Gone but Not Forgot:
Gender Differences in Networks and Performance Following Mobility

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ABSTRACT (194 words)

This paper investigates how shifts in an individual's communication network affect performance when the individual experiences a job change and how these effects differ between men and women. Using a proprietary dataset including employees' personnel records, monthly performance, and email, we examine job changes occurring within a large financial institution. Comparing objective performance prior to and following each job change, we show that mobility is disruptive to individual performance, but that women's performance is less hampered than that of men. We argue and find evidence that this variation in performance can be explained by women's and men's differential likelihood of retaining ties to former colleagues at their previous jobs. While women tend to be embedded in dense networks that are often assumed to limit their advancement, these same network patterns may also foster the retention of relationships to colleagues when women employees move to new jobs. Such "network resilience" increases women movers' network bridging opportunities, which in turn bolster their post-move performance. Our results contribute to research on social network dynamics and gender by showing that network characteristics which are conventionally considered disadvantageous may help mitigate performance challenges when individuals experience job mobility.

Keywords: Communication Networks; Intra-organizational Mobility; Gender.

INTRODUCTION

Organizational research has long recognized the importance of social networks—the patterns of interpersonal relationships among employees—within organizations. Social networks and the information that flows through them have consequences for valued outcomes such as performance and career advancement (Borgatti and Halgin, 2011; Burt, 1992; Granovetter, 1985; Podolny and Baron, 1997; Tortoriello, Reagans, and McEvily, 2012). And connections to employees who are otherwise seperated—such as boundary-spanning ties (Allen and Cohen, 1969), brokerage relations (Gould and Fernandez, 1989), structural holes (Burt, 1992), or bridging ties (McEvily and Zaheer, 1999)—confer additional advantages (Burt, 1992; Burt, 2005; Lin, Cook and Burt, 2001; Kilduff and Brass, 2010). Despite evidence in support of the value of bridging ties, establishing and maintaining such connections is difficult (Brands, Menges, and Kilduff, 2015; Burt, 2002; Biancani, McFarland, and Dahlander, 2014; Krackhardt, 1998). Moreover, individual preferences and organizational design (e.g., highly connected structures that create coordination and integration advantages) often conspire for closure: employees tend to commonly confine their intra-organizational social relationships to formal structures that correspond to their roles, departments, and business units (Hinds and Kiesler, 1995; Kleinbaum, Stuart, and Tushman, 2013; Lee, 2019).

Given the influence of formal structures on employees' intra-organizational social networks, mobility that changes employees' formal positions can simultaneously serve as a catalyst in reshaping their social networks. Specifically, job mobility engenders two possibilities: employees could either relinquish prior relationships and quickly embed themselves into new social groups corresponding to their new roles, or they could maintain prior relationships and hence bridge between former and current colleagues. Past work focusing on social networks and careers suggests that certain sequences of jobs can give rise to increased brokerage within intra-organizational networks (e.g., Kleinbaum, 2011; Kleinbaum and Stuart, 2014), yet this line of work has not considered the subsequent performance implications of such network changes. A different line of work focusing on mobility and performance explores the portability of employee's experience and relationships (Dokko, Wilk, and Rothbard, 2009; Groysberg and

Lee, 2009; Groysberg, Lee, and Nanda, 2008) and finds that the performance disruptions arising from job mobility can be attenuated when connections are "portable," for example, when employees change jobs together with their colleagues or clients (Campbell, Saxton, and Banerjee, 2014; Groysberg and Lee, 2009; Raffiee, 2017; Raffiee and Byun, 2019). While both literatures have implied the importance of employees' relationships with prior colleagues, conspicuously missing is an exploration of how the effect of job mobility on performance flows through network changes. This lacuna is particularly puzzling given that job mobility inevitably changes intra-organizational social networks (Kleinbaum, 2018; Podolny and Baron, 1997) and hence gives rise to variation in movers' social relations to prior colleagues (Kleinbaum, Jordan, and Audia, 2015; Mehra, Kilduff, and Brass, 2001; Sasovova et al., 2010; Walsh, Halgin, and Huang, 2018). Such variation could come from individuals' preferences and beliefs that are tightly intertwined with their individual working experiences and extant social networks, all of which correlate with gender (Brass, 1985; Brands and Kilduff, 2014; Brands and Mehra, 2019; Chattopadhyay, George and Shulman, 2008; Ibarra, 1992; Kilduff and Brass, 2010).

In the present study, we explore how changes in movers' social networks affect their performance following mobility and how the effects differ by gender. Building on research that demonstrates the importance of relationships to prior colleagues as valuable source of knowledge and social capital (Dahlander and McFarland, 2013; Levin, Walter, and Murnighan, 2011; Walsh et al., 2018), we contend that maintaining relationships to prior colleagues—which we term *network resilience*—is an important factor for performance during job transitions. We find that high network resilience coupled with a job change corresponds with increased bridging opportunities within the organization, which indeed mitigates the performance disruptions associated with job mobility. We also find that not all individuals equally maintain network relations to prior colleagues. In particular, men and women's differential response to relationship retention has implications for their bridging opportunities. Integrating literature on gender and social networks (e.g., Brass, 1985; Brands and Kilduff, 2014; Ibarra, 1992), we propose that women movers tend to exhibit higher network resilience than their men counterparts. Given that the effect of mobility on performance partly flows through its effect on networks, we argue and find that because of

their greater network resilience, job mobility presents fewer performance challenges for women movers compared to men. We further explore the structural differences between networks of women and men to understand the possible mechanisms underlying these network differences.

For the purpose of this study, we focus on intra-organizational mobility events—moves where an employee changes jobs internally across working groups within an organization rather than across organizations. Focusing on internal mobility allows us to take advantage of longitudinal observations on whole networks and network dynamics before and after mobility. These internal moves also permit us to hold organizational characteristics, such as culture, performance calculation metrics, and incentive systems, constant. We obtained data from a large US-based financial institution (hereafter, Big Bank), consisting of all employees' demographic information, HR records, and metadata on email communications. We focus on email communications to construct intra-organizational social networks, as prior work has shown that email data is an effective representation of communication networks between employees (e.g., Aven, 2015; Kleinbaum et al., 2013; Quintane and Kleinbaum, 2011). We also collected objective monthly sales performance data for all retail sales employees. Using these email metadata coupled with objective monthly performance data, we employed a before-after design to test our theoretical propositions on the differential effects of intra-organizational job changes on employees' social networks and performance for men and women. Consistent with our expectations, analyses suggest that job changes are disruptive to short-term performance, but that they are less disruptive to the performance of women, whose networks tend to be more resilient than those of men, who tend to more quickly realign their informal networks to the formal structure of their new working groups.

MOBILITY, NETWORK RESILIENCE, AND PERFORMANCE

Studies in organization theory and sociology have long recognized the importance of social networks and the information that flows through them in shaping individual outcomes (Borgatti and Halgin, 2011; Burt, 1992; Granovetter, 1985; Tortoriello, Reagans, and McEvily, 2012; Podolny and Baron, 1997). Through their network contacts, employees gain access to "strategic information" like gossip or the "goings on" of an organization, social support, and friendship (Borgatti and Halgin, 2011;

Burt, 1992; 2005; Podolny and Baron, 1997; Walsh et al., 2018). Within organizations, differences in social network centralities contribute to differences in access to information, which is key to the execution of work, task performance, and opportunities to advance.

Although social networks constantly evolve as connections are added or ended, an intriguing question is whether and how job mobility allows movers to benefit from ties to prior colleagues while adjusting to a new working environment. On the one hand, when an employee changes from one job position to another, she is required to form new position-relevant social relations, which in turn serve to expand the employee's intra-organizational networks (Podolny and Baron, 1997). The network literature has established the benefits of networking with new colleagues and rapidly adapting to new working contexts (Groysberg and Lee, 2009; Morrison, 2002; Sterling, 2015) and has explored the changes in whom individuals choose to add to their networks in the adjustment process (e.g., Kleinbaum et al., 2013; Lee, 2019; McPherson, Smith-Lovin, and Cook, 2001). On the other hand, even in the realm of instrumental relationships, workplace social networks rely heavily on stability and embedded ties to facilitate trust, reciprocity, and in-depth communication (Dahlander and McFarland, 2013). Individuals not only vary in choosing which ties to add, but also which prior contacts to retain. Recent work has offered a more dynamic view by examining the ways in which shifting between cohesive and relatively open network structures may be advantageous in achieving innovation (Fleming, Mingo, and Chen, 2007) and career goals (Burt and Merluzzi, 2016). Yet, among these existing studies, attention has focused narrowly on network structure updates (e.g., Burt and Merluzzi, 2016; Davis, 2008; Sasovova et al., 2010); equally important is the question of whether network dynamics affect performance outcomes (Kneeland, 2018; Vissa and Bhagavatula, 2012; Walsh et al., 2018). Herein we specifically focus on ties that persist and the effect they have on they performance of employees who experience job changes.

We propose that individuals differ in their propensity to maintain ties in their social networks following formal positional changes in organizations. And we propose that the extent to which mobility alters the composition of individuals' networks will vary; we conceptualize the degree to which individuals choose to preserve their prior networks as *network resilience*. Furthermore, we expect that this

network resilience can help an individual employee navigate the performance challenges that occur during mobility.

A key premise underlying this study is that employees' informal networks do not change uniformly in response to changes in formal organizational structures (Kleinbaum and Stuart, 2014; Walsh et al., 2018). When individuals undertake new positions, some will desist their social interactions with prior colleagues and predominantly focus on building social networks with new colleagues; others will maintain relationships to prior colleagues. High network resilience means a large proportion of movers' relationships to prior colleagues remain active. These persistent social ties inevitably "force" employees to connect with colleagues both at current and prior job positions, and thus maintain open network structures where not all their contacts communicate with one another. Unsurprisingly then, conditional on moving, high network resilience creates favorable circumstances for brokerage positions.

We expect that network resilience's effects on brokerage is a mechanism for its moderating effect on post-move performance. Persistent ties to former colleagues could help movers connect people and groups associated with the two respective positions. Such ties are the tangible manifestation of brokerage (Burt and Merluzzi, 2016; Kleinbaum, 2012). In other words, when movers maintain connections with both current and prior colleagues—that is, when movers' network resilience is high—they are in an optimal position to bridge structural holes in the overall intra-organizational network and to benefit from such a position. Network resilience and the brokerage that it enables give movers the opportunity to reap information, control, and visioning benefits, permitting them to outperform those whose networks lack structural holes (Borgatti and Halgin, 2011; Burt, 1992; Granovetter, 1985; Tortoriello et al., 2012). Taking the context of retail banking as an example, a salesperson's communication network is typically comprised of coworkers, supervisors, and administrative staff or colleagues in other departments within the same organization. A salesperson could benefit from timely access to strategic information or new sales tactics that are developed in her prior branch and could be usefully applied in her current tasks.

Even if they lack knowledge about the mover's new task environment, contacts associated with the past position may still possess knowledge that is valuable for current performance. Prior work has

documented that persistent ties can link current and prior employers to the benefit of both. For example, when inventors change firms, not only can new employers acquire what the inventors bring (Rosenkopf and Almeida, 2003; Singh and Agrawal, 2011; Tzabbar, 2009), the prior employer is also more likely to cite patents owned by their new employer and accessed through the persistent interpersonal ties (Corredoira and Rosenkopf, 2010). Moreover, the benefits of breadth of expertise and knowledge often comes at the expense of depth (Hansen, 1999; Uzzi, 1997); network resilience can resolve this tension between breadth and depth by permitting movers to continue to benefit from those with whom they have worked closely. Information that circulates readily from their prior colleagues could therefore help movers find better solutions to their current tasks and deliver superior performance.

In addition to the knowledge or information that may flow through persistent ties and the brokerage opportunities they enable, for individual movers, persistent ties to former colleagues could channel social support for movers in their transition period (Ibarra, 1992; McPherson, Smith-Lovin, and Cook, 2001; Podolny and Baron, 1997). Movers with high network resilience will continue to receive social support at precisely the time they need it the most (the difficult transition to a new role), while they are simultaneously busy forming new instrumental ties with colleagues at the new job. Taken all together, we expect that high network resilience gives rise to greater brokerage opportunities, continuous access to knowledge of prior colleagues, and better social support for movers, all of which facilitate post-move performance.

While the aforementioned performance and career benefits may provide an incentive to maintain high network resilience, since the primary mechanism is the transfer and application of relevant knowledge, we expect that persistent ties that were initially established in other organizations or job roles may offset these benefits. In fact, movers' prior experience could hinder rather than help with post-move performance when it is irrelevant to the new position (e.g., not directly related to current tasks or associated with colleagues) (Dokko, Wilk, and Rothbard, 2009; Groysberg et al., 2008; Groysberg and Lee, 2009). And past experiences, including habits, routines, and scripts, that contribute to performance in one working context may detract performance in new working environment when they are irrelevant or

inappropriate in the new context (Dokko et al., 2009). Additionally, high network resilience is costly: it occupies movers' time, and because interpersonal networks are constrained by both cognitive and time factors, this may come at the expense of finding and forming new network connections (Dunbar, 1993; Roberts and Dunbar, 2015). Hence, we expect the performance benefits of network resilience are more salient for individuals moving across similar working environments than individuals moving across organizational or role boundaries. Empirically, however, it would be difficult to directly observe the sunk costs of maintaining those persistent ties compared with the benefits flowing through them. We thus refine our hypothesis involving employees' subsequent performance: when the benefits associated with network resilience are likely to outweigh the potential challenges—namely, in an internal move—performance increases. Taken together, we expect:

Hypothesis 1: High network resilience facilitates post-move performance for internal movers.

GENDER AND NETWORK RESILIENCE

Despite the substantial benefits of network resilience for movers, the ultimate need to form new ties with current colleagues and the challenge of cooperation with multiple social groups make it difficult to maintain social ties with prior colleagues. We propose that movers vary in their likelihood of engaging in such activities despite these difficulties. Specifically, we posit that such network changes differ between men and women. To develop this argument, we start by discussing the antecedences of network resilience. We then explicate how the types of network contacts men and women tend to seek out for interaction differ and relate with the forces that give rise to network resilience. Finally, taken altogether, we discuss the performance implications of network resilience for men and women movers.

The Antecedences of Network Resilience

A core premise of both network resilience and brokerage is that they enable individuals to leverage opportunities that exist among disconnected groups. To the extent that these individuals are able to make sense of and mediate inconsistent, incompatible, and diverging perspectives, brokers—in this case those who experience job mobility—have the potential to generate value for themselves and the

organization. Nevertheless, maintaining connections with coworkers in different groups and reconciling the differing vantage points they hold do not happen automatically. Research has highlighted substantial psychological and structural constraints on an individual's capacity to do this. Following a job change, new ties are formed between the mover and their new colleagues. And ties to former colleagues may, to some degree, decay as a function of increased physical distance (Allen and Cohen, 1969; Burt, 2001; Lee, 2019), reduced interactions (Roberts and Dunbar, 2015), and reduction in third-party contacts (Kleinbaum, 2018; Krackhardt, 1999). Correspondingly, we expect that post-move network resilience will decrease relative to pre-move levels. We also expect that both *tie strength* and *embeddedness* could help movers to attenuate the decreasing trend and will facilitate network resilience.

Since frequent communication increases familiarity and understanding, it concomitantly reduces the effort required to manage these ties and the psychological costs of doing so. Commitment to a relationship is a function of satisfaction with it, the costs associated with maintaining it, and the availability of alternatives (Rusbult, 1983). Interacting with diverse working groups can be psychologically challenging. By virtue of high network resilience, movers need to frequently adjust their behaviors to fit into their new working groups as well as maintain connections in their prior groups. The social groups at both positions, however, have their own perceived in-group norms, values, and expectations. As a result, movers might face the challenge of coping with incompatible expectations and competing demands from disparate social groups or cliques (Burt, 2001; Kleinbaum, 2018; Krackhardt, 1999), and incur psychological costs in the transition.

In addition to frequent interactions at the dyad level, high network resilience could result from structural embeddedness. In particular, network cohesion around the dyad can help movers maintain connections with prior colleagues. Extant work has shown that ties connected through common third parties are significantly more stable than ties involving individuals lacking such third-party connections, and that ties lacking common third parties are more difficult to maintain and more likely to decay (Kleinbaum, 2018; Krackhardt, 1999). Underlying tie resistance is the third-parties' facilitation: shared third parties create not only normative pressure to maintain connections, but also ongoing opportunities

for two people to interact (Kossinets and Watts, 2009; Krackhardt, 1999). Ultimately, these embedded ties reinforce one another: when a tie is more embedded, a mover carries a greater risk of acquiring a tainted reputation due to leaving the network or cutting ties, and network resilience increases.

Gender and Network Resilience

Although interactions are prescribed to a significant degree by functional roles or tasks within organizations, social networks differ by gender (Brass, 1985; Ibarra, 1992; Kleinbaum et al., 2013; Kilduff and Brass, 2010). We expect that women's network ties tend to persist after positional changes because women tend to have higher strength and embeddedness in their intra-organizational ties, both of which are expected to correlate with network resilience.

Compared to men, women are more likely to be embedded in cohesive networks where ties are densely connected with each other (Lincoln and Miller, 1979; McPherson et al., 2001). Extant work has documented that women have historically lacked structurally diverse relationships (Brass, 1985; Ibarra, 1992). And empirical evidence has shown that women are less prone to decay ties to other women (Kleinbaum, 2018). These network patterns can translate into unequal access to the knowledge and skills critical to individual performance and the fulfillment of career goals. For instance, women have been shown to have longer paths for locating experts than men (Singh, Hansen and Podolny, 2010), which slows down their execution of certain tasks. Despite the potential disadvantage in finding specific knowledge, however, women's network patterns can translate into stable access to in-depth knowledge and social support (Ody-Brasier and Fernandez-Mateo, 2018). Because of their embeddedness in cohesive social groups and connections with others who are likely to have similar network positions, women are well situated to strategically maintain communication with their social contacts when they move.

Moreover, women and men differ in how they sustain their relationships. When the structural locus of social interaction no longer exists, and ties can only be retained with communication tools such as email instead of joint activities, women are found better able to manage these remote connections than their men counterparts (Dunbar and Spoors, 1995; Roberts and Dunbar, 2015). As a result, reduced propinquity arising from job mobility would lead men's relationships to prior colleagues to decay,

whereas it threatens women's networks less. Suppose employees' networks naturally evolve with a base rate of network resilience. Compared with this baseline rate, we expect that all employees will exhibit a decrease in network resilience following mobility, but compared to men movers, women movers will exhibit smaller loss of network resilience.

> *Hypothesis 2: Following a move, women movers' network resilience decreases less than that of men movers.*

Gender, Network Resilience, and Performance

So far, we have argued that network resilience benefits post-move performance and that women movers are likely to exhibit less decrease in their network resilience compared with men movers. We proceed to argue that women movers experience fewer post-move performance challenges because of their relatively higher level of post-move network resilience.

This link between gender, network resilience, and performance should not be taken for granted because men could benefit disproportionally from network diversity. Because maintaining structurally diverse networks is often viewed as inconsistent with feminine stereotypes (Eagly, 2005; Eagly and Karau, 2002), women professionals who diversify their social networks and bridge various groups could experience backlash from peers or supervisors (Barbulescu and Bidwell, 2013; Brands and Kilduff, 2014; Brands et al., 2015). Furthering this line of work, Brands and Mehra (2018) recently suggest that women themselves tend to feel stress and experience threat when they perceive their own networks to be structurally diverse; in turn, such perceptions prevent them from cultivating network structural diversity. Thus, although brokerage has generally been found to benefit performance, maintaining diverse networks can be challenging for women's performance, partly because others devalue women whom they perceive to be acting instrumentally, and partly because brokerage can be more cognitively stressful for women than for men.

Against this backdrop, we propose that job mobility and post-move network resilience provide a "legitimate" form of brokerage for women that is consistent with their gender role expectations. By staying in touch with former colleagues, women who have experienced mobility often exhibit greater

structural diversity than those who have not moved. Because doing so is consistent with the stereotype that women are "social specialists" and person-oriented (Brands and Kilduff, 2014; Brands et al., 2015; Eagly, 2005; Eagly and Karau, 2002; Ibarra, 1992), retaining ties following mobility is role-congruent and "expected" of women. Thus, the very network structure that is disadvantageous to women in static analyses forms the basis of the network resilience that leads to advantages when they move. We expect that the greater network resilience that women movers exhibit compared with men provides a unique form of brokerage, and that women can take advantage of these brokerage positions arising from network resilience without concerns about the backlash or stress that they might otherwise suffer.

> *Hypothesis* 3*: Women movers will suffer less performance disruption from job mobility than men movers, mediated by network resilience.*

METHOD

Empirical Setting

In choosing the industry to study to answer our research question, we sought to meet two criteria. First, testing performance implications of professional network changes requires multiple observations of intra-organizational networks and measurable individual performance. Second, as understanding differences between men and women is central to our question, the setting needs to contain a sufficient number of women and men in the same positions to enable comparison. Additionally, we sought to minimize the impact of other factors that are known to affect movers' performance, such as the portability of teammates or clients (e.g., Groysberg et al., 2008; Groysberg and Lee, 2009). The retail banking industry fulfills these criteria and offers a setting well-suited to the research purposes of this paper.

We investigate the effects of intra-organizational mobility for women and men in the retail sales department in a large US-based financial institution that we call Big Bank. Big Bank is organized into four large departments: retail sales, asset management, corporate and institutional banking, and mortgages. We focused on data collected from the retail sales department because the documentation includes objective performance for its employees. The data we collected consists of 102,841 monthly observations for 12,916 retails sales employees between November 2014 and April 2016, including both

individuals who were at Big Bank prior to the beginning of the observation period and those who joined during the window. In November 2014, there were 7,486 retail salespeople; over the study period this number ranged from 7,568 to 7,760.

The retail sales department at Big Bank provides a number of advantages for examining the effects of gender and network dynamics on post-move performance. First, key to the choice of this setting, a high level of intra-organizational mobility at Big Bank allows us to get traction on the effect of mobility on networks and performance. As movers change jobs within the same organization, their past networking behaviors and objective performance information are both readily available in our dataset. Moreover, while these internal job changes are not random, Big Bank does not prioritize internal candidates over external candidates. Hiring managers post open positions along with job descriptions and characteristics of ideal applicants online, then interview all job candidates to evaluate their suitability and select the one most appropriate and qualified for the position. This feature of the hiring process is important because a job candidate is unlikely to know exactly when a vacancy will be posted in order to "prepare" their social networks accordingly.

Second, this setting provides an objective measure of individual performance. Retail sales employees specialize in providing personal financial tools and products to consumers and small businesses. They work independently to sell similar products to local customers, and at the end of each month Big Bank calculates their individual monthly sales as a performance metric. This monthly calculation of total sales value provides a regular and objective measure of each employee's performance without interference from work group confounds, such as task interdependence (e.g., Argote, Aven, and Kush, 2018). This objective measure also mitigates concerns from prior research that suggests subjective measures of performance—such as self, peer, or supervisor evaluations—suffer from evaluation bias (e.g., Brands and Mehra, 2018; Walsh et al., 2018).

Finally, interviews with HR executives at Big Bank indicate that retail sales employees rely heavily on email communication throughout their work activities to share job-related information including product details and sales strategies. Big Bank allowed us to collect anonymized metadata—

sender IDs, receiver IDs, email size, and timestamp—of email exchanges among all employees. The use of email communication affords a behavioral measure of social interactions in organizations that is less prone to the biases that often affect self-reported data, and existing evidence indicates email communication provides a reliable proxy for other communciation media (Aven, 2015; Kleinbaum et al., 2013; Quintane and Kleinbaum, 2011).

Data and Sample

We obtained access to three sources of data from Big Bank. These data, dated from October 2014 to April 2016, include: (1) individuals' monthly retail sales records, which are comprised of monthly observations of total sales value in dollars for each employee; (2) anonymized email metadata (including sender ID, receiver ID, message size, and timestamp) for all internal emails of Big Bank employees during the observation period; and (3) monthly updated data on employees' demographic characteristics, which includes gender, race, age, job role, formal positional level at Big Bank, organizational tenure, tenure in the retail sales role, supervisor information, and locations (branch office addresses).

Our sample consists of 1,137 retail sales employees who *changed business units within the retail sales department* between February 2015 (the third month following November 2014, the start of the observation period) and January 2016 (three months from the end of the observation period in April 2016) are included in the sample. These internal movers do not experience changes in their primary tasks (e.g., selling financial products to customers), but instead, their work setting—where they complete daily tasks—is new.

Within the sample of internal movers, we construct an individual-month sample of movers' networks and performance. For example, if a mover changed business units in month t, we identify a six-month window (ranging from month $t-5$ to $t-1$, month t, and month $t+1$ to $t+5$, respectively) as the pre- and post-move observation periods for each mover and compare the performance of the mover before and after job mobility. Notably, in this data construction process, for 140 employees, we have less than six-month observations before they moved, and for 67 employees, we have less than six-month observations after they moved. Given our contacts at Big Bank confirmed that three months (one financial quarter) is

considered a "reasonable" timeframe for employees to adjust to job transitions, we keep employees in the sample as long as we have at least three month-observations on their pre-move and post-move networks and performances. The inclusion of these employees does not change our analyses or the interpretation of results. This final individual-level sample has in total 12,161 mover-month observations.

Networks and Performance at Big Bank. As a conservative representation of the intra-organizational communication network, we limit our analyses to one-to-one emails within the organization, excluding all one-to-many emails or emails sent to and received from external sources. Because the performance metrics update monthly, we collapse all one-to-one emails into multiple cross-sectional networks by counting of the number of communications within unordered pairs of individuals in each month. This approach has been shown to reliably quantify longitudinal intra-organizational networks (Kleinbaum et al., 2013; Wuchty and Uzzi, 2011).

We report the relationship between retail sales employees' communication network characteristics and their performance in the subsequent month in Appendix A. Employees in the retail sales department, exhibiting certain degrees of autonomy in choosing how to perform their daily tasks, face resource limitations in terms of both available customers and internal support—limitations that encourage them to look for ways to boost productivity. One way to do so is to leverage one's professional network within the organization. Consistent with prior research on social networks in organizations (Burt, 1992), we find that brokers (measured by betweenness centrality in intra-organizational networks, log-transformed) exhibit significantly higher performance (measured by objective monthly revenue, log-transformed) than non-brokers ($\beta = 0.10$, $p < 0.01$), and the positive effect is even stronger when employees work in markets that Big Bank considered to be rapidly growing ($\beta = 0.15$, $p < 0.01$). These results confirm that communication networks correspond with performance in our setting. And more specifically, retail sales employees occupying brokerage positions achieve higher performance than their non-broker peers.

Gender at Big Bank. *Gender* is a self-identified variable that was documented in Big Bank's HR

database for each employee. The field initially had three categories: Female, Male, and Declined to identify. There were less than 20 employees in the last category; as we are interested in gender differences, we exclude them from the following analyses. We report basic statistics of the entry, mobility, and performance of women employees at Big Bank in Appendix A. By averaging the total number of men versus women employees by job grade in the retail sales department, we find that women are more likely to start at lower job grades ($p < 0.01$, as shown in Appendix Figure B.1, Panel B). We also find there is a significant yet low correlation ($r = -0.059$, $p < 0.05$) between women and new hires' first-month performance within job grade (as shown in Appendix Figure B.1, Panel B). Although women predominantly start from jobs at lower levels, as they advance along the organizational career ladder, data from Big Bank does not indicate any performance gap between men and women (as shown in Appendix Figure B.1, Panel C).

Moreover, we find that women are less likely to change business units or supervisors than men, and women are slightly more likely to get promoted, although the differences are not significant. We plot the proportion of men movers (divided by all men employees) and the proportion of women movers (divided by all women employees) by the number of supervisor changes that they have experienced (Appendix Figure B.2, Panel A), change of business units (Appendix Figure B.2, Panel B), and promotion (Appendix Figure B.2, Panel C).

Variables

Individual Sales Performance. The dependent variable for Hypotheses 1 and 3, *Individual Sales Performance,* is a continuous variable that measures the dollar amount of products that an employee sold during each calendar month. To account for the right-skewed distribution of *Individual Sales Performance,* we log-transform it. The effects should then be interpreted as a percentage change because the models estimate the ratio of geometric mean of *Individual Sales Performance* in the log scale.

Network Resilience. Our main independent variable and the dependent variable for Hypothesis 2, *Network Resilience,* is a dynamic construct that requires measurement continuously across time rather than a discrete change between two time periods. Thus, we use a moving window of three months in the

calculation of network resilience. We report results with the three-month windows as this is a time window (a financial quarter) that is commonly discussed in the bank. Results hold when we vary the time windows to two, four, and five months. For each month, we measure the extent to which an ego's network has changed by calculating the ratio of persistent ties to total initial ties. Notably, herein we calculate the measure of *Network Resilience* with all *Outgoing Ties* that are essentially decided by the focal employee. Focusing on outgoing ties (emails sent by the focal employee) permits us to capture the extent to which the focal actor chooses to keep the relationship persistent (versus incoming emails, over which the employee has no control). Although the majority of outgoing ties went to colleagues working at the same business units (77.1%, std. 22.3%), we choose not to limit "social contacts" based on working locations because ties to all colleagues within Big Bank are essentially work-related and could contribute to current performance. Specifically, *network resilience* for individual *i* in time *t* is measured as (total number of ties persisting across t, t-1, and t-2) / total number of ties present in t-2, as is shown in the equation below. Note that all our results hold when we measure network resilience merely with employees' contacts to prior business units, as is reported in Appendix C.

$$P_{i,t} = \frac{\sum \cap (T_{i,t-2}, R_{i,t-1}, R_{i,t})}{\sum T_{i,t-2}}$$

where P represents Network resilience for individual i in time t, which is the total number of overlapped email recipients between current month (T_t), prior month T_{t-1}, and two months ago (T_{t-2}), divided by the total number of initial email recipients (T_{t-2}).

Network Size and ***New Contacts.*** Underlying these controls is the idea that it could be movers' new ties that drive the performance effect, rather than persistent ties. There are two variables that can potentially be helpful in this regard, namely, *Network Size* and *New Contacts*. *Network Size* in each month counts the total number of *Email Recipients* in the network during that calendar month. This variable helps us to account for the movers' overall activities. *New Contacts* in each month counts the total number of "new" contacts in the network of that month—those who were not contacted by the focal sender in months t-3, t-

2, and t-1. This variable helps us to capture the movers' activities to establish relationships with current coworkers. We log-transform both variables to account for their right-skewed distribution.

Brokerage. As one possible mechanism, we expect *Network Resilience* to be associated with *Brokerage*. We empirically test this expectation. We measure *Brokerage* by calculating the inverse of the square root of Burt's *Network Constraint* measure. *Network Constraint* is commonly used to measure network cohesion around an individual (Burt, 1992). Conceptually, it calculates the level of concentration of contacts who are also connected—which also coincides with the lack of structural holes in an incumbent's communication network—as the sum of constraint posed by each of the contacts in the network. More specifically, this variable is a function of the direct communication between focal employee A and a contact C and the extent to which C also communicates with A's other contacts D (detailed in Burt, 1992). Monotonically transforming *Network Constraint* measure to a *Brokerage* measure facilitates interpretation of the results without introducing bias to measure (e.g., Kleinbaum, 2018). Doing so permits us to directly measure *Brokerage*, which facilitates the interpretation of results. Our results are robust to global measures of brokerage, such as *Betweenness Centrality*.

Modelling Strategy

Using the panel data constructed with employees who have experienced intra-organizational mobility, we employ a *pre-post* design to compare the communication networks and performance of movers before and after a change of working business units. With a dummy variable *Post Move* that is equal to 1 for observations occurring after a job change and 0 otherwise, we estimate the main effect of *Post Move* and interaction terms *Post Move* × *Gender* on two variables of interest: *Individual Sales Performance* in the subsequent month in Hypothesis 1 and Hypothesis 3, and *Network Resilience* in Hypothesis 2. As *Network Resilience* essentially captures network changes comparing current month and past months, we choose not to lag independent variables in estimating Hypothesis 2. All independent variables are lagged by one month when we estimate *Individual Sales Performance*.

To identify the effect of mobility on individual performance, we adopt a *within-person* fixed effect approach. The within-person fixed effect model compares each mover with her own past records (in

terms of communication networks and performance) and then estimates whether the variation of communication networks, namely *Network Resilience,* can be explained by *Post Move* × *Gender,* which in turn, affects *Individual Sales Performance*. The mover fixed effect allows us to account for time-invariable differences across individuals, such as unobserved individual ability. Given that this approach precludes the inclusion of employee gender without interacting it with a variable that varies temporally, we also estimate models for the sub-samples of men and women employees.

Across all the models, we use dummy variables for each month to control for possible time-specific effects. We also include business unit fixed effects to control for geographic factors that might affect performance. As a robustness check, we also ran multilevel linear random-effect models with individual-level observations nested within business units. These multilevel linear models compare an individual with both her own past networks and that of other to-be movers who are still in their pre-move periods. The multilevel liner models are reported in Appendix C. The results remain consistent across the modeling approaches.

RESULTS

Among the 1,137 employees in the sample, 682 (60%) employees are women. We report the descriptive statistics and correlation matrix in Table 1. Individuals' demographic variables other than gender (e.g., organizational tenure) are not included in the models because our primary specifications of interest include individual fixed effects. We report models with control variables in Appendix C.

[TABLE 1 ABOUT HERE]

The Effect of Network Resilience on Performance

Table 2 presents results for *Network Resilience* on *Individual Sales Performance,* again using the within-person before-after approach. As shown in Model (1), *Post Move* is significantly negative for *Individual Sales Performance* ($\beta = -0.25$, $p < 0.01$). Consistent with the portability literature (e.g., Groysberg and Lee, 2009), movers experience significant performance decline during the transition to a new job. In Model (2), the main effect of *Post Move* remains significant ($\beta = -0.09$, $p < 0.01$), while

Network Resilience has a significant and positive effect on *Individual Sales Performance* ($\beta = 1.70$, $p < 0.01$). Model (3) adds the interaction term *Post Move x Network Resilience* and shows a positive association between the interaction term *Post Move x Network Resilience* on *Individual Sales Performance* ($\beta = 2.05$, $p < 0.01$). Next, we estimate effects accounting for *Network Size* in Model (4) and the effects of *Network Resilience* and the interaction term remain consistent. The estimates remain consistent with the inclusion of *Network Size*. And effects hold when we include *New Contacts* instead of *Network Size*. To avoid modeling issues with multicollinearity, we only include the variable *Network Size* because it is correlated with *New Contacts* ($r = 0.81$, $p < 0.01$). Models (5) and (6) estimate the effect of *Post Move x Network Resilience* separately for women and men movers, and indicate that the effect of *Network Resilience* works similarly for women and men movers. Note that as individual fixed effects are included, the models in Table 2 present the relative change of *Individual Sales Performance* compared to the same person prior to their move.

[TABLE 2 ABOUT HERE]

Together, the findings from Table 2 demonstrate that *Network Resilience* facilitates performance following a job change. Although mobility corresponds with performance disruptions for movers, this disruption varies as a function of movers' *Network Resilience*. The positive interaction effect of *Post Move* and *Network Resilience* supports Hypothesis 1. These results also provide evidence for Hypothesis 3; comparing Model (1) and the subsequent models in Table 2 shows that the effect of *Post Move* on *Individual Sales Performance* varies when we account for *Network Resilience*.

The Effect of Gender on Network Resilience

Table 3 presents the results of analysis on *Gender* and *Network Resilience*. In Model (1), *Post Move* is significantly negative for *Network Resilience* ($\beta = -0.08$, $p < 0.01$). This negative coefficient suggests that average movers exhibit decreases in *Network Resilience* following mobility. This is not surprising as changes in formal structures make it difficult to maintain connections to prior contacts. Model (2) includes the term *Post Move x Gender* ("*Women"* as compared to *"Men"* which is the

reference category) and demonstrates that women movers exhibit significantly greater *Network Resilience* ($\beta = 0.08$, $p < 0.01$) than men movers. This positive and significant interaction effect supports Hypothesis 2.

[TABLE 3 ABOUT HERE]

The Effect of Gender on Performance through Network Resilience

To test Hypothesis 3, we examine the effects of *Network Resilience* by gender; that is, we test whether the effect of *Post Move x Gender* on *Individual Sales Performance* is mediated by *Network Resilience*. If change in *Network Resilience* was a mediator between *Post Move x Gender* on *Individual Sales Performance*, then a) the changes in *Post Move x Gender* should have significant effects in Model (4), as it does; b) change in *Network Resilience* should have significant effects in Model (5); and c) the coefficient for the *Post Move x Gender* interaction term should either become insignificant or decrease in significance in Model (5) (Baron and Kenny, 1986).

Models (3) - (4) in Table 3 estimate the effect of *Post Move* and *Gender* on *Individual Sales Performance*. As shown in Model (4), women movers exhibit a significantly greater *Individual Sales Performance* ($\beta = 0.13$, $p < 0.01$) than men movers, despite the fact that *Individual Sales Performance* of all movers decreases after job changes ($\beta = -0.33$, $p < 0.01$). Model (5) in Table 3 adds *Network Resilience* and shows that *Network Resilience* is significantly and positively associated with *Individual Sales Performance* ($\beta = 1.64$, $p < 0.01$). Importantly, the *Post Move x Gender* interaction term is no longer statistically informative, which is indicative of *Network Resilience* acting as a mediator (Baron and Kenny, 1986).

Because *Network Resilience* might have different performance implications before and after job mobility and our theory concerns post-move relationship between *Network Resilience* and performance, we also run models including the interaction term *Post Move x Network Resilience*. As is shown in Model (6), after including the interaction term *Post Move x Network Resilience*, analyses show a similar effect as Model (3) in Table 2 ($\beta = 1.97$, $p < 0.01$): that *Network Resilience* benefits post-move performance. The

coefficients for *Post Move x Gender* in both Models (5) and (6) are no longer significant after the inclusion of *Network Resilience* in the models, indicating that *Network Resilience* mediates the relationship of *Post Move x Gender* on *Individual Sales Performance* (Baron and Kenny, 1986). Model (7) further controls for *Network Size*, and all results remain robust. We confirmed the mediation with the method used by Imai, Keele, and Yamamoto (2010): the nonparametric Bootstrap Confidence Intervals with the Percentile Method where the confidence intervals via the bootstrap were estimated with 2000 resamples. This analysis confirms that the effect of *Post Move x Gender* on *Individual Sales Performance* flows through its effects on *Network Resilience* (proportion of variation explained: 91.31%, 95% CI [0.63, 1.17], $p < 0.01$).

DYADIC-LEVEL ANALYSES ON TIE PERSISTENCE

So far, we have provided evidence that (1) higher network resilience is associated with higher post-move performance for both men and women movers, and (2) the loss network resilience following mobility is much less severe for women movers, so that their performance suffers less from mobility than that of men movers. An empirical question thus arises: why do women movers exhibit a smaller decrease in network resilience than their men counterparts? We herein conduct a set of dyad-level analyses to estimate the factors that help explain *the likelihood of a tie being retained* after a move. The models aim to provide a complementary analysis for the underlying factors driving Hypothesis 2 and the related Hypothesis 3 on the differential effects on *Network Resilience* between women and men movers.

To do so, we construct a cross-sectional dataset comprised of 16,384 communication ties from 1,137 movers in the three months before job changes. Supposing a mover (ego) changes working business units in month t; an ego-contact dyad will be included in the sample as long as the contact received one email from the ego between month t-3 and t-1. The key dependent variable *Tie Persistence* is set to 1 when mover A sent at least one email to person j in month t+1, month t+2, or month t+3, conditional on mover A must have sent at least one email to j between month t-3 and month t-1; otherwise it is 0.

Because each dyad represents a tie to prior colleague, a high likelihood of *Tie Persistence* in this model indicates a high *Network Resilience*. In this analysis, we focus our attention on the gender of the

ego (the sender of the email) and the sender-receiver relationship, particularly tie strength and embeddedness, and their implication on *Tie Persistence*. If the proposed theory on gender and network resilience holds, women will be more likely to continue sending emails to prior contacts after making job changes, because their dyad communications with the recipients tend to be *stronger* and more *embedded* that those between men and their email recipients.

We first estimate effects of gender on network characteristics, namely *Tie Strength* and *Embeddedness*, before we analyze *Tie Persistence*. The results are reported in Table 4. We then estimate the effect of gender on *Tie Persistence* and test whether or not such gender variation could be explained by the differential network characteristics of men and women movers. We report these analyses in Table 5. In both tables, we control for other homophily variables that have been found to affect tie formation or persistence in the literature (Kleinbaum, 2018), including *Same Gender* (set as 1 when both parties have the same gender, and 0 otherwise), *Same Department* (set as 1 when both parties work in the same department, and 0 otherwise), and the differences between ego and recipient working and organizational experience. We also control for the *Network Degree* and *Brokerage* of the contact (receiver). And finally, in the estimation of *Tie Persistence*, we additionally control for post-move geographic distance and whether or not the mobility involved a promotion. Following procedures in extant research (Kleinbaum, 2018), all the regression models are estimated with two-way clustering on both the movers and their contacts, accounting for the interdependence among network observations in calculating the standard errors (Cameron et al., 2011).

Models (1) and (2) in Table 4 report the effect of a sender's gender on the proxies of *Tie Strength*: *Reciprocity* (the percentage of messages that received a reply from the recipient) and *Response Interval* (the average time between emails sent and received between the sender and the receiver). Model (1) shows that ties initiated by women are more likely to be reciprocated ($\beta = 0.082$, $p = 0.02$). Model (2) shows that ties initiated by women tend to exhibit a significantly shorter response interval ($\beta = -0.16$, $p < 0.01$) than that of men, indicating a higher frequency of communication between women and their

contacts. Models (3) and (4) in Table 4 report the effect of sender gender on the proxies of *Embeddedness,* the first of which is the dyad-level *Structural Similarity* between the individual and each communication contact. The pairwise *Structural Similarity* measures the level of equivalence by calculating twice the number of common contacts between month *t-3* and month *t-1* divided by the sum of total contacts for both parties. To illustrate, *A* and *B* are structurally similar if they both have communication ties to the same people (e.g., *C* and *D*) and likewise lack ties to the same others (e.g., *E* and *F*). A related yet less complicated way to measure embeddedness is a binary measure of whether or not a particular tie is a *Simmelian Tie*, which is empirically quantified by the presence of at least one shared third party (Krackhardt (1999). Model (3) suggests that ties initiated by women are more structurally similar ($\beta = 0.067$, $p < 0.01$), and relatedly, Model (4) shows that these ties are much more likely to be simmelian ties ($\beta = 0.329$, $p < 0.01$) than those of men. Taken together, the findings in Table 4 suggest that women's ties tend to be stronger than men's both in terms of amount and speed of response and structural embeddedness. In the subsequent set of analyses, we show that all these features increase the likelihood of *Tie Persistence*.

[TABLE 4 ABOUT HERE]

Table 5 reports the models estimating *Tie Persistence*. Model (1) suggests that ties initiated by women are more likely to be retained after a mover changes job locations ($\beta = 0.216$, $p < 0.01$). As is shown in Models (2) and (3), the effect of gender remains signficant with the inclusion of mobility and homophily related variables ($\beta = 0.283$ and 0.265 respectively, $p < 0.01$ in both models). Moreover, the effect of gender becomes less significant or insignificant when proxies of tie strength are included in Model (3). Particularly, *Reciprocity* ($\beta = 0.254$, $p < 0.01$) in Model (4), *Response Interval* ($\beta = -0.914$, $p < 0.01$) in Model (5), and *Structural Similarity* ($\beta = 0.409$, $p < 0.01$) in Model (6) all help explain the gender effect on the likelihood of a tie being persisted after the sender of the tie moves. The mediation effects are further confirmed when we calculate the mediation with method used in Imai, Keele, and Yamamoto (2010): the effect of *Gender* on *Tie Persistence* flows through its effects on *Reciprocity* ($p <$

0.01), *Response Interval* ($p < 0.01$), and *Structural Similarity* ($p < 0.01$). Note that being *Simmilian Ties* highly correlates with *Structural Similarity*, thus the effects are consistent. We do not report the additional 7th model in the interest of space.

[TABLE 5 ABOUT HERE]

Taking the two sets of analyses together, we complement our main analyses on Hypothesis 2 by providing evidence suggesting that women's communication ties to prior colleagues are more mutual, channeling more symmetric and frequent communication, and are more likely to be structurally embedded than the ties of men, and in turn permit women movers to exhibit high *Network Resilience* after mobility.

MECHANISM EXPLORATION: NETWORK RESILIENCE AND BROKERAGE

Although not explicitly hypothesized, among the possible mechanisms such as emotional support and knowledge transfer, our theory suggests that the performance effect of *Network Resilience* should flow through *Brokerage*. By extension, we tested whether the effect of *Post Move x Network Resilience* on *Individual Sales Performance* is at least partly mediated by *Brokerage*.

[TABLE 6 ABOUT HERE]

We first show that *Post Move x Network Resilience* associates with *Brokerage*. Models (1) – (4) in Table 6 estimate the effect of *Post Move* and *Network Resilience* on *Brokerage* and Models (5) and (6) provide analyses with men and women movers separately. As shown in Model (1), *Post Move* alone is not significantly meaningful for *Brokerage*. Model (2) includes the main effect of *Network Resilience*, and it has a significant and positive effect on *Brokerage* ($\beta = 2.13$, $p < 0.01$). Model (3) adds the interaction term *Post Move x Network Resilience* and shows a positive association between the interaction term *Post Move x Network Resilience* on *Brokerage* ($\beta = 2.44$, $p < 0.01$).

We then include *Brokerage* on performance in Models (7) – (9). As is shown in Model (7), and consistent with extant findings in the social network literature (Burt, 1992), *Brokerage* significantly increases *Individual Sales Performance* ($\beta = 0.54$, $p < 0.01$), demonstrating that spanning groups benefits employees' performance. More important is the effect of *Post Move x Network Resilience* on *Individual*

Sales Performance. We finally confirm the mediating effects of *Brokerage* based on the method detailed by Imai, Keele, and Yamamoto (2010). We find evidence for partial mediation (ACME = 0.33, $p = 0.01$; proportion of variation explained: 22.45%, 95% CI [20.50%, 24.01%], $p = 0.01$). This set of analyses complements our main analyses on Hypotheses 1 and 3 by showing that one mechanism through which network resilience facilitates performance is via its effect on brokerage. The evidenced partial mediation also indicates that there are other mechanisms at play, for example, the social support that may flow through persistent ties.

SUPPLEMENTAL ANALYSES

Control Variables

We present supplementary analyses with control variables at the individual and group levels in Appendix C. More specifically, we first rerun the analyses controlling for individuals' demographic variables: age, organizational tenure, and job experience. We additionally report the analyses controlling for group-level characteristics such as size, total number of top performers, gender composition, and group email network characteristics. We also control for group performance in the prior month. All hypothesized effects remain robust.

Endogeneity Concerns with Mobility

Although we take advantage of the longitudinal nature of our data and include individual fixed effects in our main analyses, as with many mobility studies, there are reasons to be concerned about endogeneity introduced by unobserved variables. Specifically, the underlying reasons why employees might choose to change jobs may be driving both their social networking behavior and their post-move performance. Moreover, it is possible that unobservable differences between women movers and men movers exist that may be driving both their mobility and their post-move differences. We attempt to address this endogeneity concern by adopting two different analytical strategies: using a subsample of movers from business units that were officially closed and using a "matched" sample of movers and observationally equivalent non-movers.

Subsample Analyses with Employees from Business Units that Were Closed. We identified a sample of employees for whom—even if it were possible to maintain prior network ties—there exists no strong reason to do so. Specifically, we examined the effects of *Network Resilience* and *Individual Sales Performance* on a sample of employees who moved due to the closure of their business units (n=165). The primary reason provided as to why these Big Bank business units closed was the shift to mobile banking and associated changing consumer demand for in-person service. These external factors made employees move within Big Bank involuntarily and potentially less prepared than other movers who were hired into their new job through official applications. For these movers, the priority during mobility is to get adopted into their new jobs. This closure-driven sample not only helps to mitigate concerns about endogeneity arising from employees' motives for moving, but also allow us to examine a case wherein employees would need to significantly reshape their social networks in a relatively shorter amount of time and with less mental preparation. We run the same set of analyses with this sub-sample, and all findings remained robust despite the greatly decreased sample size. We report the analyses in Appendix D.

Triple-Differences Approach with "Matched" Movers and Non-movers. Instead of comparing movers with their past selves, we could also compare movers, who change jobs, to an observably equivalent set of employees who do not change jobs to assess the differences in variables of interest, then compare to see whether the magnitude of effects differs between men and women. Essentially, doing this helps net out the selection effect of mobility, addressing the concern that movers are substantially different from employees who stay in their positions.

We adopt a *differences-in-differences-in-differences* (triple differences) approach and report the analyses in Appendix E. This triple-differences approach can be understood as a two-step analysis: first estimating differences-in-differences (diff-in-diff) for women and men separately and then comparing the effect sizes. In other words, the basic diff-in-diff analysis examines the outcomes of actors who are exposed to a treatment (in our case, treatment means moving within an organization) with the outcomes of those not exposed to the treatment (the control group of non-movers). How do women movers perform relative to similar women employees who did not move? And how do men movers perform relative to

similar men employees who did not move? The diff-in-diff analysis in essence controls for the average outcome in the control group (non-movers) from the average outcome in the treatment group (movers), thereby eliminating confound effects arising from stable differences between groups and from the trend (Ashenfelter and Card, 1985).

Ideally, when the treatment is randomly assigned, we can interpret the estimated effects as causal (as opposed to simply correlational), but it seems impossible that voluntary job changes within an organization would occur at random. We therefore introduce an additional differencing into the diff-in-diff estimator to purge our results of factors correlated with moving, resulting in a triple-differences approach (Rogan and Sorensen, 2014). With the triple-differences estimator, we seek to compare the trajectories of movers with a matched set of controls (observationally equivalent individuals who do not move). The triple-differences analysis then represents differences between these differences, to arrive at an estimate of how the effect of intra-organizational mobility depends on gender. The analyses, therefore, account for the selection in who moves and focuses on variations in the effects of intra-organizational mobility as a function of gender. Together these differences provide an estimate of the effect of intra-organizational mobility, conditional on gender. All interpretations remain robust.

DISCUSSION AND CONCLUSION

Understanding network changes arising from job mobility is particularly important to inform theory on how individual network differences come about and accumulate over time (Ahuja, Soda, and Zaheer, 2012; Borgatti and Halgin, 2011; Burt, 1992; Granovetter, 1985; Kleinbaum, 2012; Podolny and Baron, 1997). Building on a theoretical foundation to explore network dynamics and careers, we set out to extend our understanding of the gendered difference in individuals' likelihood to persist extant communication ties as they experience career mobility. We demonstrate a systematic gender difference in how movers manage their portfolios of social ties, which in turn is consequential for the movers' post-move performance.

This paper offers three contributions to the literature. First, our attempt to investigate how women's and men's networks differ in response to intra-organizational mobility builds on and extends

research that links social network and gender differences. Scholars studying gender differences increasingly acknowledge the critical role that social networks and social interactions play in organizations (Brands and Kilduff, 2014; Brands et al., 2015; Merluzzi, 2017; Ibarra, Kilduff, and Tsai, 2005). As women strive to pursue their professional goals by changing their networks, they are likely to experience challenges associated with freeing themselves from the "super-strong and sticky" social relationships within which they were previously embedded (Ibarra, 1992; Krackhardt, 1998; Ody-Brasier and Fernandez-Mateo 2017). By demonstrating that women could increase their bridging returns by maintaining persistent communication ties, our work provides a new lens through which women might be able to create value for themselves and their organizations.

Second, this study speaks to previous work on intra-organizational mobility and organizational hiring. Network scholars have documented substantial descriptive network differences between men and women. Compared to men, women tend to have smaller (Dunbar and Spoors, 1995) and less diverse networks (Kleinbaum et al., 2013), which tend to be weaker in providing career-related information, resources, and opportunities compared with those of their men counterparts (Brass, 1985; Ibarra, 1992; Moore, 2009). Despite ample evidence underscoring gendered network differences (Burt, 1992; 2004; Ibrarra, 1992), there has been little investigation into how women might benefit from their networks (cf. Obukhova and Kleinbaum, 2017; Ody-Braisier and Fernandez-Mateo, 2018). Our paper suggests that intra-organizational mobility, the process by which employees move between business units within the same organization (Bidwell and Keller, 2014; Keller, 2018), may create opportunities that are advantageous to women given their approach to networking.

Lastly, our investigation contributes to the question of how gender role stereotypes interact with characteristics of work to affect performance outcomes and possibly career advancement. According to the gender-stereotype literature, women who are seen to be violating prescribed gender roles elicit punishment such as hostility and antipathy from their peers (Eagly, 2005; Eagly and Karau, 2002). Because brokerage in workplace networks is associated with striving to get ahead, the kind of agency it involves tends to be associated with stereotypical expectations for men rather than women (Barbulescu

and Bidwell, 2013; Brands et al., 2015; Eagly, 2005; Eagly and Karau, 2002). Hence, prejudice against women as brokers of relationships in organizations is evident in the literature on subjective performance evaluation and leadership (Brands et al., 2015; Brands and Kilduff, 2014; Brands and Mehra, 2018). Our work shows a contingent context in which women could benefit from brokerage: women movers could overcome prejudice in the social realm and perform well by leveraging relationships to their prior colleagues.

Despite the fact that our results indicate that intra-organizational mobility could potentially help women to reconcile the challenge posed by gender role stereotypes, our outcome is based on the actual email exchanges of the women in our sample rather than the perceptions in employees' heads. Hence, we cannot directly speak to whether or not their colleagues are aware of the brokerage positions that women movers occupy, nor can we identify how others' awareness and perceptions affect the benefits that women movers could obtain. It is one thing to identify the overall performance implication, but equally important is the question of how people understand their intra-organizational networks and the social relationships around their colleagues. Accordingly, future research should directly measure perceptions of employees who accept movers to explore the conditions under which brokerage may be perceived as role congruent for women.

Moreover, although we explored possible antecedence of tie persistence, the cognitive underpinnings—and more generally the purpose—of women's retaining persistent ties more than men remain ambiguous. It is possible that women maintain persistent social ties strategically or it may be that the exhibited gender difference is an inadvertent consequence of women sorting into embedded social networks. Although our data cannot clearly distinguish the two possibilities, the empirical finding that women movers tend to exhibit higher brokerage than women non-movers suggests that women who are able to make intra-organizational career changes might have a strategic mindset.

Following other case study approaches common in this type of research, we study these network dynamics following job mobility within a single organization. Focusing on a single firm limits the extent to which we can generalize our findings to organizations beyond those similar to the one we examine. The

role that network resilience plays in the intra-organizational market might be phenomenologically driven, as employees move between similar working environments and rely on their own first-hand organizational knowledge. Notably, while the aforementioned performance and career benefits may provide an incentive for network resilience, as the primary mechanism is the transfer and application of relevant knowledge, we indeed expect that the performance benefits of network resilience are particularly salient for individuals moving across similar working environments. Examples of such movers include internal movers changing branches within an organization or job candidates moving between similar job positions across organizations (e.g., Corredoira and Rosenkopf, 2010; Groysberg et al., 2008). It is worth identifying the conditions under which the benefits of network resilience overweight its costs. These benefits are derived not only from the presence of the relationships that connect employees, but also the connections between working contexts—the extent to which the people network and the task network interact. Overall, our findings indicate that it is critical to take gender and network structures into account when organizations plan and design internal hiring programs, and there may be potential career paths for women to take within an organization to ameliorate their starting disadvantages.

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Table 1: Descriptive Statistics (1,137 Intra-Organizational Movers, 682 Women Movers)

		Mean.	Std.	Min.	Max.	Women Mean.	Men Mean.	1	2	3	4	5	6	7
1	Age (years)	34.70	11.49	21	74	36.02	32.57							
2	Organizational Experience (years)	4.26	6.23	0.67	44.90	5.10	2.93	0.54*						
3	Retail Experience (years)	1.11	1.21	0.34	11.70	1.10	1.12	0.32*	0.34*					
4	Network Resilience	0.40	0.21	0	1	0.42	0.38	0.03*	0.06*	0.10*				
5	Brokerage	2.51	0.79	1	17.19	2.45	2.632	0.19*	0.20*	0.29*	-0.05*			
6	New Contacts (logged)	2.26	0.99	0	7.78	2.20	2.34	0.16*	0.17*	0.25*	-0.32*	0.59*		
7	Network size (logged)	3.36	1.02	0.69	7.82	3.31	3.43	0.16*	0.17*	0.24*	0.08*	0.65*	0.81*	
8	Individual Sales Performance (logged)	10.08	2.26	0	13.83	10.06	10.12	0.14*	0.20*	0.23*	0.17*	0.29*	0.35*	0.39*

*$p < 0.05$

Table 2: Effects of Mobility and Network Resilience on Performance

	Individual Sales Performance (t+1, logged)					
	(1)	(2)	(3)	(4)	(5)	(6)
					Women Subsample	Men Subsample
Post Move	−0.254***	−0.093**	−0.092*	−0.075*	−0.074	−0.081*
	(0.033)	(0.031)	(0.031)	(0.031)	(0.037)	(0.039)
Network Resilience		1.703***	−0.235**	−0.582***	−0.556***	−0.610***
		(0.071)	(0.078)	(0.076)	(0.104)	(0.134)
Post Move x Network Resilience			2.053***	2.232***	2.027***	2.552***
			(0.147)	(0.145)	(0.176)	(0.250)
Network size (logged)				0.881***	0.808***	0.986***
				(0.031)	(0.038)	(0.053)
Observations	12,161	12,161	12,161	12,161	7,637	4,523
Adjusted R^2	0.111	0.130	0.283	0.464	0.436	0.427
Unit Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Mover Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (two-tailed tests)
Standard errors clustered by movers are in parentheses

Table 3: Effects of Mobility and Gender on Individual Network Resilience and Performance

	Network Resilience		*Individual Sales Performance (t+1, logged)*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post Move	−0.078***	−0.125***	−0.254***	−0.330***	-0.091**	−0.087*	−0.071*
	(0.004)	(0.006)	(0.033)	(0.034)	(0.031)	(0.031)	(0.031)
Post Move x Women		0.078***		0.125*	-0.008	−0.074	−0.077
		(0.008)		(0.051)	(0.067)	(0.067)	(0.065)
Network Resilience					1.637***	−0.235**	−0.582***
					(0.071)	(0.078)	(0.076)
Post Move x Network Resilience						1.972***	2.287***
						(0.147)	(0.145)
Network Size (logged)							0.881***
							(0.031)
Observations	12,161	12,161	12,161	12,161	12,161	12,161	12,161
Adjusted R^2	0.274	0.276	0.111	0.118	0.130	0.284	0.468
Business Unit Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mover Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (two-tailed tests)
Standard errors clustered by movers are in parentheses

Table 4: The Effect of Gender on Tie Strength and Embeddedness

	Tie Strength		*Embeddedness*	
	(1) Reciprocity	(2) Response Interval	(3) Structural Similarity	(4) Simmelian Tie
	Linear (Standardized Coefficients)			Logistic
Women	0.082*	−0.164***	0.067**	0.329***
	(0.033)	(0.029)	(0.028)	(0.062)
Ego Job Tenure (T1)	−0.007	0.043**	−0.046**	−0.074**
	(0.015)	(0.013)	(0.013)	(0.028)
Ego Org Tenure (T1)	0.007*	0.001	-0.009**	−0.006
	(0.003)	(0.003)	(0.003)	(0.007)
Receiver Indegree (logged, T1)	0.092***	−0.345***	0.144***	0.636***
	(0.022)	(0.020)	(0.019)	(0.045)
Receiver Brokerage (T1)	-0.013	0.084***	-0.073***	−0.090**
	(0.009)	(0.008)	(0.008)	(0.017)
Same Department	−0.034	−0.192***	0.510***	0.352***
	(0.036)	(0.032)	(0.031)	(0.069)
Same Gender	0.033	-0.035	0.063*	0.027
	(0.031)	(0.028)	(0.027)	(0.059)
Job Tenure Difference (Sender – Receiver, T1)	−0.009	-0.007	0.004	0.027*
	(0.007)	(0.006)	(0.006)	(0.013)
Org Tenure Difference (Sender – Receiver, T1)	−0.005*	0.0003	0.003	−0.001
	(0.002)	(0.002)	(0.002)	(0.004)
Observations	16,384	16,384	16,384	16,384
Log Likelihood	−18,608.229	−17,942.773	−17,709.680	−13,676.687
Monthly Fixed Effects	Yes	Yes	Yes	Yes

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (two-tailed tests)

Standard errors clustered by senders and receivers are in parentheses

Table 5: The Effect of Gender and Network Resilience on Tie Strength and Embeddedness

	Tie Persistence (T2)					
	(1)	(2)	(3)	(4)	(5)	(6)
Women	0.216**	0.283**	0.265**	0.186*	0.109	0.184
	(0.081)	(0.082)	(0.097)	(0.098)	(0.097)	(0.099)
Distance (logged)		−0.051***	−0.057***	−0.058***	−0.058***	−0.045**
		(0.010)	(0.011)	(0.011)	(0.012)	(0.011)
Ego Being Promoted		0.406***	0.506**	0.508**	0.382*	0.506**
		(0.130)	(0.143)	(0.143)	(0.133)	(0.143)
Ego Job Tenure (T1)			0.097*	0.101*	0.145**	0.116**
			(0.041)	(0.042)	(0.041)	(0.041)
Ego Org Tenure (T1)			−0.010	-0.013	−0.006	−0.003
			(0.010)	(0.011)	(0.010)	(0.010)
Receiver Indegree (logged, T1)			0.752***	0.724***	0.566***	0.721***
			(0.072)	(0.072)	(0.077)	(0.074)
Receiver Brokerage (T1)			−0.185***	−0.181***	−0.144***	−0.160***
			(0.026)	(0.026)	(0.028)	(0.028)
Same Department			0.542***	0.549***	0.393**	0.331***
			(0.104)	(0.104)	(0.110)	(0.108)
Same Gender			0.062	0.055	0.060	0.029
			(0.091)	(0.091)	(0.091)	(0.091)
Job Tenure Difference (Sender – Receiver, T1)			−0.026	−0.013	−0.028	−0.026
			(0.021)	(0.021)	(0.022)	(0.021)
Org Tenure Difference (Sender – Receiver, T1)			0.007	0.009	0.003	0.005
			(0.007)	(0.007)	(0.007)	(0.007)
Reciprocity (T1)				0.254***		
				(0.060)		
Response Interval (T1)					−0.914***	
					(0.052)	
Structural Similarity (T1)						0.409***
						(0.044)
Constant	−.061***	−2.634***	−5.212***	−5.077***	−5.278***	−5.494***
	(0.297)	(0.314)	(0.442)	(0.442)	(0.461)	(0.455)
Observations	16,384	16,384	16,384	16,384	16,384	16,384
Log Likelihood	12,251.004	-12,224.954	-11,777.418	-11,657.232	-11,593.483	-11,619.516

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (two-tailed tests)

Standard errors clustered by senders and receivers are in parentheses; Monthly Fixed Effects are included.

Table 6: Effects of Mobility and Network Resilience on Performance via Brokerage

	Brokerage						*Individual Sales Performance (t+1, logged)*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					Women Subsample	Men Subsample			
Post Move	−0.052	0.137*	0.108*	0.118*	0.115*	0.128*		−0.078*	−0.100**
	(0.058)	(0.058)	(0.054)	(0.055)	(0.056)	(0.059)		(0.033)	(0.034)
Network Resilience		2.125***	−0.349**	−0.157*	−0.192*	−0.096		−0.232**	−0.575***
		(0.106)	(0.118)	(0.077)	(0.090)	(0.097)		(0.077)	(0.076)
Post Move x Network Resilience			2.437***	2.068***	2.082***	2.034***		1.603***	1.961***
			(0.348)	(0.330)	(0.242)	(0.254)		(0.147)	(0.145)
Network size (logged)				0.468***	0.470***	0.461***			0.870***
				(0.007)	(0.008)	(0.011)			(0.032)
Brokerage							0.537***	0.368***	0.107*
							(0.051)	(0.050)	(0.050)
Observations	12,161	12,161	12,161	12,161	7,637	4,523	12,161	12,161	12,161
Adjusted R^2	0.105	0.133	0.138	0.281	0.289	0.276	0.221	0.413	0.478
Unit Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mover Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (two-tailed tests)
Standard errors clustered by movers are in parentheses