

**SPACE AND STRUCTURE:
THE INTERPLAY BETWEEN PROXIMITY, UNIT BOUNDARIES, AND SUPERVISION IN
SHAPING WORKPLACE INTERACTIONS**

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Abstract

Organizations commonly co-locate employees in the same office to foster collaboration, yet spatial interventions often fail to deliver their intended benefits. Conflicting evidence in the proximity and office design literatures highlights the need for a better understanding of when and how physical space shapes workplace interactions, particularly across organizational units. Drawing on theories of attention, we propose that spatial arrangements and organizational structures intersect to influence employees' attentional processes. We argue that (1) proximity's effects on work-related interactions should be stronger for same-unit dyads than cross-unit dyads because organizational relationships determine who is most likely to stand out in a busy office environment, and (2) proximity to supervisors should reduce cross-unit interactions as employees focus on demonstrating unit-focused productivity to nearby authority figures. We find evidence consistent with these hypotheses in a field study in which employees were quasi-randomly assigned to desks following a headquarters relocation, creating exogenous variation in proximity between employees from different units and between employees and their supervisors. This research contributes to the literatures on boundary spanning, physical space, and organizational attention by demonstrating that office design's impact on collaboration depends critically on the organizational relationships among the employees within the space.

Keywords: Boundary spanning, office design, proximity, intraorganizational networks, collaboration

**Space and structure:
The interplay between proximity, unit boundaries, and supervision in shaping workplace interactions**

I. Introduction

Organizations invest millions of dollars in office space, often with the explicit goal of fostering collaboration among employees from different units (Waber et al. 2014; Berg 2022). This investment aligns with management research highlighting the importance of intraorganizational boundary spanning – interactions among members of different units to achieve work-related goals – for outcomes such as innovation, knowledge transfer, and team performance (Marrone 2010; Ancona and Caldwell 1992; Joshi et al. 2009). The aftermath of the COVID-19 pandemic has intensified the focus on office space as a policy tool for fostering such interactions, with executives at companies such as Apple, Amazon, and JPMorgan explicitly citing organizational collaboration as a primary rationale for return-to-office mandates (e.g., Goldberg 2023; Lee 2022; Brownstein and Chan 2025). Yet, despite decades of research on how physical space shapes work-related interactions among employees, spatial interventions intended to increase collaboration often fail to deliver their intended benefits (Irving et al. 2020; Bernstein and Turban 2018). Given that boundary spanning interactions are notoriously difficult to cultivate (Tushman and Scanlan 1981) and office design represents a readily available managerial tool, understanding how spatial arrangements can facilitate collaboration across units represents both an important organizational challenge and a significant research opportunity.

Although prior work demonstrates that employees from different units tend to interact more often when they are collocated in the same office (e.g., Van den Bulte and Moenaert 1998), we have surprisingly little insight into how office layouts can facilitate (or discourage) boundary spanning. A key challenge in extant research is that office floor plans typically mirror the organizational chart (e.g., Sailer and McCulloh 2012; Zahn 1991), and thus spatial boundaries in many offices are confounded with organizational boundaries. This confound makes it difficult to determine whether the effects of office design on work-related interactions observed in past literature are contingent on how employees are connected through the organizational structure. For instance, while numerous studies show that proximity

increases interactions by creating opportunities for spontaneous encounters (e.g., Allen 1977; Reagans 2011; Kabo et al. 2014), we do not know if proximity is equally effective at fostering interactions across unit boundaries as it is within units. Similarly, while employees tend to interact less when the spatial layout makes them more observable to others (Bernstein and Turban 2018), the organizational relationships between the observers and the observed could condition this effect. Observation by a supervisor may have different consequences for employees' interaction choices than observation by colleagues, particularly given that supervisors sometimes undermine boundary spanning behavior (Mell et al. 2022; Xie et al. 2023). A key outstanding question is thus: Does physical space shape interactions differently depending on how employees are connected by the organizational structure?

The purpose of this article is to develop and test a theory of how spatial configurations influence boundary spanning by examining whether proximity operates differently for employees within and across unit boundaries. Drawing on theories of attention (James 1890; Kahneman 1973; Ocasio 2011), we propose that spatial configuration and organizational structure intersect to shape employees' selective attention processes (who notices whom) and how they allocate attention (which activities are prioritized). Because the organizational structure defines who is most likely to collaborate and who is accountable to whom (Galbraith 1973), we suggest it determines who is most likely to 'stand out' to whom as both interaction partners and observers in the context of a busy office (Fiske and Taylor 2008). Building on these ideas, we propose that (1) the effect of proximity on work-related interactions will be stronger for same-unit dyads relative to cross-unit dyads and (2) that proximity to supervisors will reduce employees' propensity to engage in cross-unit interactions in the office.

We find support for these predictions in a field study in which employees were quasi-randomly assigned to desks in an open-plan office following a headquarters relocation. This process created exogenous variation in proximity between employees from different units and between employees and their supervisors, such that space and structure were not confounded in the new office. Using sociometric surveys collected three months after the move ($N = 5,718$ dyads), we find that the effects of proximity on work-related interactions are significantly stronger for same-unit dyads relative to cross-unit dyads.

Moreover, cross-unit dyads were less likely to interact when seated near their respective supervisors in the new office, suggesting that working in close proximity to supervisors constrains boundary spanning interactions.

Our findings reveal that proximity's effects on collaboration cannot be understood without considering the organizational structure in which spatial relationships are embedded. This work contributes to three ongoing conversations in the organizations literature. First, we advance boundary spanning research (e.g., Marrone 2010; Marrone et al. 2007; Mell et al. 2022) by examining physical space as an organizational design tool that can foster or constrain cross-unit interactions. Specifically, we demonstrate that proximity is a less powerful instrument for increasing boundary-spanning interactions than extant proximity research suggests, and that proximity to supervisors within the office floorplan can deter cross-unit collaboration. Second, we contribute to the office design literature (e.g., Oyedemi et al. 2025; Lauterbach and Borge, 2026) by demonstrating how proximity to third parties shapes dyadic interactions beyond what dyadic proximity alone would predict, highlighting the importance of considering the location of observers in spatial arrangements. Finally, we extend the body of research on attention in organizations (e.g., Ocasio 2011; Bernstein et al. 2024; Mayo 2022) by presenting attention as a unifying mechanism for reconciling conflicting findings in past research on office design.

II. Literature Review and Hypothesis Development

For decades, management scholarship has examined how physical work environments shape interactions among employees (Oldham and Brass 1979; Olson and Olson 2000; Kiesler and Cummings 2002; Oyedemi et al. 2025). In particular, numerous studies have examined collaboration in the context of an 'office' – a dedicated physical space in which multiple employees from the same organization conduct knowledge work (Sailer and McCulloh 2012). The spatial configuration (i.e., layout) of the office is considered a key variable of interest in this area of research (Sundstrom and Sundstrom 1986).

Prior literature has examined the effects of spatial configurations on work-related interactions through two distinct perspectives. The propinquity perspective focuses on distance among employees (Reagans 2011). This work demonstrates that physical closeness increases interaction by shaping

employees' movements and creating *opportunities* for spontaneous encounters (Allen 1977; Reagans 2011; Kabo et al. 2014). The transparency perspective focuses on the observability afforded by proximate work arrangements (Bernstein 2017). Research adopting this perspective has shown that proximity can, paradoxically, reduce interactions by increasing the extent to which employees are *observable* to others (Bernstein and Turban 2018; Irving et al. 2020). We suggest that the attention literature offers a useful lens for integrating these seemingly conflicting findings because it explains why the same spatial configuration may produce different interaction patterns for different dyads. Building on these ideas, we develop a theory of how spatial configurations and organizational structure intersect to shape work-related interactions among employees. We focus on two manipulable aspects of spatial layouts: the proximity among pairs of employees and the proximity of employees to their supervisors.

Because our theorizing and analyses focus on work-related interactions between pairs of employees in an office, we adopt a dyadic perspective throughout this paper. We use the notation A and B to refer to the two members of any given dyad when discussing their work-related interactions, proximity, and organizational relationships. Throughout the paper, we use the labels *boundary spanning* and *cross-unit* interchangeably to refer to dyadic interactions between employees who are not members of the same organizational unit.

Examining Spatial Configurations and Collaboration through the Lens of Attention

Organizational scholars have long argued that firms shape employee behavior by developing structures that channel attention toward certain stimuli and away from others (Simon 1947; March and Simon 1958; Ocasio 1997, 2011). From this lens, office spaces are one available policy tool organizations can deploy to channel employees' attention. Specifically, an employee's location within the office establishes his or her field of stimulation – the set of sensory inputs available for potential attention (Kahneman 1973; Broadbent 1958). Among these stimuli are colleagues whose presence, movements, and conversations can capture attention (Birnholtz et al. 2007; Bernstein et al. 2024). Both the propinquity and transparency perspectives offer insight into how employees attend to nearby colleagues in their physical environment and the consequences of this attention for workplace interactions.

The propinquity perspective demonstrates that increasing proximity among dyads increases their interaction frequency (Allen 1977; Sailer and McCulloh 2012; Reagans 2011; Olson and Olson 2000; Spillane et al. 2017). This stream of research typically invokes opportunity as the mechanism linking physical closeness to increased interaction between A and B. When A and B work in close proximity to one another, they have more exposure to one another and thus more opportunities to learn about one another's activities and expertise (Edenius and Yakhlef 2007; Appel-Meulenbroek et al. 2017). Further, they are more likely to experience opportunities for serendipitous interactions in shared spaces such as hallways, kitchens, and breakrooms (Kabo et al. 2014; Reagans 2011). From an attention perspective, A and B are more likely to enter one another's sensory environments when they work closer together, such as by approaching in peripheral vision, being within earshot, or crossing paths near one another's workplaces. These encounters provide the opportunity for A and B to notice one another and establish the mutual attention required for an interaction (Bernstein et al. 2024).

The transparency perspective examines how physical space shapes employees' interactions through its effects on observability (Bernstein 2017; Oyedele et al. 2025). A key finding in this stream of research is that open plan office designs can paradoxically reduce face-to-face interactions among employees relative to designs that afford more privacy (e.g., Irving et al. 2020; Kim and De Dear 2013). Although propinquity effects occur in both open and cellular offices (e.g., Sailer and McCulloh 2012; Allen 1977), the observability afforded by open designs can induce a sense of monitoring that reduces collaboration among employees (Bernstein and Turban 2018). Applying the lens of attention, these findings reflect two related processes. First, employees attend to nearby colleagues not only as potential interaction partners, but also as observers who can monitor them: Just as they can see and hear nearby colleagues, they are also aware that nearby colleagues can see and hear them. Second, awareness of observers activates goal-directed attention toward behaviors they believe observers will view favorably and away from those they believe observers will view unfavorably (Bolino et al. 2016). This notion of modifying one's behavior in the presence of observers is consistent with decades of research on self-presentation: when in front of an 'audience', people tend to 'act' (Goffman 1959).

Both the propinquity and transparency perspectives hinge on employees attending to nearby colleagues as potential interaction partners or as observers whose presence shapes behavior. Yet, a basic principle in psychological and organizational theories of attention is that attention is a limited resource (James 1890; Kahneman 1973; Ocasio 2011). To manage attentional constraints, employees' selective attention guides focus toward specific stimuli while filtering out others (Katsuki and Constantinidis 2014; Knudsen 2007). In busy environments where many inputs compete for attention, more salient stimuli – such as those that are personally meaningful, behaviorally relevant, or related to topics that are present on one's mind (e.g., a current objective) – are more likely to capture attention than less salient stimuli (Treisman 1960; Knudsen 2007; Birnholtz et al. 2007; Johnston and Dark 1986). Extending this concept to how employees attend to one another, we suggest that organizational structure plays a key role in who attends to whom both as potential interaction partners and observers. In both cases, organizational structure shapes attention through the same underlying process (i.e., determining which nearby colleagues are most salient), but the consequences differ depending on the nature of the relationship. Shared unit membership heightens the salience of colleagues as potential interaction partners, increasing the likelihood of work-related interaction. Supervisors' control over valued resources heightens their salience as observers, prompting employees to consciously adjust which interactions they pursue.

A common confound in proximity research is that office layouts typically mirror organizational charts (Sailer and McCulloh 2012; Zahn 1991), such that employees who are already likely to attend to one another due to formal work relationships also tend to be physically closer. Consequently, existing research cannot disentangle whether proximity is equally effective at fostering boundary-spanning interactions as it is at fostering within-unit interactions. Similarly, studies have not examined how the presence of particularly salient observers such as supervisors affects interaction patterns. Building on the attention-based arguments developed above, we propose two hypotheses about how spatial configuration and organizational structure intersect to shape work-related interactions. Specifically, we argue that the relationship between dyadic proximity and work-related interaction is stronger for same-unit dyads than

for cross-unit dyads, and that proximity to supervisors constrains boundary spanning interactions more than within-unit interactions.

Dyadic Proximity and Boundary Spanning Interactions

Employees who work in close proximity should have more opportunities to engage in work-related interactions (e.g., Kabo et al. 2014, Allen 1977), regardless of whether they are members of the same unit. However, employees' current work goals and focus shape which stimuli in their environment are likely to capture their attention (Ocasio 2011; Corbetta and Shulman 2002). Colleagues whose activities relate closely to topics currently on an employee's mind – due to shared projects, expertise, or task demands – may be more likely to penetrate attentional filters than those whose activities are less related (Treisman 1960; Knudsen 2007; Johnston and Dark 1986). We suggest that this differential noticing influences the extent to which employees recognize and act on the opportunities for work-related interaction that proximity affords.

When A and B are members of the same unit, their actions and conversations may be especially likely to capture one another's attention because they may be related to one another's ongoing work or expertise (Johnston and Dark 1986; Tushman and Scanlan 1981; Cronin and Weingart 2007). They may thus be more likely to notice opportunities for work-related interactions because they are more familiar with one another's work and have shared schemas for situating one another's activities (Klimoski and Mohammed 1994). This is consistent with the notion that stimuli that are related to topics that are currently active in an employee's mind are "easy to attend to but difficult to ignore" (Johnston and Dark 1986: 63). Conversely, when A and B are members of different units, their activities and communication in the office may be less interpretable to one another (Katz and Kahn 1966; Tushman and Scanlan 1981; Carlile 2002); consequently, their actions and conversations may be less likely to penetrate one another's attentional filters because they are less likely to be mutually relevant (Treisman 1969). This reasoning suggests that even when employees from different units are seated in close proximity, they may be less likely to perceive opportunities to engage in work-related interactions relative to same-unit dyads.

Selective attention may also shape how employees respond to the work-related interaction opportunities that proximity affords. Productive interactions require the mutual attention of two or more colleagues (Vertegaal 1999; Birnholtz et al. 2007, Bernstein et al. 2024). Although chance encounters may trigger obligatory greetings (Boutellier et al. 2008), employees who are already attending to similar topics may more easily convert these opportunities to fruitful work-related interactions. When A and B work in the same unit – and therefore likely work on related activities (Tushman and Scanlan 1981) – a chance encounter provides a natural opening to discuss work. For instance, they might provide one another with brief updates on a project or quickly exchange task-relevant information. In contrast, when A and B are members of different units, they may be less prepared to engage in meaningful work-related interactions when they encounter one another by chance (Liu and de Rond 2016). Thus, even when an opportunity arises, cross-unit colleagues may be less likely to engage in work-related interactions than same-unit colleagues.

In summary, we expect the effects of proximity on work-related interaction to be conditional on unit membership. When A and B are members of the same unit, the relationship between proximity and work-related interaction is stronger, because A and B are more likely to recognize and act on the opportunities to interact that proximity affords.

***Hypothesis 1:** Employees A and B are more likely to engage in work-related interactions in the office when they sit closer together, but this positive relationship is stronger when A and B are members of the same unit than when they are members of different units.*

Supervisor Proximity and Boundary Spanning Interactions

Thus far, we have argued that A and B's proximity and unit membership jointly affect their likelihood of engaging in work-related interactions in the office. However, such interactions occur in a spatial environment populated by other employees who may observe them (Oyedeji et al. 2025; Bernstein and Turban 2018). Organizational research dating back to the *Hawthorne Studies* has demonstrated that employees are mindful of observers in their work environments and alter their behavior accordingly (Roy 1952). Yet, just as employees cannot attend to all potential interaction partners in a busy office equally,

they are unlikely to attend to all potential observers equally. Given their control over valued resources such as promotions and job assignments, supervisors should be especially conspicuous as observers (Bolino et al. 2016; Komaki 1986).

Supervisors play a central role in directing employees' attention toward particular activities through processes such as goal setting and performance management (Locke and Latham 1990; Ocasio 1997). When supervisors are nearby, employees may be conscious that their allocation of attention is on display, as supervisors can readily observe what they are working on (Birnholtz et al. 2007) and to whom they are talking (Long et al. 2015). This awareness may make evaluative concerns especially salient, leading employees to deliberately direct their attention toward activities and interactions they believe supervisors will view favorably.

How might employees' deliberate allocation of attention in response to nearby supervisors influence how they behave in the office? Employees may prioritize allocating attention to activities they believe will demonstrate dedication and hard work to their supervisors (Bolino et al. 2016; Jones and Pittman 1982). This desire to demonstrate "busyness" may lead employees to engage in behaviors that signal productive work engagement, such as working independently for extended periods of time at their desks (Elsbach et al. 2010; Gershuny 2005; Cristea and Leonardi 2019). Interacting with colleagues, by contrast, sends a more ambiguous signal of productive work. Employees may worry that conversations could appear to be socializing rather than task-relevant information exchange and therefore err on the side of behaviors that more clearly signal task focus when supervisors are nearby. Beyond reducing employees' own propensity to initiate interactions, employees' efforts to signal busyness may also make them appear less approachable to colleagues who might otherwise interrupt them (Birnholtz et al. 2007). Importantly, because work-related interactions require the mutual attention of both parties (Bernstein et al. 2024), these dynamics apply symmetrically to each member of the dyad: proximity to supervisors on the part of A, B, or both may activate the evaluative concerns that we theorize suppress interaction. We therefore expect A and B to interact less frequently when they sit closer to their respective supervisors.

However, employees are unlikely to perceive all interactions in the office as equally incompatible with the goal of appearing productive in the eyes of a nearby supervisor. Prior research suggests that evaluative concerns lead employees to be selective in their interactions, engaging more with some colleagues while avoiding others (Long et al. 2015). Knowledge work is often highly collaborative (Wageman et al. 2012), and task interdependence tends to be concentrated within organizational units rather than across them (Kleinbaum et al. 2013). As a result, employees may view allocating attention to interactions with same-unit colleagues as clearly aligned with their supervisors' priorities and therefore as appropriate even when supervisors are nearby. Further, some supervisors even encourage information exchange, helping behaviors, and coordination within their units (Raver et al. 2012; Bergeron et al. 2013). When A and B are members of the same unit, they may therefore believe that their supervisors will interpret their interactions as relevant to unit goals, and thus be less hesitant to engage with one another when they sit in close proximity to their supervisors.

By contrast, employees may view boundary spanning interactions as a less appropriate allocation of attention in the presence of nearby supervisors. While interactions among members of the same unit may suggest a focus on supervisors' immediate goals, interactions among members of different units may be more ambiguous and vulnerable to negative reactions (Mell et al. 2022). Although collaboration across units is often necessary for organizational success, organizational units frequently prioritize achieving their own immediate objectives over more distal organizational goals (Davison et al. 2012). Employees' direct supervisors typically serve as their primary point of contact for goal setting and performance evaluation (Latham 2023), and employees may therefore infer that unit-level priorities take precedence over broader organizational collaboration in the eyes of their supervisors. Unlike same-unit interactions, boundary spanning interactions may have unclear relevance to supervisors' unit-focused priorities as it may be unclear whether the interactions are related to the focal unit's work, the other employee's unit's work, or work at all. This ambiguity may make cross-unit interactions more vulnerable to negative attribution. Indeed, research shows that supervisors sometimes undermine boundary spanning behavior, viewing it as a threat to territorial control or as encroaching on their own role as the unit's external

representative (Mell et al. 2022; Xie et al. 2023). When A and B are members of different units, they may therefore avoid engaging with one another when they sit in close proximity to their respective supervisors.

In summary, we expect that proximity to supervisors activates evaluative concerns that shape how employees allocate their attention in the office. In particular, we suggest it reduces their propensity to engage in work-related interactions in the office. Because same-unit interactions are more likely to be interpreted as task-relevant and aligned with supervisors' priorities, the constraining effects of supervisory proximity should be weaker for same-unit dyads. By contrast, because cross-unit interactions represent more ambiguous signals of productive work and are more vulnerable to negative attribution, proximity to supervisors should be especially likely to deter boundary-spanning interactions.

***Hypothesis 2:** Employees A and B are less likely to engage in work-related interactions in the office when they sit closer to their respective supervisors, and this relationship is stronger when A and B are members of different units than when they are members of the same unit.*

III. Field Study

Company Background and Study Context

We examine whether organizational structure and spatial structure interactively shape work-related interactions in the office through a field study centered on the relocation of the headquarters of a publicly traded multinational company based in Latin America ($N = 108$ employees). The company manufactures and distributes water treatment equipment such as water heaters, purification systems, and industrial storage tanks. It has been in business for nearly 40 years and employs over 2,000 people across 10 countries. The headquarters relocation was driven by the expiration of a lease agreement, and the office moved from the original building to a different building located across the street.

Approximately six months prior to the headquarters relocation, the CEO expressed interest in introducing a mixed seating arrangement in the new office. One of the firm's core values was "collaboration" and that its units were "one company," and he believed that the seating arrangement in the old office – which consisted of an open floorplan that mirrored the organizational chart – reinforced divisions between units rather than encouraging productive interactions among them. We conducted over

a dozen additional informational interviews with other executives and employees at headquarters who similarly observed that employees from different units tended to remain in the areas immediately surrounding their desks, interacting primarily among themselves.

The company agreed to participate in a field study in which employees would work from quasi-randomly assigned desks in the new office and report their work-related interactions through sociometric surveys. This was an ideal method to examine how spatial configurations influence work-related interactions within and across units because it created exogenous variation in the proximity between employees from different units and between employees and their supervisors. Further, there were no significant changes in the company's internal operations or external environment during the study period, nor were there any policy changes targeting cross-unit collaboration (e.g., no changes in incentives). In both locations, the strategic nature of the work occurring at headquarters often required interaction among employees from several units. Although each unit had its own responsibilities and goals, nearly all of the company's top strategic priorities required contributions from multiple units.

Organizational Structure and Employee Sample

All 126 full-time non-executive staff members who worked at the old headquarters office for at least three months prior to the office move participated in the study. The company's executive leadership team was excluded from the sample. During the period of the study, 18 employees exited the company, and thus our final sample included 108 employees.¹ There were also over 20 new employees hired into the company who were present in the new office, however, these employees were excluded from the sample because their desks were not randomly assigned and their first few months at the company generally consisted of orientation and onboarding activities.

The employees in the sample occupied two organizational ranks. Some were specialized individual contributors or front-line managers ($N = 78$) and others were senior managers ($N = 30$). In total, 28 of the employees managed direct reports who also worked at headquarters, and an additional 9

¹ Most of these exits were voluntary, and this level of total turnover was consistent with that of the same period in both the preceding and following years.

had direct reports who worked in other company offices. Most employees held either a bachelor's degree (63%) or a master's degree (21%), and the average organizational tenure was 5.25 years ($SD = 6.01$). The average employee was 34.9 years old ($SD = 7.85$) and 65% of the employees were men. In both the old and new offices, employees worked on-site daily with the exception of occasional work travel, off-site customer meetings, or vacations. Employees at headquarters did not have remote or hybrid work arrangements at the time of the study.

Each employee at the company reported to one supervisor. In general, supervisors were responsible for choosing which projects employees would work on and ensuring work met quality standards, as well as representing their direct reports' work to the executive management team. Supervisors' feedback was the primary input to the performance review process at the company, and thus they played an important role in shaping employees' career trajectories and compensation.

The hierarchical structure of the company closely aligned with employees' functional responsibilities, with employees reporting to the same supervisor or skip-level supervisor generally working on the same or similar projects. We refer to groups of employees reporting up to the same supervisor or skip-level supervisor as 'units' within the organization.² In total, there were 8 job functions represented at headquarters (e.g., human resources, marketing, sales, finance, IT) with 23 sub-functions (e.g., publicity, commercial sales, accounting).

Like in many organizations (e.g., Sailer and McCulloh 2012; Zahn 1991), the spatial layout of the old office was confounded with the organizational structure. The primary seating area for employees in the sample was an open floor plan on the lower floor of a two-floor office, where each employee had an assigned desk. The office was "U-shaped", with a large elevator bay in the center. Employees' desks were located near the desks of other members of their unit in 'pods' of desks that were connected at the sides. In this arrangement, nearly three-quarters (73.4%) of the employees who sat within 6 steps of one another were members of the same unit. The individual contributors and frontline managers in the sample also

² We use the general term 'unit' rather than the label 'team' or 'department' because the company used multiple labels to refer to these groups.

tended to sit very close to their supervisors in this arrangement (median proximity = 12.25 steps), while the senior managers sat further from their supervisors who worked on the upper level of the office (median proximity = 75 steps).

Study Design and Data Collection

The study involved three primary activities: (1) documenting baseline patterns of work-related interaction in the old office, (2) designing and implementing a seating chart for the new office, and (3) measuring work-related interaction frequency in the office after the move. For the duration of the study, two research assistants were on-site for approximately 20 hours per week (10 hours each on nonoverlapping days).

Documenting baseline patterns of work-related interaction. Three months prior to the headquarters relocation, we conducted a sociometric survey to examine baseline levels of interaction in the old office. The purpose of this survey was to enable us to control for pre-existing interaction patterns prior to the office move in our analyses. All employees in the sample were invited to participate (100% response rate). The company's CEO announced the survey to employees in an email, and then employees received a link to complete the survey via an online survey platform shortly thereafter. In the survey, employees at the headquarters were asked to report the frequency with which they engaged in informal work-related interactions with each of the other employees at headquarters (e.g., Allen 1977; Van den Bulte and Moenaert 1998). We used this roster method to avoid recall bias and took several steps to ensure employees were listed using the names or nicknames by which their colleagues knew them at the company (Pustejovsky and Spillane 2009). Consistent with the notion that more interactions occur within units than across units (Kleinbaum et al. 2013), we found a strong association between employees being part of the same unit and how often they engaged in work-related interactions in the old office ($r = .38$).

Designing and implementing a seating chart for the new office. We documented the spatial features of the new office as it was finishing construction. Unlike the old office, the new office occupied a single floor and was "L-shaped". The far sides of the floor plan contained the executives' private offices (all of which had transparent glass walls), and the remainder of the office was entirely open. The open

space consisted of three large sections that were outfitted with 40-60 desks, each of which was assigned a number. There were no walls dividing the three sections and each had its own small conference rooms and phone booths, which had glass walls. After all office furniture was installed, the two on-site research assistants walked all of the main pathways in the office and recorded the proximity between hundreds of specific markers in steps. We then used an algorithm to compute the shortest walking paths between every pair of desks in the new office, measured in steps.

To document the extent to which proximity corresponded with visibility among employees in the new office, the research assistants also coded which other desks were within the line-of-sight of an individual sitting at each desk (1 = visible, 0 = not visible). These binary visibility measures were highly correlated with the number of steps between desks ($r = .64$), which gave us confidence that proximity among employees was closely related to how likely they were to see one another in the new office space when sitting at or standing near their desks.

Next, we created a seating chart for the new office using a quasi-random assignment procedure. The three inputs for the quasi-random assignment process were employees' job subfunctions³, office sections, and desk numbers. First, we used a randomizer to assign each of the subfunctions to a section of the office: A, B, or C. Employees who were members of that subfunction were then assigned to the randomly selected section. Once employees were split into sections, we used a random number generator to assign each employee to a desk number. This approach reduced the strong overlap between formal work relationships and the location of employees in the office and enabled exogenous variation in the proximity between employees and supervisors, while also keeping employees who worked in the same subfunction within a reasonable distance. With the new seating chart, now only 20.3% of the colleagues located within 6 steps were part of the same unit as the focal employee (versus 73.4% in the old office). Similarly, the median proximity between employees and their supervisors nearly doubled to 29.5 steps away, and all employees now worked on the same floor as their supervisors. For a visual comparison,

³ At the company, job subfunctions are a more granular distinction than the 'units' about which we theorize; 25.1% of employees within the same unit belonged to the same job subfunction.

Figure 1 depicts the floor plans of both the old and new offices and highlights the placement of employees in one unit in the new versus old office.

[Insert Figure 1 about here]

About a week prior to the office move, the CEO announced to employees that the seating assignments in the new offices would not be arranged by unit and would instead be mixed. In this announcement, he emphasized that the units at headquarters are “one company” and the purpose of the mixed seating arrangement was to reflect that. The quasi-random seating chart was implemented on the first day that employees began working at the new office, with only minor changes. Two employees who regularly handled confidential information had been assigned to desks in areas with high foot traffic, so their assigned seats were switched with colleagues who were members of the same subfunction and reported to the same supervisor. Otherwise, employees were required to maintain their assigned desks for the duration of the study. The two research assistants who were on-site following the move reported that employees maintained their new desks as assigned.

Measuring work-related interaction frequency in the new office. Three months after the office move, employees completed a sociometric survey in which they reported how often they engaged in work-related interactions with each employee in the office (100% response rate). This survey was identical to the one administered to collect the baseline measure, with one exception. After rating their interaction frequencies with each colleague, employees answered 15 additional questions about various aspects of their experience in the new office location (such as satisfaction with the new facility and ease of interacting with colleagues). We report descriptive statistics for these additional measures in the Online Supplement.

Additional Data Collection

Although our theorizing centers on face-to-face interactions in the office, the company provided archival email metadata for all employees at the headquarters for the two-month period before and the ten-month period after the office move. This metadata included email timestamps, sender, and recipients for all messages sent between members of headquarters during the period, but not the content of the

messages. We made no formal predictions regarding how proximity and structure would intersect to predict email communication, but we examine email as an alternative dependent variable for exploratory purposes in Additional Analysis 2.

Analytic Strategy

To test our hypotheses regarding how spatial proximity and organizational structure jointly shape work-related interactions, we examine network regression models using the multiple regression quadratic assignment procedure (MR-QAP) (Krackhardt 1988). In network data, observations are inherently non-independent because each individual appears in multiple dyads, violating the independence assumption of standard regression techniques. MR-QAP addresses this issue by estimating a multiple regression model in which the dependent variable is a matrix (e.g., frequency of interaction between A and B), and the predictors are also matrices representing dyadic covariates (e.g., physical proximity). To assess statistical significance, MR-QAP compares the observed regression coefficients to a distribution generated by repeatedly permuting the rows and columns of the dependent matrix, thereby maintaining the network structure of the data while breaking any systematic association between the dependent and independent variables. Because this procedure is nonparametric, it does not rely on the assumption that errors are normally distributed. Following prior management scholarship (e.g., Sherman and Keller 2011), we report *p*-values based on 10,000 permutations for each model. All MR-QAP analyses were conducted in R (version 4.2.2) using the ‘sna’ package (Butts 2008).

The data for each model are organized in square matrices (108×108), where each cell represents a pair of employees (e.g., A, B). Because our dependent variable of interest is how often members of the dyad interact with one another, all matrices used in our analysis are symmetrized to capture undirected relationships.⁴ Further, given that our interest is in how frequently employees interact with colleagues rather than their supervisors, we exclude 60 dyads involving direct supervisor-subordinate relationships

⁴ We reach identical conclusions examining directed models in which the interaction reported from A to B and B to A is modeled separately. These models are available in the Online Supplement.

and omit their cells from the dependent and independent matrices via masking.⁵ Our final sample was thus 5,718 dyads. We describe the construction of each predictor matrix in the following section.

Measures

Dependent variables. For our test of Hypotheses 1 and 2, we constructed a matrix of *Interaction Frequency* to capture the average frequency with which each pair of employees (A and B) reported interacting with one another in the post-move sociometric survey. In this survey, employees indicated how frequently they interacted with each of their colleagues about work-related matters on a five-point scale: (1) never, (2) monthly, (3) every other week, (4) weekly, or (5) daily. There was a strong correlation between A's reported interaction frequency with B and B's reported frequency with A ($r = .57$), and for 88% of dyads, the two ratings were within one scale point of each other. We averaged the two reports to produce a single, symmetrized measure of interaction frequency for each dyad.

Explanatory variables. We capture the degree of *Dyadic Proximity* between employees by computing the number of steps that employees have to travel to get from one desk to another (e.g., Allen 1977). This distance is reverse-coded so that the interpretation is consistent with the notion of proximity: higher values represent higher levels of proximity between employees (a value of -10 indicates 10 steps away). Using the same approach, we computed the number of steps that each employee sat from his or her supervisor in the new office. We then created a variable *Dyadic Proximity to Supervisors* that represents an average of these two values for each dyad (i.e., the mean of A's proximity to Supervisor_A and B's proximity to Supervisor_B). We operationalized this variable as an average because we expect the attentional processes associated with observation to apply symmetrically to each member of the dyad, and A's proximity to their supervisor, B's proximity to their supervisor, or both could inhibit interaction. The average thus captures the overall exposure to supervisory observation for the dyad.⁶ Finally, *Same Unit Dyad* was set to a value of 1 if A and B are members of the same unit and otherwise set to zero.

⁵ For robustness, we confirmed our results do not change if these dyads are included in the analysis.

⁶ As a robustness check, we confirmed that we obtain similar results if we instead use a measure of the closest supervisor (taking the maximum supervisory proximity value for the dyad) or furthest supervisor (taking the minimum supervisor proximity value for the dyad).

Control variables. We control for interaction history in the old office as well as several homophily variables that we expect could impact interactions among dyads. *Prior In-person Interaction Dyad* was set to 1 if A and B reported in-person work-related interactions in the pre-move survey and *Prior Email Interaction Dyad* was set to 1 if A and B emailed one another during the pre-move period. From a homophily perspective, *Same Gender Dyad* was set to a value of 1 if both employees were men or women and otherwise set to zero. *Tenure Difference Dyad* was measured as an absolute difference in the company tenures of A and B.

Finally, to account for the seniority of A and B, we included two additional control variables: *One Senior Manager Dyad* (which was set to a value of 1 if either A or B was a senior manager) and *Both Senior Managers Dyad* (which was set to 1 if both A and B were senior managers). These variables were otherwise set to zero. The baseline category in the models is thus dyads in which neither employee is a senior manager.

IV. Results

Main Analysis

Table 1 presents descriptive statistics and correlations for all variables in our analysis. We report means and standard deviations at the dyadic level ($N = 5,718$ dyads) and use quadratic assignment procedure (QAP) correlations to account for the non-independence of network observations (10,000 permutations). There are several aspects of this table worth noting. First, the quasi-random seat assignment process resulted in a very weak positive association between *Dyadic Proximity* and *Same Unit Dyad* ($r = .04$). This suggests that the quasi-random seating assignment procedure was effective in creating exogenous variation in proximity between same-unit and cross-unit dyads (for comparison, this correlation was $r = .27$ in the old office). Second, *Dyadic Proximity* was positively correlated with *Interaction Frequency* ($r = .15$), which is consistent with prior work linking proximity to increased interaction (e.g., Allen 1977). Finally, *Dyadic Proximity to Supervisors* was negatively associated with *Interaction Frequency* ($r = -.11$). This is consistent with our theorizing that employees who sit closer to their supervisors are less likely to collaborate with colleagues in the office.

[Insert Table 1 about here]

Table 2 reports the MR-QAP models predicting *Interaction Frequency* in the new office. In Model 1, we examine just the main effects of the independent variables. As expected, *Dyadic Proximity* has a positive and significant effect ($\beta = 0.007, p < .001$). To put this in perspective, moving from one standard deviation below the mean (-61 steps, or about 61 steps apart) to one standard deviation above the mean (-20 steps, or about 20 steps apart) is associated with a predicted 0.29 increase in interaction frequency on the 5-point scale. *Dyadic Proximity to Supervisors* shows a negative and significant effect ($\beta = -0.003, p < .001$). Moving from one standard deviation above the mean to one standard deviation below the mean in supervisor proximity — from about 19 steps away to about 55 steps away — is associated with a 0.11-point increase in interaction frequency. *Same Unit Dyad* has a strong positive effect ($\beta = 1.159, p < .001$), indicating that members of the same unit interact significantly more frequently than boundary spanning dyads.

[Insert Table 2 about here]

Model 2 adds the interaction terms to test our hypotheses. As predicted in Hypothesis 1, there is a positive and significant interaction between *Dyadic Proximity* and *Same Unit* ($\beta = 0.009, p < .001$). This indicates that the effect of proximity on *Interaction Frequency* differs depending on whether the members of the dyad are part of the same unit. For same-unit dyads, moving from one standard deviation below the mean (about 61 steps apart) to one standard deviation above the mean (about 20 steps apart) yields a 0.57-point increase in *Interaction Frequency*. Conversely, for cross-unit dyads, the same change in proximity yields just a 0.21-point increase in *Interaction Frequency*. This difference is consistent with our theorizing that proximity is more strongly associated with work-related interaction for members of the same unit.

Providing support for Hypothesis 2, Model 2 also shows a significant interaction between *Dyadic Proximity to Supervisors* and *Same Unit* ($\beta = 0.007, p < .001$). For cross-unit dyads, moving from one standard deviation above to one standard deviation below the mean in supervisor proximity — from about 19 steps away to about 55 steps away — is associated with a 0.18-point increase in interaction frequency, indicating that cross-unit dyads interact more when they sit further from their supervisors. For same-unit

dyads, however, the pattern reverses: the net effect of *Dyadic Proximity to Supervisors* is slightly positive ($-0.005 + 0.007 = 0.002$), suggesting that same-unit dyads interacted slightly more when they sat *closer* to their supervisors. Together, these results suggest that working in close proximity to supervisors constrains boundary spanning interactions but does not reduce work-related interactions among members of the same unit. This is consistent with our arguments that employees who work in closer proximity to their supervisors may wish to appear focused on their unit's goals, leading them to engage in fewer boundary-spanning interactions while maintaining (or even prioritizing) interactions with same-unit colleagues.

Finally, Model 3 includes control variables. *Prior Work Interaction* shows a strong positive effect ($\beta = 0.801, p < .001$), indicating that dyads that interacted in the old office were more likely to interact in the new office. Similarly, *Both Senior Managers Dyad* shows a positive effect ($\beta = 0.280, p < .001$), suggesting more frequent communication among senior managers in the office. *Tenure Difference Dyad* (absolute value) showed a negative relationship with interaction frequency ($\beta = -0.005, p = .029$), while there was no significant association between *Same Gender Dyad* or *One Senior Manager Dyad* and dyads' tendency to engage in work-related interactions in the new office. Importantly, the hypothesized interaction effects remain significant after controlling for these factors. Figure 2 depicts these interactive relationships. Overall, these results provide support for both of our hypotheses.

[Insert Figure 2 about here]

As a robustness check, we also examined whether the two spatial forces operate interactively rather than additively by estimating a specification that includes a three-way interaction among *Dyadic Proximity*, *Dyadic Proximity to Supervisors*, and *Same Unit Dyad*, in addition to all lower order interactions. Although our theory treats these two interactions as operating through distinct attentional processes, the underlying processes could intersect in practice, as the salience of nearby colleagues may shift when employees are observed by their supervisors. This three-way interaction was statistically significant but very small in magnitude ($\beta = 0.0004, p < .001$), indicating that the two-way interaction between *Dyadic Proximity* and *Same Unit Dyad* varies slightly depending on *Dyadic Proximity to*

Supervisors. We provide a full interpretation of this effect in the Online Supplement. Importantly, both hypothesized two-way interactions remain significant and directionally consistent in this specification.

Additional Analyses

Although our primary interest in this study is how proximity shapes work-related interaction frequency in the office, we also conducted two additional analyses to examine how proximity in the new office differently shaped new versus existing relationships (Additional Analysis 1) and how proximity in the new office influenced email communication among employees (Additional Analysis 2). We should stress that we made no formal predictions for these relationships, although we will offer an interpretation of each of these results according to our theory of how spatial arrangement and structure intersect to influence employees' interactions in the office (Hollenbeck and Wright 2017). In our Online Supplement, we provide further analyses examining how employee-level and subfunction-level networks changed following the office move.

Additional Analysis 1 – New Tie Formation and Tie Persistence

Because prior work suggests that the effects of proximity on ongoing interaction may differ from its effects on the formation and maintenance of relationships (Hasan and Koning 2019), we also examined how the spatial intervention influenced tie formation and maintenance among employees following the headquarters relocation. To do so, we separated previously non-interacting dyads (those reporting no interaction in the pre-move survey) from previously interacting dyads and examined binary outcomes for each group using logistic regression QAP models (LR-QAP). LR-QAP follows the same permutation procedure as MR-QAP but uses logistic regression to model binary dependent variables. For previously non-interacting dyads, we modeled the binary outcome of whether the dyad interacted in the post-move sociometric survey (0 = remained non-interacting, 1 = formed new tie). For previously interacting dyads, we modeled whether existing ties continued to report interaction in the post-move survey (0 = dissolved tie, 1 = tie persisted). These analyses allowed us to examine the role of proximity in creating new same-unit and boundary spanning ties as well as maintaining existing ones.

Tie formation. Among the 5,718 dyads in our sample, 3,712 (64.9%) reported no interaction prior to the office move. Of these previously non-interacting dyads, 646 (17.4%) formed new ties following the headquarters relocation. This tie formation rate varied substantially based on unit membership: 35.9% of previously non-interacting same-unit dyads began interacting post-move, compared to just 16.3% of cross-unit dyads.

Table 3 presents LR-QAP models predicting new tie formation among previously non-interacting dyads. We use the same set of predictor variables as we did in the Main Analysis. Model 4 examines the main effects of the independent variables. *Dyadic Proximity* has a positive and significant effect ($\beta = 0.020$, OR = 1.02, $p < .001$), suggesting that each additional step closer two employees sit in the new office increased their odds of forming a new tie by about 2%. Conversely, *Dyadic Proximity to Supervisors* shows a negative effect ($\beta = -0.012$, OR = 0.99, $p = .003$), indicating that the odds of forming a new tie decreased by about 1% for each additional step closer that members of the dyad sat to their respective supervisors on average. Finally, *Same Unit Dyad* has a large positive effect ($\beta = 0.974$, OR = 2.65, $p < .001$), indicating that previously non-interacting same-unit dyads have substantially higher odds of forming new ties compared to cross-unit dyads.

[Insert Table 3 about here]

Model 5 adds the interaction terms. The interaction between *Dyadic Proximity* and *Same Unit* is not significant ($\beta = 0.006$, $p = .429$), suggesting that proximity had similar effects on tie formation for both same-unit and cross-unit dyads. The interaction between *Dyadic Proximity to Supervisors* and *Same Unit*, however, is significant ($\beta = 0.025$, OR = 1.02, $p < .001$). For cross-unit dyads, moving from one standard deviation above the mean (about 19 steps from supervisors) to one standard deviation below the mean (about 55 steps from supervisors) is associated with 1.76 times higher odds of forming a new tie. For same-unit dyads, however, the same change in supervisor proximity yields 0.73 times the odds of forming a new tie — meaning that, for same-unit dyads, greater supervisor proximity is instead associated with higher odds of tie formation. This suggests that supervisor presence may facilitate new same-unit connections, perhaps because supervisors encourage within-unit collaboration or because employees view

same-unit relationship building as aligned with their supervisors' expectations. These patterns are robust to the inclusion of control variables in Model 6.

Tie persistence. Among the 2,006 dyads that were interacting prior to the office move, 1,416 (70.6%) maintained their ties following the relocation. This persistence rate varied by unit membership: 88.7% of same-unit ties persisted, compared to only 62.2% of cross-unit ties. Table 4 presents LR-QAP models predicting tie persistence among previously interacting dyads. Model 7 examines the main effects. *Dyadic Proximity* has a positive and significant effect ($\beta = 0.013$, OR = 1.01, $p < .001$), indicating that employees who had a history of interacting in person about work-related matters were more likely to continue doing so if they were assigned to sit closer together. Moving from one standard deviation below the mean (about 61 steps apart) to one standard deviation above the mean (about 20 steps apart) is associated with 1.70 times higher odds of maintaining the tie. *Dyadic Proximity to Supervisors* also showed a negative effect on tie persistence ($\beta = -0.012$, OR = 0.99, $p = .004$). Moving from one standard deviation above the mean (about 19 steps from supervisors) to one standard deviation below the mean (about 55 steps from supervisors) is associated with 1.54 times higher odds of tie persistence. Finally, *Same Unit Dyad* has a large positive effect on tie persistence ($\beta = 1.534$, OR = 4.64, $p < .001$).

[Insert Table 4 here]

Model 8 adds the interaction terms. Neither the interaction between *Dyadic Proximity* and *Same Unit* ($\beta = 0.007$, $p = .303$) nor the interaction between *Dyadic Proximity to Supervisors* and *Same Unit* ($\beta = 0.004$, $p = .624$) reaches statistical significance. This suggests that proximity affects tie persistence similarly for both same-unit and cross-unit relationships, and that supervisor proximity has comparable effects across organizational boundaries. Model 9 includes control variables, and the pattern of main effects remains consistent.

Collectively, the models predicting tie formation and persistence add important nuance to our main analyses. Consistent with our main results, A and B's proximity is positively associated with both tie formation and tie persistence, while their proximity to supervisors is negatively associated with both outcomes. However, the evidence that these tie formation and persistence mechanisms operate differently

for same-unit and boundary spanning dyads is mixed. Although directionally consistent with our main findings, the interaction between *Dyadic Proximity* and *Same Unit Dyad* did not reach statistical significance in predicting either tie formation or tie persistence. Further, comparing tie formation and persistence reveals an important asymmetry: while supervisor proximity may deter the formation of new cross-unit ties, it does not differentially affect the persistence of *existing* cross-unit ties (as shown by the insignificant interaction in Table 4). This suggests that concerns about how the supervisor may react to boundary spanning ties may be most salient when initiating new boundary-spanning relationships rather than maintaining established ones. It is possible that existing boundary spanning relationships – those formed in the old office where employees typically worked in close proximity to their supervisors – do not evoke the same evaluative concerns that new ones do.

Additional Analysis 2 – Email Communication

Although our theorizing relates to how spatial locations influence work-related interactions among employees in the office, email communication provides a useful supplementary analysis because it is less observable than the in-person interactions reported in the sociometric surveys. The attentional processes that we argue strengthen the relationship between proximity and interactions for same-unit dyadic interactions relative to cross-unit interactions may ‘spill over’ into email communication, such that employees who notice one another and interact with one another more frequently in the office are also more likely to email one another. Conversely, the deliberate allocation of attention that we propose inhibits face-to-face interactions in front of nearby supervisors may not apply to email, as this communication is not visible to observers. To examine the effects of *Dyadic Proximity* and *Dyadic Proximity to Supervisors*, as well as their interactions with *Same Unit*, we examine email communication using a parallel set of predictors reported in the Main Analysis.

Consistent with prior research examining email communication data, we exclude ‘mass emails’ from our analysis, which we define as messages that have more than four recipients (following

Kleinbaum et al. 2013).⁷ To create the dependent matrix for *Email Communication*, we measured the total number of email messages exchanged between A and B, calculated as a sum of the messages sent in both directions (logged) during the period one month before and one month after the post-move survey (plus a constant of 1 to avoid log-zero issues). To control for prior email relationships, we also created a dummy variable to indicate whether the dyad exchanged email in the two-month period coinciding with the pre-move survey (Prior Email = 1, otherwise 0).

Table 5 reports the MR-QAP models predicting *Email Communication* in the new office. Model 10 examines the main effects of the independent variables. *Dyadic Proximity* has a positive and significant effect ($\beta = 0.002, p < .001$). Because email communication is log-transformed, moving from one standard deviation below the mean (about 61 steps apart) to one standard deviation above the mean (about 20 steps apart) is associated with approximately 9% more emails exchanged. *Dyadic Proximity to Supervisors* shows no significant effect ($\beta = 0.000, p = .733$), suggesting that email communication is less sensitive to supervisory observation than face-to-face interaction. Although not predicted, this is consistent with our theorizing that employees may be more hesitant to communicate face-to-face when their interactions can be observed by supervisors. *Same Unit* membership has a strong positive effect ($\beta = 0.459, p < .001$), indicating that same-unit dyads exchange about 58% more emails than cross-unit dyads.

[Insert Table 5 about here]

Model 11 adds the interaction terms. The interaction between *Dyadic Proximity* and *Same Unit* is positive and significant ($\beta = 0.002, p = .038$), indicating that proximity has a stronger effect on email communication for same-unit dyads than for cross-unit dyads, consistent with the pattern observed for in-person interactions in the main analysis. The interaction between *Dyadic Proximity to Supervisors* and *Same Unit* is also positive and significant ($\beta = 0.008, p < .001$), indicating that supervisor proximity is associated with increased email communication for same-unit dyads but a small negative effect for cross-unit dyads.

⁷ For robustness, we confirmed that we obtained similar results using alternative thresholds of 2, 6, or 8.

Model 12 includes control variables. *Prior Email* history shows a strong positive effect ($\beta = 0.509, p < .001$), while *Same Gender Dyad*, *One Senior Manager Dyad*, and *Both Senior Managers Dyad* show no significant effects. *Tenure Difference Dyad* shows a negative relationship with email communication ($\beta = -0.002, p = .041$). After including controls, the interaction between *Dyadic Proximity* and *Same Unit* becomes non-significant ($\beta = 0.000, p = .923$), while the interaction between *Dyadic Proximity to Supervisors* and *Same Unit* remains significant ($\beta = 0.005, p < .001$). The main effect of *Dyadic Proximity to Supervisors* is not significant in Model 12 ($\beta = 0.000, p = .621$), indicating that there was no association between supervisor proximity and email communication for cross-unit dyads. For same-unit dyads, however, the net effect is positive ($0.000 + 0.005 = 0.005$), suggesting that same-unit dyads exchange more emails when sitting closer to their supervisors. Figure 3 plots these interactive effects.

[Insert Figure 3 here]

In summary, the most notable difference between the results of our Main Analysis and Additional Analysis 2 is that supervisor proximity constrains cross-unit face-to-face interactions but does not appear to constrain cross-unit email communication. This is consistent with our theorizing that the evaluative concerns activated by nearby supervisors primarily shape interactions that supervisors can observe. Additionally, supervisor proximity appears to facilitate same-unit communication across both channels, which is consistent with the notion that employees focus on their supervisors' priorities when they are physically close by.

V. Discussion

This paper examined how the spatial location of employees within an office layout intersects with organizational structure to shape work-related interactions among employees. Drawing on theories of attention (Kahneman 1973; Ocasio 2011; Johnston and Dark 1986; Fiske and Taylor 2008; Bernstein et al. 2024), we theorized that organizational relationships determine which colleagues are most likely to 'stand out' to one another in a busy office environment as both potential interaction partners and observers. Building on these ideas, we predicted that the effect of proximity on work-related interaction would be

stronger for members of the same organizational unit and that proximate supervisors would constrain boundary spanning interactions. We found support for these predictions in a field study in which employees were quasi-randomly assigned to desks in an open plan office following a headquarters relocation.

Theoretical Implications

This work makes three contributions to the organizational literature. First, we extend the boundary spanning literature by examining how the physical environment creates and constrains opportunities for cross-unit interaction. While extensive research has documented the importance of boundary-spanning interactions for coordination, knowledge transfer, innovation, and other critical outcomes (see Marrone 2010 for a review), the boundary spanning literature has largely focused on individual and team antecedents of cross-unit interactions (e.g., Marrone et al. 2007; Guo et al. 2022; Ancona and Caldwell 1992) and the factors that make these interactions challenging (e.g., Tushman and Scanlan 1981; Schotter et al. 2017; Cronin and Weingart 2007). Management scholarship has theorized that contextual variables influence boundary spanning (e.g., organizational conflict, Joshi et al. 2009), but to-date there is limited empirical work examining how organizational design choices can promote boundary spanning behavior, and, conversely, how they might undermine it.

We contribute to this literature by introducing spatial layouts as an organizational design variable that shapes boundary spanning interactions and intra-unit interactions. Our findings reveal organizational relationships as a key boundary condition that influences how employees respond to the opportunity and observability afforded by proximate work arrangements. Because office layouts often mirror organizational charts (Sailer and McCulloh 2012; Zahn 1991), existing studies have not demonstrated whether proximity is an equally effective tool for fostering boundary spanning interactions as it is for fostering within-unit interactions: Our results suggest that it is not. Instead, our findings indicate that while proximity does increase cross-unit interaction, its effects are substantially weaker than for within-unit interaction – a pattern consistent with our theorizing that employees differentially attend to nearby same-unit and cross-unit colleagues. An implication of this finding is that spatial interventions designed to

encourage serendipitous interactions among members of different organizational units (e.g., Hasan and Koning 2019; Lane et al. 2021) may underperform relative to interventions targeting within-unit learning and collaboration (e.g., Chan, Li, and Pierce 2014b). This suggests an important trade-off in spatial design decisions: While locating employees from different units closer together does increase boundary spanning interactions, the same colocation generates substantially stronger effects for same-unit collaboration. This means that spatial interventions intended to maximize cross-unit interaction through mixed seating arrangements may inadvertently undermine within-unit interactions that are more sensitive to proximity.

Further, we demonstrate that nearby supervisors can deter boundary spanning interactions in the office. Although executives often recognize boundary spanning as critical to organizational success (Cross et al. 2015), employees' direct supervisors sometimes view it as a threat to their territorial control or status (Mell et al. 2022; Xie et al. 2023). Because direct supervisors are often responsible for performance evaluations and job assignments (Bolino et al. 2016; Komaki 1986), employees may hesitate to engage in boundary spanning activities when their supervisors can observe them – even when organizational policies, such as mixed seating arrangements, encourage this behavior. Our findings thus highlight supervisor location as a critical but overlooked variable in office design decisions aimed at fostering cross-unit collaboration. More broadly, this work adds to a growing body of research demonstrating that proximity alone does not determine how employees interact; rather, the organizational context in which spatial relationships are embedded, such as incentive structures (Chan, Li, and Pierce 2014a), shapes whether and how employees act on the opportunities that proximity affords. These contributions align with calls to move beyond treating physical space as a “passive container for the actions happening within it” (Kornberger and Clegg 2004: 1095) by demonstrating how the interplay between spatial arrangements and the organizational relationships among the people within them shapes interaction patterns.

Second, we contribute to the literature on proximity in organizations by examining how the presence of specific third parties shapes interaction among employees in an office. Proximity scholarship has long recognized that locating employees closer together increases their likelihood of

interaction (e.g., Reagans 2011; Festinger et al. 1950; Kabo et al. 2014). However, this work has predominantly examined proximity through a dyadic lens (e.g., Sailer and McCulloh 2012; Allen 1977), focusing on the distance between two potential interaction partners rather than the social context in which these relationships are embedded. Our findings reveal that proximity to authority figures can counteract the expected benefits of dyadic proximity for in-person interactions, as employees may believe – correctly or incorrectly – that such interactions will not align with their supervisors’ expectations or preferences. This triadic perspective helps reconcile conflicting findings in the office design literature showing that dyadic interaction increases with proximity (e.g., Sailer and McCulloh 2012) but that observability can decrease interaction overall (e.g., Bernstein and Turban 2018). Our results demonstrate the importance of considering not only how close actors are to one another and whether their interactions are observable, but also *who* might observe them. More broadly, our findings suggest that cellular offices for authority figures – which are often interpreted as a marker of status or hierarchical differentiation (Baldry 1999; Elsbach and Bechky 2007) – may, counterintuitively, encourage employee collaboration by limiting the extent to which supervisors can readily observe or overhear interactions in the office.

Finally, we extend research on attention in organizations (e.g., Ocasio 1997, 2011; Bernstein et al. 2024) by proposing attention as a unifying mechanism to explain how spatial configurations shape workplace interactions. While prior work has examined how employees allocate attention to tasks and strategic priorities (e.g., Ocasio 1997; Ocasio 2011), we extend this logic to consider how they allocate attention to potential interaction partners. Spatial configurations define the set of colleagues to which an employee could potentially attend (i.e., the ‘field of stimulation’, Kahneman 1973), but organizational relationships determine which colleagues are most likely to capture attention as both interaction partners and observers. Selective attention processes favor stimuli that are personally salient and related to topics currently on one’s mind (Johnston and Dark 1986; Knudsen 2007), which we propose leads employees to more readily notice colleagues whose activities are relevant to their own work. This strengthens proximity’s effects for same-unit dyads while weakening them for boundary-spanning dyads. Meanwhile, supervisors’ control over performance evaluations and job assignments should make employees especially

likely to direct attention to them as observers (Bolino et al. 2016; Komaki 1986), prompting employees to focus on activities and interactions that align with their supervisors' priorities. By establishing attention as a theoretical bridge linking both opportunity and observability to interaction frequency, we offer a psychologically-grounded account of why spatial interventions designed to foster collaboration often fail.

Our attention-based framework also speaks to research on attention in physical work environments, which has largely focused on how employees maintain focus amid unwanted stimuli such as noise and interruptions (e.g., Seddigh et al. 2015; Oldham 1988; Gonsalves 2020). This work tends to treat the presence of nearby colleagues as a source of distraction to be managed. Yet, colleagues are also potential interaction partners whose presence creates opportunities for productive collaboration. Understanding how employees selectively attend to specific colleagues is important for advancing this literature, given that colleagues are both a primary source of stimulation in offices and serve as potential interaction partners (Birnholtz et al. 2007; Bernstein et al. 2024).

Limitations and Future Research Directions

This study has several limitations worth mentioning. First, our study only examined one organization over a relatively short time period. While the combination of sociometric survey data and email communication logs provided rich insight into communication within this organization, future research would benefit from conducting similar studies in multiple organizations over longer periods. Expanding the scope would help us better understand the generalizability and boundary conditions of the results presented here. For example, proximity may have a nonlinear relationship with interaction frequency in larger offices. It also may be the case that proximity affects interactions differently depending on how familiar employees are with one another (e.g., a dormant working relationship from years ago versus no prior contact, Levin et al. 2011). Similarly, while we took great care to study the process of how physical proximity impacts work-related interactions three months after a headquarters relocation, future research could associate these patterns with organizational performance outcomes or employees' long-term career outcomes.

Another limitation of this work is that we did not directly test the attentional mechanisms that we propose link dyadic proximity and supervisory proximity to the same-unit and boundary spanning interaction outcomes. Although the results of our study are consistent with our theorizing, there could be alternative mechanisms that shape the relationships reported in this research. For instance, it is possible that social norms influence whether cross-unit and same-unit colleagues initiate interactions with one another in the office. Similarly, it is possible that when employees sit close to their supervisors, potential interaction partners exhibit deference to the nearby supervisor rather than approaching the focal employee.

Future research could more directly test our proposed attentional mechanisms and alternative explanations through several approaches. Experience sampling methods could capture employees' spontaneous awareness of nearby colleagues and their reported reasons for initiating or avoiding interactions. Eye-tracking studies in office environments could measure whether employees visually attend more to same-unit colleagues than cross-unit colleagues, and whether the presence of supervisors shifts visual attention away from potential interaction partners. Experimental designs that manipulate both proximity and organizational relationships (e.g., via vignettes or lab-based office simulations) could isolate the relative contributions of attentional filtering versus alternative mechanisms such as social norms or deference. Such approaches would help establish whether the patterns observed in this study are indeed driven by the attentional processes we theorize.

Finally, this work examined how spatial configuration and organizational structure intersect to shape interactions in physical space, but similar dynamics may operate in the digital environments that are central to collaboration in knowledge work settings. As organizations increasingly rely on communication platforms such as Slack and Microsoft Teams, questions arise about whether organizational relationships shape employees' interaction patterns in analogous ways in these digital venues. For instance, shared channels that span unit boundaries may suffer from the same attentional challenges we document in physical space: employees may be less likely to notice or engage with messages from cross-unit colleagues whose work is less relevant to their ongoing tasks. Additionally, the presence of supervisors in

digital spaces may shape interaction patterns as they do in physical spaces. Employees may be less likely to initiate cross-unit conversations in channels where their supervisors are present, or may shift boundary-spanning discussions to direct messages that are less observable. Future research could examine whether and how the dynamics documented here translate to digital collaboration environments, and whether design choices in these platforms – such as channel structure, visibility settings, and notification systems – can mitigate barriers to cross-unit collaboration that we observe in physical offices.

Managerial Implications

Our research offers important insights to managers who are implementing policies related to office design. Although there are hundreds of popular press articles on the impact of workspace design on employee collaboration (e.g., Congdon et al. 2014), emphasis is often placed on architectural design (e.g., open plan layouts) and there is rarely any discussion of how to position employees in an office relative to the organizational structure. Our study suggests this is a crucial variable that impacts how spatial layouts shape interactions among employees.

Our research demonstrates that effective office design requires aligning the spatial layout of employees with organizational goals. Organizations should consider whether their primary objective of having employees work out of an office is facilitating within-unit collaboration (in which case positioning employees near supervisors may be beneficial) or cross-unit collaboration (in which case positioning employees near supervisors may be counterproductive). If organizations wish to balance both of these goals, one potential strategy may be to cluster same-unit employees together within the floorplan while locating supervisors further away in the office floorplan (e.g., on the other side of the office). This enables unit members to collaborate among themselves readily and may offer them the latitude to initiate interactions with members of different units without hesitation due to supervisor observation. In sum, when organizations fail to consider how organizational structures interact with physical space, they risk undermining their investments in workplace design.

VI. Conclusion

In this article, we proposed a theoretical account of how the spatial location of employees within an office intersects with organizational structure to shape interaction patterns in an office. Through a field study in which employees were quasi-randomly assigned to desks in a new office, we demonstrate that proximity is associated with more informal work-related interactions, but that this effect is stronger within units than across them. We also find that proximity to supervisors is associated with a decrease in boundary spanning interactions among employees. These findings contribute to the literatures on boundary spanning, proximity, and attention in organizations by highlighting the complex interplay between physical space, organizational structure, and hierarchical relationships in shaping patterns of employee interaction. Moreover, our findings suggest that where employees are positioned relative to colleagues and supervisors represents an overlooked factor in office layout decisions that has critical implications for employee collaboration.

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Tables and Figures

Table 1. Descriptive Statistics and QAP Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Interaction Frequency	1.55	0.96										
2. Email Communication (log)	0.29	0.49	.64									
3. Dyadic Proximity	-40.95	20.28	.15	.10								
4. Dyadic Proximity to Supervisors	-37.36	17.68	-.11	-.03	.04							
5. Same Unit Dyad (1=yes)	0.15	0.36	.44	.34	.04	-.12						
6. Prior In-person Interaction Dyad (1=yes)	0.35	0.48	.52	.46	.06	-.08	.35					
7. Prior Email Dyad (1=yes)	0.36	0.48	.45	.56	.07	-.09	.23	.44				
8. Same Gender Dyad (1=yes)	0.53	0.50	.01	.00	.00	.04	.02	.05	.00			
9. Absolute Tenure Difference	5.54	6.38	-.03	-.04	.08	.08	-.01	.00	-.02	.05		
10. One Senior Manager Dyad	0.40	0.49	.00	.01	-.02	-.32	-.03	.01	.04	.02	.07	
11. Both Senior Managers Dyad	0.08	0.26	.18	.07	.00	-.35	.19	.14	.09	-.01	.07	-.23

Note. N = 5,718 dyads. Values represent QAP matrix-correlations based on 10,000 permutations.

Table 2. MR-QAP Models Predicting Dyadic Interaction Frequency

Variables	Model 1	Model 2	Model 3
Intercept	1.515***	1.395***	1.271***
Controls			
Prior In-person Interaction			0.801***
Same Gender Dyad			−0.008
Tenure Difference Dyad (Abs.)			−0.005*
One Senior Manager Dyad			0.050
Both Senior Managers Dyad			0.280***
Main Effects			
Dyadic Proximity	0.007***	0.005***	0.005***
Dyadic Proximity to Supervisors	−0.003***	−0.005***	−0.002
Same Unit Dyad	1.159***	1.784***	1.191***
Interactions			
Dyadic Proximity × Same Unit (Hypothesis 1)		0.009***	0.007***
Proximity to Supervisors × Same Unit (Hypothesis 2)		0.007***	0.004*
R ²	.217	.225	.371
N (dyads)	5,718	5,718	5,718

Note. MR-QAP was performed using 10,000 permutations. Reference category for rank: Neither employee is a senior manager.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3. LR-QAP Models Predicting New Tie Formation Post-Move (Additional Analysis 1)

Variables	Model 4 (OR)	Model 5 (OR)	Model 6 (OR)
Intercept	-1.310*** (0.27)	-1.456*** (0.23)	-1.323*** (0.27)
Controls			
Same Gender Dyad			-0.024 (0.98)
Tenure Difference Dyad (Abs.)			0.001 (1.00)
One Senior Manager Dyad			0.077 (1.08)
Both Senior Managers Dyad			1.184*** (3.27)
Main Effects			
Dyadic Proximity	0.020*** (1.02)	0.019*** (1.02)	0.019*** (1.02)
Dyadic Proximity to Supervisors	-0.012** (0.99)	-0.016*** (0.98)	-0.010* (0.99)
Same Unit Dyad	0.974*** (2.65)	2.409*** (11.13)	2.481*** (11.95)
Interactions			
Dyadic Proximity × Same Unit (Hypothesis 1)		0.006 (1.01)	0.006 (1.01)
Proximity to Supervisors × Same Unit (Hypothesis 2)		0.025*** (1.02)	0.030*** (1.03)
Pseudo-R ² (McFadden)	.360	.363	.370
N (dyads)	3,712	3,712	3,712

Note. LR-QAP was performed using 10,000 permutations. Coefficients are log-odds; OR = odds ratio in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. LR-QAP Models Predicting Tie Persistence (Additional Analysis 1)

Variables	Model 7 (OR)	Model 8 (OR)	Model 9 (OR)
Intercept	0.607** (1.83)	0.521* (1.68)	0.664** (1.94)
Controls			
Same Gender Dyad			0.217* (1.24)
Tenure Difference Dyad (Abs.)			−0.017 (0.98)
One Senior Manager Dyad			0.623*** (1.86)
Both Senior Managers Dyad			1.668*** (5.30)
Main Effects			
Dyadic Proximity	0.013*** (1.01)	0.012*** (1.01)	0.014*** (1.01)
Dyadic Proximity to Supervisors	−0.012** (0.99)	−0.012** (0.99)	0.001 (1.00)
Same Unit Dyad	1.534*** (4.64)	1.953*** (7.05)	1.984*** (7.27)
Interactions			
Dyadic Proximity × Same Unit (Hypothesis 1)		0.007 (1.01)	0.008 (1.01)
Proximity to Supervisors × Same Unit (Hypothesis 2)		0.004 (1.00)	0.003 (1.00)
Pseudo-R ² (McFadden)	.201	.201	.225
N (dyads)	2,006	2,006	2,006

Note. LR-QAP was performed using 10,000 permutations. Coefficients are log-odds; OR = odds ratio in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$

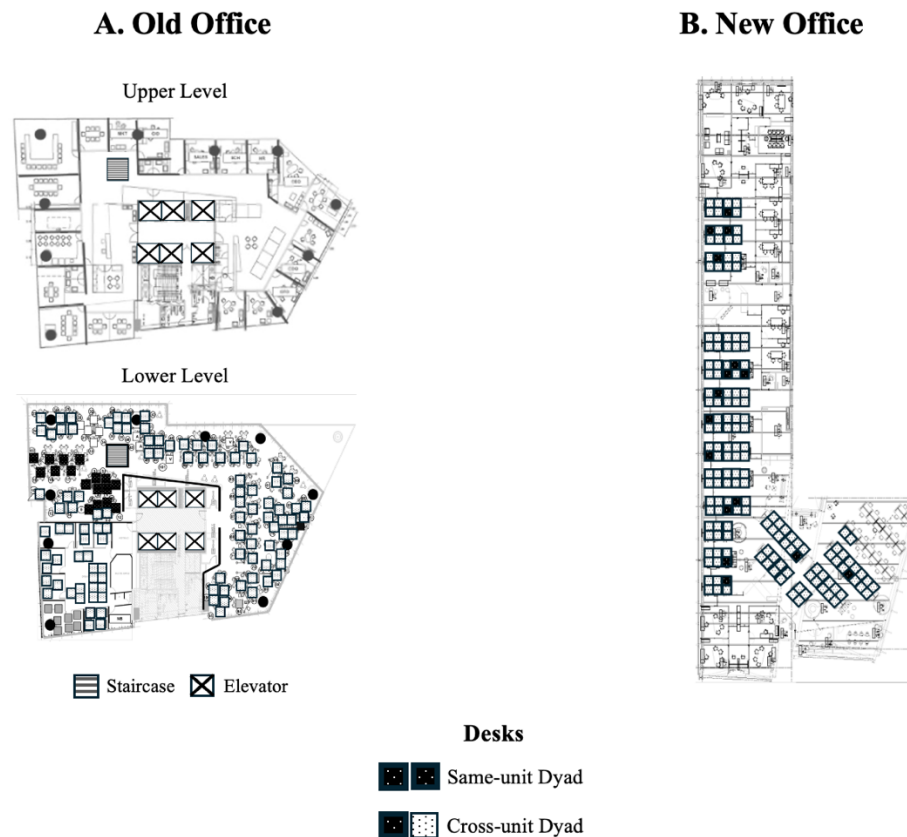
Table 5. MR-QAP Models Predicting Log of Total Email Communication (Additional Analysis 2)

Variables	Model 10	Model 11	Model 12
Intercept	0.311***	0.231***	0.125***
Controls			
Prior Email Interaction			0.509***
Same Gender Dyad			0.004
Tenure Difference Dyad (Abs.)			−0.002*
One Senior Manager Dyad			0.016
Both Senior Managers Dyad			0.027
Main Effects			
Dyadic Proximity	0.002***	0.002***	0.001***
Dyadic Proximity to Supervisors	0.000	−0.002*	0.000
Same Unit Dyad	0.459***	0.847***	0.501***
Interactions			
Dyadic Proximity × Same Unit		0.002*	0.000
Proximity to Supervisors × Same Unit		0.008***	0.005***
R ²	.121	.136	.370
N (dyads)	5,718	5,718	5,718

Note. MR-QAP was performed using 10,000 permutations. Dependent variable is log-transformed total email communication post-move.

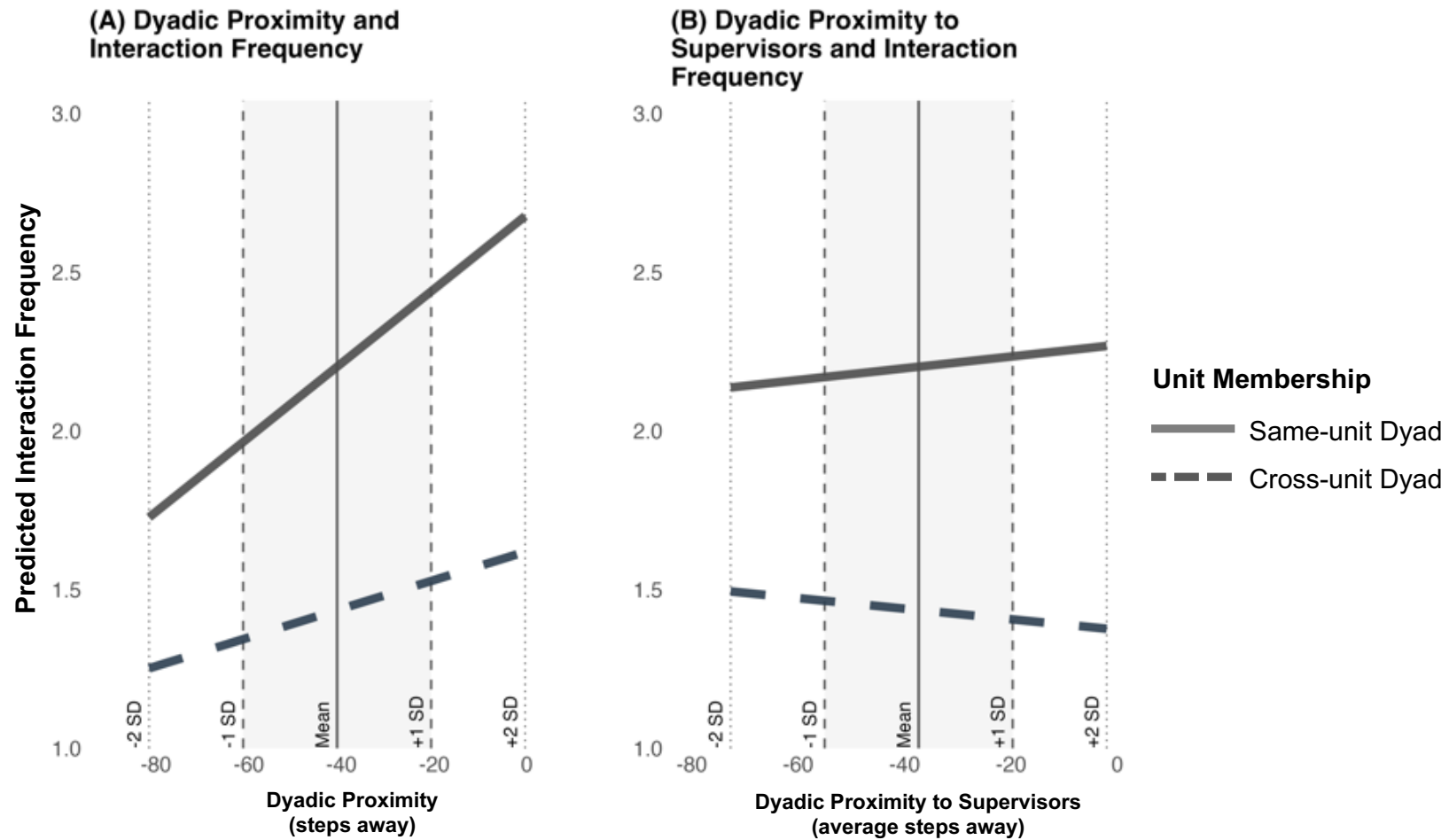
* $p < .05$, ** $p < .01$, *** $p < .001$

Figure 1. Headquarter layout before and after the office relocation illustrating the spatial locations of one unit's members before and after the move



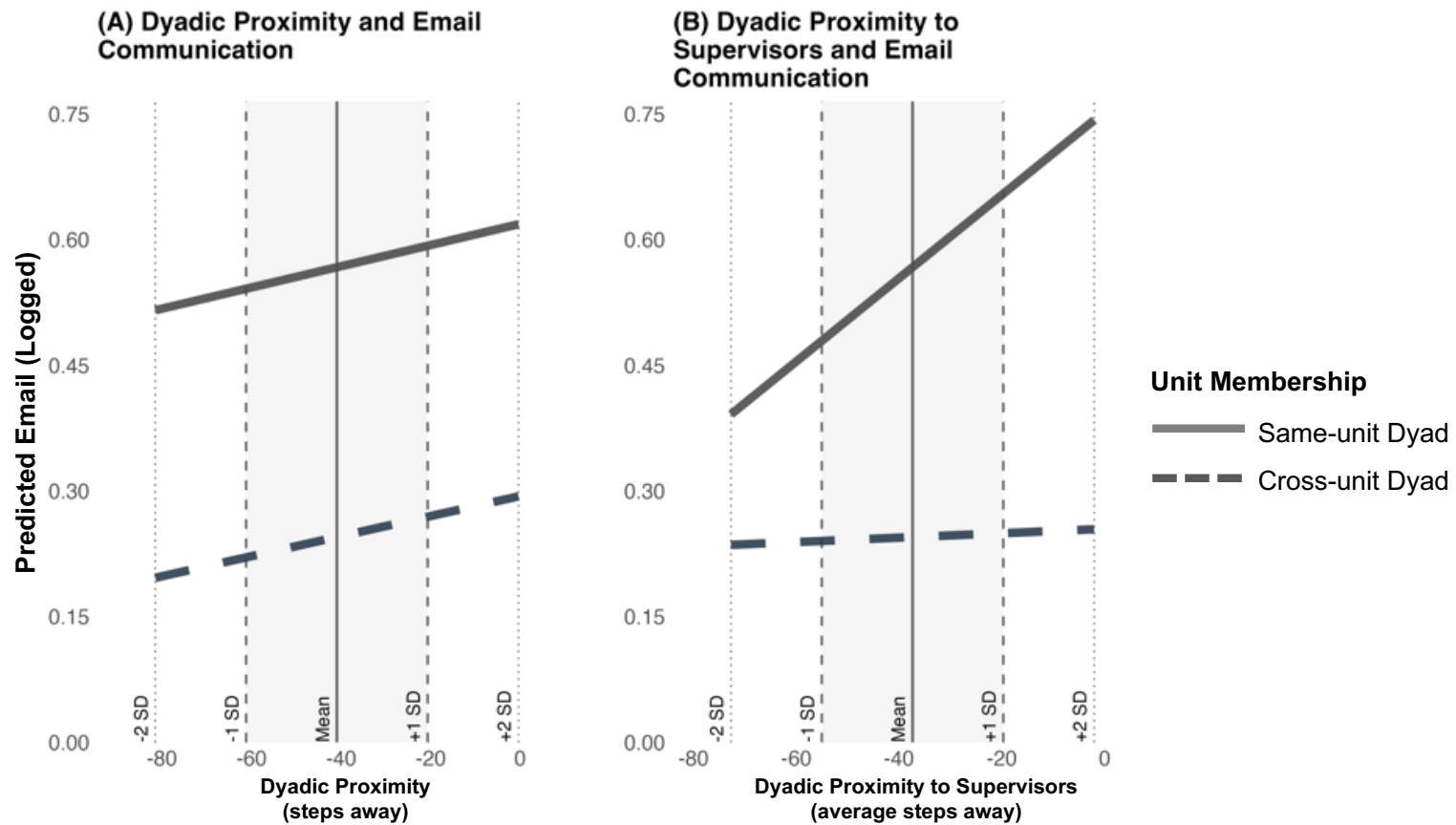
Note: Panel A depicts the floorplan of the old office. Employees in the sample worked at desks on the lower floor of the office, while the executive offices were located one floor above them. Panel B depicts the new office layout. In both Panel A and Panel B, employees' workspaces are represented by squares. To illustrate how the seating chart in the new office altered proximity among members of the same unit, the desks of members of a single unit are shaded in black. Dyads for which both desks are shaded black illustrate same-unit dyads. Dyads for which one desk is black and one desk is white illustrate cross-unit dyads.

Figure 2. Interactive Effects of Dyadic Proximity and Same Unit Dyad (A) and Interactive Effects of Dyadic Proximity to Supervisors and Same Unit Dyad (B) on Interaction Frequency



Note: A (1) on the y-axis corresponds with an interaction frequency of “Never” and a (3) corresponds with an interaction frequency of “Every other week”. Predicted values are calculated holding all other variables at their mean values. Interaction coefficients are from Model 3 results with full controls.

Figure 3. Interactive Effects of Dyadic Proximity and Same Unit Dyad (A) and Interactive Effects of Dyadic Proximity to Supervisors and Same Unit Dyad (B) on Log of Total Email Communication



Note: Predicted values are calculated holding all other variables at their mean values. Interaction coefficients are from Model 12 results with full controls.