8.2, provide evidence for both explanations, suggesting that the additional opportunities for virtual interactions created a tradeoff in the interns' time. Both the interns' survey responses regarding their satisfaction with remote work and their open-text comments suggest that the treated interns found it more difficult to maintain a work-life balance, due to potentially more conflicting demands on their time. At the same time, we find some evidence from the interns' open-text comments indicating that the intern-senior manager water cooler condition augmented opportunities for information and advice-sharing, as well as fostered greater organizational commitment compared to the control condition.

2.8.1. Survey Findings of Interns' End-of-Program Attitudes

We collaborated with the firm to design survey questions to measure different dimensions of the interns' attitudes toward their remote work experiences and relationships with other employees at the end of the program. First, leveraging Raghuram, Garud, and Weisenfeld (2001)'s survey instrument on adjustment to

remote work, we asked the interns about their experiences with remote work on the final week of the internship (see Appendix for the specific items used in the survey measures). We use BDIM to examine how the interns' end-of-program attitudes differed across the experimental conditions.¹⁰ Overall, we find no major differences in satisfaction with remote work between the treatment and control conditions, other than a weak difference between the asynchronous Q&A and control condition (asynchronous Q&A: BDIM = -0.17, $p = 0.08$; intern group project: -0.02, $p = 0.80$; intern-senior manager water cooler: BDIM = 0.08, $p = 0.35$; intern-only water cooler: BDIM = 0.02, $p = 0.79$). We also find no differences in perceptions of their job performance or preferences for working remotely compared to a physical office by experimental condition (see Appendix for exact wording of survey scale items).

That said, we find consistent evidence in three of the four virtual interactions treatment conditions that the treated interns found it more difficult than the control interns to balance their job and personal life, with the largest difference in perceptions being among the interns assigned to the intern-only water coolers (asynchronous Q&A: BDIM = -0.08, $p = 0.63$; intern group project: -0.24, $p = 0.08$; intern-senior manager water cooler: BDIM = -0.25, $p = 0.07$; intern-only water cooler: BDIM = -0.40, $p = 0.002$). These differences correspond to a 4.6 to 7.6 pp decrease in perceptions compared to the control condition. It is not surprising that there is no difference in perceived work/life balance between the asynchronous Q&A discussion forum and control condition, as the intervention consisted of exogenously varying the interns that would receive a reply from a senior manager, rather than exogenously varying which interns could use the discussion forum to seek advice (meaning that interns across all experimental conditions had the chance to type a question to a senior manager). In Tables A7 and A8, we show that the results remain consistent using OLS models with division fixed effects.

Furthermore, our interviews with senior executives at GLOBAL confirmed that there were no observable differences in the overall productivity of remote versus on-site interns in prior years, even though

¹⁰ We note that the sample size for the end-of-program attitudes is $N = 1,187$ due to some interns not responding to the final surveys. However, a chi-squared test indicates there are no statistically significant differences in the missing survey data across the experimental conditions ($\chi^2(4,1370) = 0.97, p = 0.803$). Hence, we assume that the data are missing at random (Marini, Olsen, and Rubin, 1980), allowing us to drop these rows from our analyses.

the remote internship was only half the time in duration. This suggests that the remote interns likely allocated more time and attention to completing their work assignments over the condensed internship, which may have contributed to the treated interns' difficulty in balancing their work and personal lives, particularly when the virtual interaction opportunities took time away from their job role activities.

2.8.2. Machine Learning Analyses of Interns' Open-Text Comments

Complementing the survey responses, we performed unsupervised machine learning analysis of the interns' open-text comments corresponding to their highlights ($N = 2,929$) and lowlights ($N = 2,818$) of the interns' week, using word embedding models. The highlights comments were in response to the question, "*What were the highlights during your work week?*", while the lowlights comments were in response to the question, "*What were the lowlights during your work week?*" Word embeddings are a type of word representation where individual words are represented as real-valued vectors in a predefined vector space. Words with similar semantic meanings and usage have a similar representation in vector space. We leverage a pretrained embedding model called Global Vector or GloVe, which is an unsupervised learning algorithm for obtaining vector representations trained on the nonzero entries of a global word-word co-occurrence matrix from a six-billion-word corpus (Pennington, Socher, and Manning, 2014). We use the pre-trained GloVe embeddings to identify intern comments containing synonyms associated with target words of interest. We selected these target words based on our proposed mechanisms of interest, namely the reduced focus time on work activities in the treatment conditions with scheduled virtual interactions due to greater constraints on their time, and the improvements in information and advice as well as organizational commitment in the intern-senior manager water cooler condition due to advantages from participating in socialization activities.

We tested each of these mechanisms by examining the interns' comments for the presence of *target words* and their synonyms associated with reduced work time in the lowlight comments and newcomer socialization in the highlight comments. Examples of time-constrained target words include "tired", "conflict", "stress", "overwhelmed", and "pressure". Examples of socialization-related target words include "networking", "advice", "feedback", "mentor", "senior", and "commitment". For each preprocessed highlight and lowlight comment, we compute the cosine similarity between each target word vector (i.e., the

target word we selected and its synonyms from the GloVe embeddings) and each word in the intern response to identify potential synonyms using a threshold cosine similarity measure of 0.6 or higher.¹¹ Next, we created dummy variables for each target word, which took a value equal to 1 if at least one synonym of the target word appeared in the intern response. Lastly, we use BDIM to compare the relative occurrence of each target word vector between the virtual interactions treatment conditions.

Examining the lowlight comments, we find evidence consistent with the notion that the virtual interactions treatment conditions reduced the amount of time the interns had to focus on their task assignments. The treated intern comments suggest they were more *tired* compared to the control condition (asynchronous Q&A discussion forum: BDIM = 0.04, $p = 0.13$; intern group project: BDIM = 0.09, $p = 0.003$; intern-only water cooler: BDIM = 0.08, $p = 0.002$; intern-senior manager water cooler: BDIM = 0.05, $p = 0.09$) and the intern-only and intern-senior manager water cooler conditions reported having more *conflicting* demands on their time (intern-only water cooler: BDIM = 0.04, $p = 0.04$; intern-senior manager water cooler: BDIM = 0.04, $p = 0.05$) compared to the control condition.

The word embedding analyses of the interns' highlight responses offer suggestive evidence indicating that the intern-senior manager water cooler condition may have had more opportunities to discuss and receive *feedback* (control: BDIM = 0.03, $p = 0.08$; asynchronous Q&A: BDIM = 0.04, $p = 0.05$; intern group project: BDIM = 0.03, $p = 0.13$) on their *careers* (control: BDIM = 0.07, $p = 0.02$; intern group project: BDIM = 0.06, $p = 0.06$, asynchronous Q&A: BDIM = 0.05, $p = 0.10$) compared to the control condition, asynchronous Q&A, and intern group project conditions. There is also evidence that the virtual water coolers with senior managers gained more access to *senior* firm personnel compared to the control, intern group project, and intern-only water cooler conditions (control: BDIM = 0.04, $p = 0.06$; intern group project: BDIM = 0.04, $p = 0.09$; intern-only water cooler: BDIM = 0.05, $p = 0.08$) as well as perceived higher organizational *commitment* compared to the intern group project and intern-only water cooler conditions

¹¹ We chose a cutoff value of 0.6 as a heuristic after examining the flagged synonyms for their semantic closeness to each target word. We tested multiple thresholds ranging from 0.4 to 0.8, and 0.6 offered the best results in terms of semantic meaning. See Tables A9 and A10 for the synonyms that had a cosine similarity measure of at least 0.6 with the target word.

(intern group project: $BDIM = 0.06, p = 0.01$; intern-only water cooler: $BDIM = 0.05, p = 0.03$).¹² In Tables A11 and A12, we report the results from word embeddings analyses of the interns' comments using OLS models with division dummies; the interpretation of the findings is consistent with BDIM.

Overall, the results from the word embeddings analyses of the interns' open-text comments offer evidence consistent with the explanation that the virtual interactions treatment conditions created a tradeoff on the interns' time: while the virtual interactions, on average, reduced the interns' time to focus on completing their work-related tasks during their remote office time, there is some suggestive evidence indicating that the intern-senior manager water cooler condition created access to socialization opportunities, potentially through higher quality information and advice and improved organizational commitment.

3. Study 2: Online Vignette Study and Causal Test of Mechanisms for the Intern-Senior Manager Virtual Watercooler

We designed and executed an online laboratory study to investigate plausible mechanisms that might explain the outperformance of the intern-senior manager water cooler with demographic match conditions from the field experiment at GLOBAL (study 1). Although the text analyses of the interns' comments offered some suggestive evidence of higher quality information and advice sharing as well as greater organizational commitment, there were two limitations to these analyses: (i) the post-hoc analysis of the interns' comments was descriptive as opposed to causal; (ii) we did not have enough sample size to investigate whether the two identified mechanisms, namely the degree of information and advice sharing or organizational commitment varied by demographic match or no-match. In Study 2, we conduct a direct test of both plausible mechanisms. Due to people's homophilic preferences to form interpersonal and advice-seeking relations with demographically similar others within their organizations (Ibarra, 1992; Kleinbaum, Stuart, and Tushman, 2013; Lazarsfeld and Merton, 1954), we posit that newcomers may be more inclined to value their information exchanges with senior managers who share a demographic match and more likely to feel stronger organizational commitment and intentions to stay at the firm.

¹² There was not enough power to detect differences between the intern-senior manager demographic match condition and the control condition due to the small sample size of comments ($N = 75$).

3.1.1. Participants

We recruited 595 participants (520 students, 113 male, 218 White or Caucasian) from a northeastern university in the United States to participate in a study in exchange for a \$5 online gift card upon completion of the study. 68.4% of the participants had past internship experience (mean = 1.46, s.d. = 1.42), and 37.0% had remote internship experience.

3.1.2. Design and Procedure

We block randomized assigned participants by gender and ethnicity to one of two between-subjects conditions: senior manager with no demographic match (control) versus senior manager with demographic match (treatment), where the no demographic match condition saw a dark Zoom videoconferencing screen with the words “senior manager” and the demographic match condition saw an image of a senior manager with a demographic match in terms of gender and ethnicity in a Zoom videoconferencing screen. In Table A13, we show that the block randomization by gender and ethnicity achieved balance across covariates collected on the participants’ demographic information (e.g., the highest level of education, frequency of use of videoconferencing tools, internship experience). We selected the images for the senior managers from the Chicago face Database (Version 3.0 – Match 2021), which provides high-resolution photographs of male and female individuals of varying ethnicity between the ages of 17-65, with extensive norming data available on physical attributes and subjective ratings by independent judges. We chose eight images of individuals with neutral expressions according to sex (male or female) and ethnicity (Asian, Black/African American, Latino/Hispanic/Spanish, or White/Caucasian). Based on independent ratings by judges, the individuals had a mean age of 40.19 years (s.d. = 2.64) and a mean attractiveness rating of 3.35 (s.d. = 0.46) on a 7-point Likert scale (1 = Not at all; 7 = Extremely). We received IRB approval (protocol # IRB22-1326) and pre-registered the study on OSF (see <https://osf.io/qsgtr9>).

In both conditions, we presented participants with a vignette, where we asked them to imagine that they were remote summer interns at a Fortune 100 firm during the summer of 2020. As part of the internship program, they would be participating in a virtual water cooler session with three or four other interns and a senior manager. The senior manager in the virtual water cooler provided advice on how to be a successful

and productive intern in a remote workplace. The control condition did not see an image of a senior manager. The treatment condition saw an image of a senior manager sharing the same demographic characteristics, in terms of gender and ethnicity, as the participant (or intern). After reading the vignette, participants then completed a series of survey questions related to the two dimensions of newcomer socialization (i.e., advice-sharing, and organizational commitment). See the appendix for the exact wording of the survey instruments.

We measured two dependent variables, corresponding to *Advice sharing* and *Organizational commitment*, which were collected at the end of the vignette scenario. We assessed advice-taking using a five-item scale ($\alpha = 0.79$), and organizational commitment using a six-item scale ($\alpha = 0.92$), which were each assessed on a 7-point Likert scale.¹³ The scale items were adapted from Tsui et al. 1992 and specific items for these scales are listed in the appendix. We averaged the advice-taking items (mean = 5.18, s.d. = 0.99) and organizational commitment items (mean = 5.17, s.d. = 1.06) into a single scale due to their high internal consistency (α) but report the intent to stay items separately.

3.1.3. Results

We use BDIM to make comparisons between the treatment (demographic match) and control (no demographic match) conditions. We find that participants in the demographic match condition reported greater organizational commitment than participants in the demographic no-match condition (BDIM = 0.18, $p = 0.04$). In contrast, we did not find any differences in the quality of advice-taking (BDIM = 0.13, $p = 0.12$). Examining each dimension of the advice-seeking scale separately, we find that the demographic match condition reported being more likely than the control condition to follow up with the senior manager for a virtual coffee chat on *interpersonal* issues (BDIM = 0.25, $p = 0.09$), corresponding to a 6.9 pp increase, but there was no difference in the likelihood of following up on *work-related* issues (BDIM = 0.07, $p = 0.59$).

Figure 5 examines heterogeneous treatment effects by prior internship experience ($N = 407$ or 68.4% of participants) and prior remote internship experience ($N = 220$ or 37.0% of participants). Figure 5 illustrates that the positive effect of the demographic match treatment on the interns' organizational

¹³ We also asked the participants about their Intentions to stay at the firm using a two-item scale, which is an alternative measure of Organizational Commitment (Tsui et al., 1992). However, the two items had low reliability ($\alpha = 0.38$), so we dropped it from analysis.

commitment is driven by interns with prior internship experience ($BDIM = 0.18, p = 0.07$) and interns with prior remote internship experience ($BDIM = 0.30, p = 0.04$). In Figure A2, we report the results split by gender (male and female), and ethnicity (White or Caucasian and other ethnicities).

[Figure 5 about here]

These results demonstrate that being in a virtual water cooler with a senior manager sharing a demographic match by gender and ethnicity led to increased organizational commitment—i.e., willingness to put in a great deal of effort into their job activities to help their organization be successful.

4. Summary and Conclusions

Remote and hybrid-remote work is gaining momentum (e.g., Barrero *et al.*, 2020) and millions of workers are expected to be onboarded remotely by firms globally in the years ahead. A pervasive concern among remote and hybrid-remote organizations is the loss of social interactions among employees. These reduced opportunities for social interactions may be particularly problematic for newcomers onboarding remotely. A rich literature on newcomer socialization that opportunities for new employees to seek information and advice from work colleagues and to be mentored by senior managers are often integral to newcomer onboarding and job productivity (Comer, 1991; Dufour *et al.*, 2021; Morrison, 1993, 2002). Yet, there is relatively little evidence on how to effectively foster virtual social interactions among remote newcomers and existing firm personnel. Communication technologies continue to change and offer new possibilities; workers can now communicate via videoconference, discussion forum, or instant messaging, each offering different possibilities in terms of the synchronicity of communication, as well as the visibility and persistence of communicative acts (Treem and Leonardi, 2013; Yang *et al.*, 2021). In addition to the modality of communication, there are open questions of whether these opportunities for virtual social interactions should include peers and/or senior managers, who offer different forms of advice and relational tie formation (Morrison, 2002). Hence, it is not immediately clear how to effectively foster virtual interactions among remote newcomers onboarding to a firm. This paper uses mixed methods, combining insights from a field experiment, a complementary laboratory experiment, and machine learning methods to shed light on these questions.

4.1. Results

Following the call to bring greater experimental research to the strategy literature (Chatterji *et al.*, 2016; Di Stefano and Gutierrez, 2019), our study experimentally tests how to foster virtual interactions between remote newcomers and firm employees to improve job productivity and performance. To test causal relationships between virtual interactions and job productivity, we leverage a field experiment on virtual interactions among 1,370 summer interns at a global, Fortune 100 firm during the summer of 2020, complemented with an online laboratory study to examine plausible mechanisms for our treatment effects. The findings of our field experiment indicate that virtual water coolers, i.e., small group interactions between peers and a senior manager, have the potential to improve job productivity outcomes when they occur at a regular cadence (i.e., high treatment dose) and when the intern and senior manager share a demographic match in terms of gender and ethnicity. However, it is important to note that we failed to detect any main effect of the virtual interactions treatments on job offers or job performance. This suggests that virtual interactions may only yield positive benefits on newcomer performance when they involve significant investments by the firm, in terms of senior manager time and resources. Our back-of-the-envelope calculations approximate the shadow price of the senior managers' time of attending virtual water coolers; the findings suggest that this cost can range from several thousand to several hundred thousand dollars depending on the salary level of the managers and the virtual water coolers' frequency of occurrence.

Motivated by the estimation of causal treatment effects, our study attempts to abductively identify plausible mechanisms explaining both the null effects of the virtual interactions treatment conditions (i.e., absence of a difference between the virtual interactions treatments and the control) and the positive treatment effect of the intern-senior manager water cooler condition with a demographic match. To rule in a plausible abductive explanation, as urged by King *et al.* (2019), we provide empirical evidence using surveys and text analyses of the interns' open-text comments to show that the virtual interactions created a tradeoff in newcomers' time. While virtual interactions have the potential to improve newcomer socialization, they also take away time from the interns' ability to focus on their work assignments. We find evidence that compared to the control interns, the treated interns were more likely to experience conflicting demands on their time

and found it more difficult to maintain a work-life balance. However, the time tradeoff cannot explain the outperformance of the virtual water cooler condition with senior managers sharing a demographic match.

To further identify plausible mechanisms for the outperformance of the intern-senior manager water cooler with demographic match, and to solve the problem of testimony, in which no single empirical study can offer sufficient basis for inference (Di Stefano and Micheli, 2022; King and Berchicci, 2021), we conduct an online vignette study in the laboratory, which aims to formally test two plausible explanations for the outperformance of the senior manager water cooler with a demographic match. Our findings suggest that sharing a demographic match with a senior manager leads to higher organizational commitment compared to the control condition, in which the participants indicated that they would be willing to exert a great deal of effort into carrying out their job tasks to improve their firm's success. Hence, we can rule in increased organizational commitment as a potential mechanism explaining the improved job performance and career outcomes of the virtual water coolers with demographically similar senior managers.

4.2. Interpretation of Results

Our study has implications for the design of virtual social interactions for remote and hybrid-remote organizations. The proliferation of communication technologies creates a range of different opportunities for designing virtual interactions between newcomers and firm personnel. Given that virtual organizations tend to schedule more virtual meetings among employees (DeFilippis *et al.*, 2022), the use of asynchronous communication to disseminate information and advice on how to onboard successfully may help reduce the number of scheduled meetings in a newcomers' workweek to give them more focus time to learn the job. However, asynchronous communication technologies might be limited in their effectiveness in conveying a demographic match between the sender and receiver of information. This could be one reason why we did not see an effect of the asynchronous Q&A discussion forum treatment on the interns' outcomes, as interns might not have had an opportunity to ascertain demographic matches while reading senior managers' responses. This possibility could be studied in future research. By contrast, synchronous communications between small groups of newcomers and senior managers may be used strategically to signal demographic matches and to strengthen interpersonal relationships as well as organizational commitment, which can

improve task performance while reducing employee absenteeism and turnover (Allen, 2006; Barrick and Zimmerman, 2005). We believe that the relationships tested in our field and laboratory study, together, point to a rich undertaking for future studies to examine how the use of different communication technologies for specific purposes (Gibson *et al.*, 2021), such as for task- versus social-related information sharing, may afford additive benefits beyond one form of technology, alone. This investigation may be particularly fruitful for permanent employees, particularly as newcomers' needs for virtual interactions are likely to change as individuals gain greater task mastery and understanding of their role(s) within the organization (Dufour *et al.*, 2021; Ostroff and Kozlowski, 1992). As our paper covered a relatively short period, it is possible that the effects of virtual interactions on performance outcomes may require more time to be realized. Hence, different types of virtual interactions—e.g., synchronous versus asynchronous and informal versus formal—may yield differentiated effects on performance and career outcomes in the near and long term.

Beyond the potential for alternative forms of virtual interactions to improve newcomer performance, our study's findings imply that virtual interactions require significant investments from senior personnel to be impactful in the near term. This brings to light the opportunity cost of senior managers' time, and whether adding additional meetings into senior managers' schedules to build firm human capital is the best use of their working hours. Given the relative lack of diversity among the top echelons of firms (Boone and Hendriks, 2009; Chang *et al.*, 2020), our finding—revealing that the largest job productivity boosts are among interns sharing a demographic match with senior managers—calls into question the feasibility of carrying out virtual water coolers at scale. Although we do not have the breakdown of gender and ethnicity of the intern class, the de-identified data suggests that the intern cohort is relatively equally distributed among gender (55% in the majority group) and ethnicity (36% representation in the largest group, and a total of nine distinct ethnicities). As diversity tends to decrease by organizational rank, the shadow price of senior managers' time may be even higher for certain individuals. One unintended consequence may be lost job productivity and performance among senior members belonging to underrepresented groups (Smith and Tian, 2017). A more pragmatic and egalitarian approach might be to identify alternative ways to build interpersonal relationships and organizational commitment among newcomers, potentially by fostering connections between newcomers

and firm personnel with similar intellectual similarities or hobbies (Dahlander and McFarland, 2013; Lane *et al.*, 2021) or experimenting with different levels of seniority between mentors and mentees when forming matches for newcomers. Lastly, it is important to recognize that virtual social interactions take place within an organizational environment, and their perceived value among newcomers is dependent on firms endorsing them as a core part of their work culture. If remote organizations tend to focus heavily on productivity as opposed to relationship building, this culture may reduce the perceived necessity of taking time out of one's day to participate in social activities that may not be perceived as "real work". Having senior managers attend the virtual water cooler sessions is one way to signal their high value to interns. This said it remains an important avenue of future work to examine how remote organizations can better signal the value of engaging in social interactions to exchange information and advice and building relational ties with coworkers.

4.3. Contributions to Literature

Our study makes important contributions to the strategic human capital literature. In this literature, Castanias and Helfat (1991, 2001) stress the importance of human capital as a source of firm competitive advantage, and Castanias and Helfat (2001) call specifically for greater research on how hiring and onboarding practices affect employee and firm performance. Ployhart (2006) builds on Huselid (1995) to assert that firms using well-developed staffing practices have better performance. However, the recent strategy literature (e.g., Chatterji *et al.*, 2016; Di Stefano and Gutierrez, 2019) has urged scholars to leverage experimental methods to study micro approaches to strategy (Di Stefano and Gutierrez, 2019; Foss and Pederson, 2016), such as whether management practices have a *causal* impact on performance outcomes.

Our results on virtual interactions only being effective when there are multiple interactions and/or when the intern is demographically matched with the senior manager, suggest the importance of studying how "resource deployment intensity" and "resource specificity" of human capital resources shape the effectiveness of management practices that involve human resources. The prior strategy literature has studied the importance of resource deployment intensity (e.g., in the case of R&D resources, see Kor and Mahoney (2004)) and resource specificity (e.g., Ghemawat and Del Sol, 1998; Sohl and Folta, 2021) in determining performance outcomes. In the case of virtual water coolers, our study suggests that senior managers are key

human capital resources. Specifically, the time commitment of senior managers, arguably a measure of resource deployment intensity, is critical to the effectiveness of virtual water coolers as a management practice. The insights from our study call for greater research on studying the importance of resource deployment intensity and specificity of human capital resources in the context of measuring the effectiveness of management practices that involve human capital as a key resource.

Lastly, our study offers a methodological contribution. The panel experimental design featured in this paper (Bojinov *et al.*, 2021) offers a cutting-edge and promising avenue for future work in strategy that tests the causal effects of treatment dose on longer-term performance and satisfaction with remote work. In addition, our use of a panel experiment presents the first application of this recently developed experimental design technique to strategy research. The strength of this design is in its ability to naturally introduce variation in the treatment dose (or frequency) without limiting our ability to directly estimate the primary effect of the intervention. We hope that our paper will accelerate the adoption of advanced experimental designs allowing for direct estimates of heterogeneous treatment effects and dose responses within the strategy and management community.

In summary, our study, to the best of our knowledge, presents the first experimental evidence of which types of virtual interactions in a remote workplace improve performance outcomes among organizational newcomers. To reiterate, given the time constraints of knowledge workers (e.g., Perlow 1999), there is a need for firms to understand how to best prioritize informal interactions for organizational newcomers working remotely. Our results suggest that senior manager participation in small virtual water coolers is a critical driver of their success in worker performance outcomes. Insights from our study contribute to the literature on strategic human capital and have relevance to managers in all-remote and hybrid-remote organizations on how to effectively onboard organizational newcomers.

5. References

- Allen DG. 2006. Do organizational socialization tactics influence newcomer embeddedness and turnover? *Journal of management*. Sage Publications Sage CA: Thousand Oaks, CA **32**(2): 237–256.
- Allen TD, McManus SE, Russell JE. 1999. Newcomer socialization and stress: Formal peer relationships as a source of support. *Journal of Vocational Behavior*. Elsevier **54**(3): 453–470.
- Allen TJ. 1977. Managing the flow of technology: Technology transfer and the dissemination of technological information within the R&D organisation. *Cambridge, MA: The Massachusetts Institute of Technology*.

- Angle HL, Perry JL. 1981. An empirical assessment of organizational commitment and organizational effectiveness. *Administrative science quarterly*. JSTOR : 1–14.
- Ascalon A. 2022, February 16. The Virtual Water Cooler | Why you need it + how to do it. *Team Building Hub*. Available at: <https://teambuildinghub.com/blog/virtual-water-cooler/> [7 April 2022].
- Ashford SJ, Blatt R, VandeWalle D. 2003. Reflections on the looking glass: A review of research on feedback-seeking behavior in organizations. *Journal of management*. Elsevier **29**(6): 773–799.
- Ashforth BE, Kreiner GE, Fugate M. 2000. All in a day's work: Boundaries and micro role transitions. *Academy of Management review*. Academy of Management Briarcliff Manor, NY 10510 **25**(3): 472–491.
- Ashforth BK, Saks AM. 1996. Socialization tactics: Longitudinal effects on newcomer adjustment. *Academy of management Journal*. Academy of Management Briarcliff Manor, NY 10510 **39**(1): 149–178.
- Barrero JM, Bloom N, Davis SJ. 2020. Why Working From Home Will Stick. *University of Chicago, Becker Friedman Institute for Economics Working Paper* (2020–174).
- Barrick MR, Zimmerman RD. 2005. Reducing voluntary, avoidable turnover through selection. *Journal of Applied Psychology*. American Psychological Association **90**(1): 159.
- Bartel CA, Wrzesniewski A, Wiesenfeld BM. 2012. Knowing where you stand: Physical isolation, perceived respect, and organizational identification among virtual employees. *Organization Science*. INFORMS **23**(3): 743–757.
- Bernstein ES, Turban S. 2018. The impact of the 'open'workspace on human collaboration. *Philosophical Transactions of the Royal Society B: Biological Sciences*. The Royal Society **373**(1753): 20170239.
- Berry GR. 2006. Can computer-mediated asynchronous communication improve team processes and decision making? Learning from the management literature. *The Journal of Business Communication* (1973). Sage Publications Sage CA: Thousand Oaks, CA **43**(4): 344–366.
- Bleakley A *et al.* 2022. Bridging social distance during social distancing: exploring social talk and remote collegiality in video conferencing. *Human–Computer Interaction*. Taylor & Francis **37**(5): 404–432.
- Bojinov I, Rambachan A, Shephard N. 2021. Panel Experiments and Dynamic Causal Effects: A Finite Population Perspective. *Quantitative Economics*.
- Boone C, Hendriks W. 2009. Top management team diversity and firm performance: Moderators of functional-background and locus-of-control diversity. *Management science*. INFORMS **55**(2): 165–180.
- Brass DJ. 1984. Being in the right place: A structural analysis of individual influence in an organization. *Administrative science quarterly*. JSTOR : 518–539.
- de Brey C *et al.* 2019. Status and Trends in the Education of Racial and Ethnic Groups 2018. NCES 2019-038. *National Center for Education Statistics*. ERIC.
- Caldwell DF, Chatman JA, O'reilly CA. 1990. Building organizational commitment: A multifirm study. *Journal of occupational Psychology*. Wiley Online Library **63**(3): 245–261.
- Castanias RP, Helfat CE. 1991. Managerial resources and rents. *Journal of management*. Sage Publications Sage CA: Thousand Oaks, CA **17**(1): 155–171.
- Castanias RP, Helfat CE. 2001. The managerial rents model: Theory and empirical analysis. *Journal of management*. Sage Publications Sage CA: Thousand Oaks, CA **27**(6): 661–678.
- Catalini C. 2018. Microgeography and the direction of inventive activity. *Management Science*. INFORMS **64**(9): 4348–4364.
- Chang EH, Kirgios EL, Rai A, Milkman KL. 2020. The Isolated Choice Effect and Its Implications for Gender Diversity in Organizations. *Management Science*. INFORMS.
- Chatterji AK, Findley M, Jensen NM, Meier S, Nielson D. 2016. Field experiments in strategy research. *Strategic Management Journal*. Wiley Online Library **37**(1): 116–132.
- Choudhury P. 2021. Geographic Mobility, Immobility, and Geographic Flexibility—A Review and Agenda for Research on the Changing Geography of Work. *Academy of Management Annals* (ja).
- Choudhury P, Crowston K, Dahlander L, Minervini MS, Raghuram S. 2020a. GitLab: work where you want, when you want. *Journal of Organization Design*. Springer **9**(1): 1–17.
- Choudhury P, Foroughi C, Larson BZ. 2020b. Work-from-anywhere: The productivity effects of geographic flexibility. *Strategic Management Journal* **2020**(1): 1–29.
- Comer DR. 1991. Organizational newcomers' acquisition of information from peers. *Management communication quarterly*. Sage Publications **5**(1): 64–89.

- Cooper CD, Kurland NB. 2002. Telecommuting, professional isolation, and employee development in public and private organizations. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*. Wiley Online Library **23**(4): 511–532.
- Courtney E. n.d. 30 Companies Switching to Long-Term Remote Work. *FlexJobs*. Available at: <https://www.flexjobs.com/blog/post/companies-switching-remote-work-long-term/> [9 March 2022].
- Cox, D. R., & Reid, N. (2000). *The theory of the design of experiments*. Chapman and Hall/CRC.
- Dahlander L, McFarland DA. 2013. Ties that last: Tie formation and persistence in research collaborations over time. *Administrative science quarterly* **58**(1): 69–110.
- DeFilippis E, Impink SM, Singell M, Polzer JT, Sadun R. 2022. The impact of COVID-19 on digital communication patterns. *Humanities and Social Sciences Communications*. Palgrave **9**(1): 1–11.
- Dennis AR, Fuller RM, Valacich JS. 2008. Media, tasks, and communication processes: A theory of media synchronicity. *MIS quarterly*. JSTOR : 575–600.
- Di Stefano G, Gutierrez C. 2019. Under a magnifying glass: On the use of experiments in strategy research. *Strategic Organization*. SAGE Publications Sage UK: London, England **17**(4): 497–507.
- Di Stefano G, Micheli MR. 2022. To Stem the Tide: Organizational Climate and the Locus of Knowledge Transfer. *Organization Science*. INFORMS.
- Dufour L, Escribano PI, Maoret M. 2021. (How) Will I Socialize You? The Impact of Supervisor Initial Evaluations and Subsequent Support on the Socialization of Temporary Newcomers. *Organization Science*. INFORMS.
- Fang R, Duffy MK, Shaw JD. 2011. The organizational socialization process: Review and development of a social capital model. *Journal of management*. Sage Publications Sage CA: Los Angeles, CA **37**(1): 127–152.
- Fayard A-L, Weeks J. 2007. Photocopiers and water-coolers: The affordances of informal interaction. *Organization studies*. Sage Publications Sage UK: London, England **28**(5): 605–634.
- Filstad C. 2004. How newcomers use role models in organizational socialization. *Journal of workplace learning*. Emerald Group Publishing Limited.
- Foss NJ, Pederson T. 2016. Microfoundations in strategy. *Strategic Management Journal* **37**(13): 22–34.
- Ghemawat P, Del Sol P. 1998. Commitment versus flexibility? *California Management Review*. SAGE Publications Sage CA: Los Angeles, CA **40**(4): 26–42.
- Gibbs M, Mengel F, Siemroth C. 2021. Work from home & productivity: Evidence from personnel & analytics data on IT professionals. *University of Chicago, Becker Friedman Institute for Economics Working Paper* (2021–56).
- Gibson CB, Dunlop PD, Majchrzak A, Chia T. 2021. Sustaining Effectiveness in Global Teams: The Coevolution of Knowledge Management Activities and Technology Affordances. *Organization Science*. INFORMS.
- Henry. 2022, March 17. Every Company Going Remote Permanently: MAR 17, 2022 UPDATE. *buildremote*. Available at: <https://buildremote.co/companies/companies-going-remote-permanently/> [7 April 2022].
- Hill EJ, Ferris M, Mårtinson V. 2003. Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life. *Journal of Vocational Behavior*. Elsevier **63**(2): 220–241.
- Hinds PJ, Carley KM, Krackhardt D, Wholey D. 2000. Choosing work group members: Balancing similarity, competence, and familiarity. *Organizational behavior and human decision processes*. Academic Press **81**(2): 226–251.
- Hinds PJ, Mortensen M. 2005. Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication. *Organization science*. INFORMS **16**(3): 290–307.
- Huselid MA. 1995. The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of management journal*. Academy of Management Briarcliff Manor, NY 10510 **38**(3): 635–672.

- Ibarra H. 1992. Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative science quarterly*. JSTOR : 422–447.
- Imbens GW, Rubin DB. 2015. *Causal inference in statistics, social, and biomedical sciences*. Cambridge University Press.
- Jiang JY, Ashforth BE, Li J. 2022. The long walk together: The role of institutionalized socialization in shaping newcomers' future expectations about their networks. *Journal of Vocational Behavior*. Elsevier **137**: 103757.
- King A, Berchicci L. 2021. Mapping the garden of forking paths: The case of social & financial performance. *Strategic Management Journal*. Wiley.
- King AA, Goldfarb B, Simcoe T. 2019. Learning from testimony on quantitative research in management. *Academy of Management Review* (ja).
- Kleinbaum AM, Stuart TE, Tushman ML. 2013. Discretion within constraint: Homophily and structure in a formal organization. *Organization Science* **24**(5): 1316–1336.
- Kor YY, Mahoney JT. 2004. Edith Penrose's (1959) contributions to the resource-based view of strategic management. *Journal of management studies*. Wiley Online Library **41**(1): 183–191.
- Lane J, Ganguli I, Gaule P, Guinan E, Lakhani KR. 2021. Engineering serendipity: When does knowledge sharing lead to knowledge production? *Strategic Management Journal*. Wiley Online Library **42**(6).
- Lee S. 2019. Learning-by-moving: can reconfiguring spatial proximity between organizational members promote individual-level exploration? *Organization Science*. INFORMS **30**(3): 467–488.
- Louis MR. 1980. Career transitions: Varieties and commonalities. *Academy of management review*. Academy of Management Briarcliff Manor, NY 10510 **5**(3): 329–340.
- Louis MR, Posner BZ, Powell GN. 1983. The availability and helpfulness of socialization practices. *Personnel Psychology*. Wiley Online Library **36**(4): 857–866.
- Marini MM, Olsen AR, Rubin DB. 1980. Maximum-likelihood estimation in panel studies with missing data. *Sociological methodology*. JSTOR **11**: 314–357.
- McKeever V. 2021, February 25. Goldman Sachs CEO Solomon calls working from home an 'aberration'. Available at: <https://www.cnbc.com/2021/02/25/goldman-sachs-ceo-solomon-calls-working-from-home-an-aberration-.html>.
- Mitchell W, Tsui AS. 2012. Research in Emerging Economy Contexts: Selected Articles from MOR and three SMS journals (GSJ, SEJ, and SMJ).
- Morrison EW. 1993. Longitudinal study of the effects of information seeking on newcomer socialization. *Journal of applied psychology*. American Psychological Association **78**(2): 173.
- Morrison EW. 2002. Newcomers' relationships: The role of social network ties during socialization. *Academy of management Journal*. Academy of Management Briarcliff Manor, NY 10510 **45**(6): 1149–1160.
- Neeley T., 2015. Global teams that work. *Harvard Business Review*, 93(10), pp.74-81.
- Neeley TB, Leonardi PM. 2018. Enacting knowledge strategy through social media: P assable trust and the paradox of nonwork interactions. *Strategic Management Journal*. Wiley Online Library **39**(3): 922–946.
- O'Dowd P, Hagan A. 2021, January 28. Uncertain COVID-19 Vaccine Distribution Leaves Many Navigating Ethics of Skipping The Line. *WBUR*. Available at: <https://www.wbur.org/hereandnow/2021/01/28/vaccine-ethics-skipping-line>.
- Ostroff C, Kozlowski SW. 1992. Organizational socialization as a learning process: The role of information acquisition. *Personnel psychology*. Wiley Online Library **45**(4): 849–874.
- Ostroff C, Kozlowski SW. 1993. The role of mentoring in the information gathering processes of newcomers during early organizational socialization. *Journal of Vocational behavior*. Elsevier **42**(2): 170–183.
- Pennington J, Socher R, Manning CD. 2014. Glove: Global vectors for word representation. In *Proceedings of the 2014 conference on empirical methods in natural language processing (EMNLP)*: 1532–1543.
- Perlow LA. 1998. Boundary control: The social ordering of work and family time in a high-tech corporation. *Administrative Science Quarterly*. JSTOR : 328–357.
- Perlow LA. 1999. The time famine: Toward a sociology of work time. *Administrative science quarterly*. SAGE Publications **44**(1): 57–81.
- Ployhart RE. 2006. Staffing in the 21st century: New challenges and strategic opportunities. *Journal of management*. Sage Publications Sage CA: Thousand Oaks, CA **32**(6): 868–897.

- Reichers AE. 1987. An interactionist perspective on newcomer socialization rates. *Academy of management review*. Academy of Management Briarcliff Manor, NY 10510 **12**(2): 278–287.
- Roche MP, Oettl A, Catalini C. 2022. *(Co-) Working in Close Proximity: Knowledge Spillovers and Social Interactions*. National Bureau of Economic Research.
- Sias PM, Pedersen H, Gallagher EB, Kopaneva I. 2012. Workplace friendship in the electronically connected organization. *Human Communication Research*. Oxford University Press Oxford, UK **38**(3): 253–279.
- Sohl T, Folta TB. 2021. Declining markets, resource specificity, and redeployment decisions. *Strategic Management Review*. now publishers **2**(2): 391–412.
- Sterling A, Merluzzi J. 2021. A longer way in: Tryouts as alternative hiring arrangements in organizations. *Research in Organizational Behavior*. Elsevier : 100122.
- Sterling AD, Fernandez RM. 2018. Once in the door: Gender, tryouts, and the initial salaries of managers. *Management Science*. INFORMS **64**(11): 5444–5460.
- Smith, E. B., & Tian, Y. (2017). Stretched too thin? The paradox of promoting diversity in higher education. In *Academy of Management Proceedings* (Vol. 2017, No. 1, p. 17252). Briarcliff Manor, NY 10510: Academy of Management.
- Treem JW, Leonardi PM. 2013. Social media use in organizations: Exploring the affordances of visibility, editability, persistence, and association. *Annals of the International Communication Association*. Taylor & Francis **36**(1): 143–189.
- Tsui AS, Egan TD, O'Reilly III CA. 1992. Being different: Relational demography and organizational attachment. *Administrative science quarterly*. JSTOR : 549–579.
- Tushman ML, Romanelli E. 1983. Uncertainty, social location and influence in decision making: A sociometric analysis. *Management Science*. INFORMS **29**(1): 12–23.
- Uzzi B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative science quarterly* : 35–67.
- Yang L *et al.* 2021. The effects of remote work on collaboration among information workers. *Nature human behaviour*. Nature Publishing Group : 1–12.

Table 1. Summary of Virtual Interactions Experimental Conditions at GLOBAL (study 1)

| Condition | Description | Duration | Hierarchy | Synchronicity | Formality |
|------------------------------------|---|---------------------|--|---------------|-----------|
| Asynchronous Q&A | Interns type a question on the discussion forum at the end of each week and are exogenously selected to receive a reply from a senior manager from their division | N/A | Hierarchical with senior managers (and other interns) | Asynchronous | Informal |
| Intern group project | Interns meet once per week over videoconference (i.e., Zoom) with the same group of three to four peers from their division to work on an Intern Group Challenge project | 30 mins per week | Non-hierarchical with interns | Synchronous | Formal |
| Intern-only water cooler | Interns meet between zero and four times (exogenously determined by the panel experimental design) over videoconference (i.e., Zoom) with a small group of three to four peers from their division to exchange advice and social information | 30 mins per session | Non-hierarchical with interns | Synchronous | Informal |
| Intern-senior manager water cooler | Interns meet between zero and four times (exogenously determined by the panel experimental design) over videoconference (i.e., Zoom) with a small group of three to four peers and a senior manager from their division to exchange advice and social information | 30 mins per session | Hierarchical with a senior manager (and other interns) | Synchronous | Informal |
| Control | Interns are not assigned to any virtual interactions treatment | N/A | N/A | N/A | N/A |

^Note: Final performance is reverse coded (1 = worst, 3 = best)

Figure 1. Sample Daily Schedule for Remote Intern at GLOBAL (Study 1)

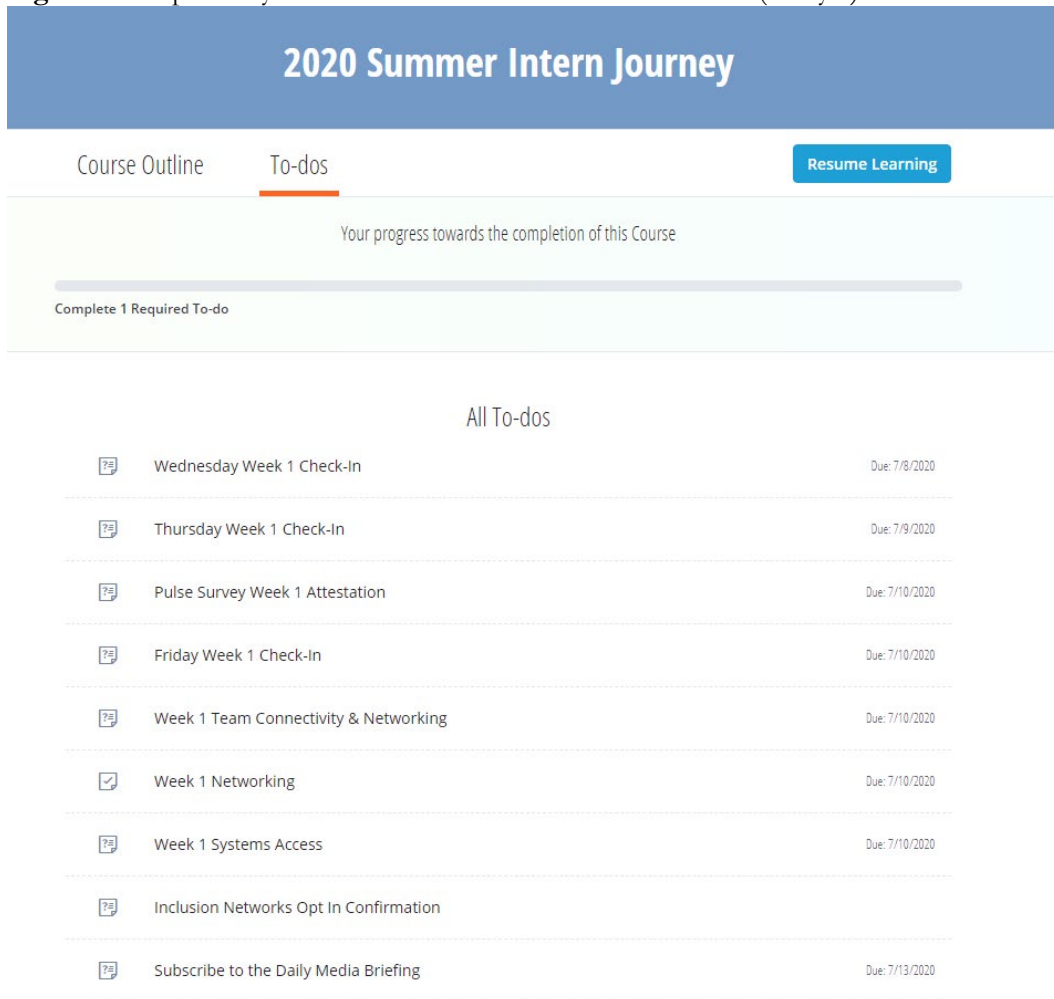


Figure 2. Mean Job Offer and Final Performance by Virtual Interactions Treatment (Study 1)

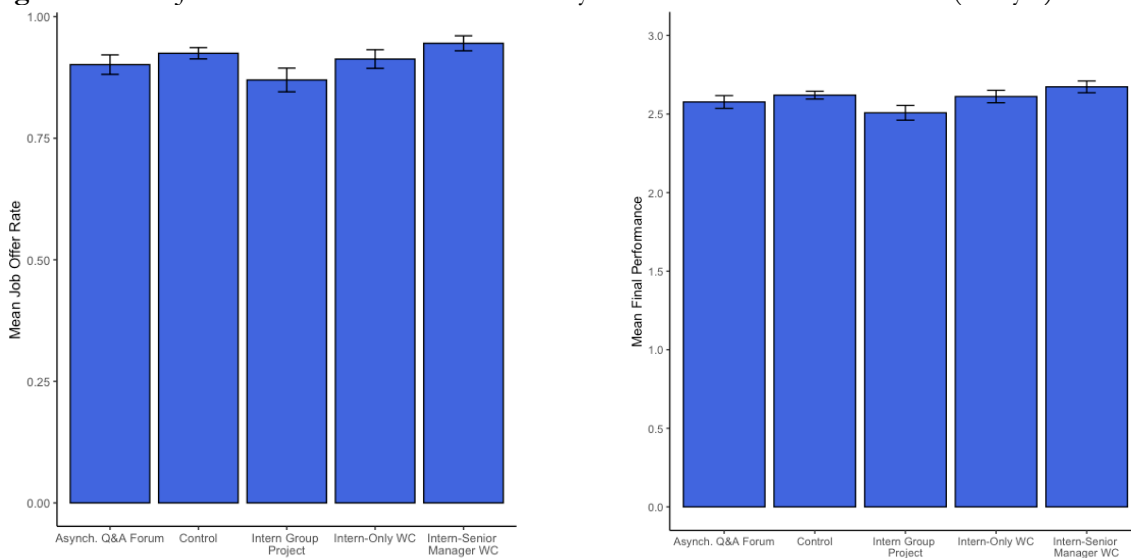
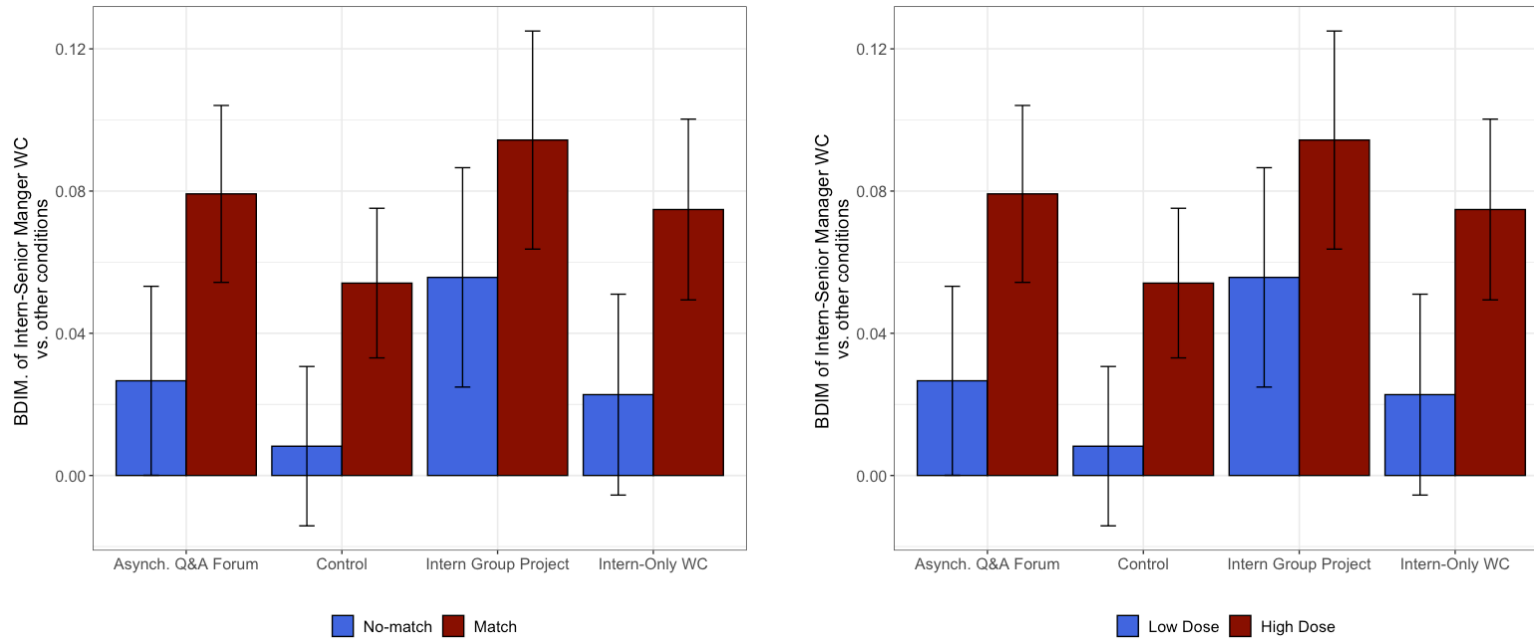


Figure 3. BDIM of Job Offer Rate vs. Intern-Senior Manager Water Cooler Condition for Demographic No-match/Match (left) and Low/High Dose (right) (Study 1)



Note: Error bars are standard errors. A low dose corresponds to 0-2 water coolers (WC); a high dose corresponds to 3-4 water coolers (WC) during the five-week internship

Figure 4. Shadow Price of Senior Manager Time for GLOBAL Remote Summer Intern Program (Study 1)

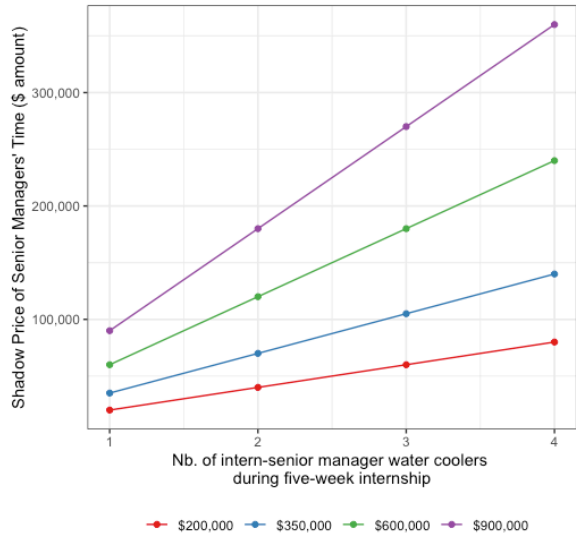


Figure 5. BDIM of Newcomer Socialization Outcomes between Demographic Match (Treatment) and No-Match (Control) Conditions (Study 2)

