Corporate Proximity and Product Market Reentry: The Role of Corporate Headquarters in Business Unit Response to Product Failure

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ABSTRACT

Understanding how organizations respond to failure is important to management research, yet prior studies have offered contrasting findings for whether, in a multiunit hierarchical organization, a corporate office improves business unit search following product failure. To better understand how a corporate office affects business unit search, we focus on the role of corporate proximity (hierarchical, geographic, and cognitive) between the corporate office and constituent units. We argue that corporate proximity improves a business unit's local search process through two mechanisms—vertical linkages and corporate attention—that positively condition the likelihood of persisting, that is, re-entering a product market after having experienced a prior product failure in that market. We find support for our theory using data on reentry in the U.S. medical device industry following exit from the market due to product failure. We also explore how age of the product market and characteristics of the failure—cause and severity—further moderate corporate proximity's role in business unit reentry. Overall, our study offers a better understanding of how complex organizations respond to failure, thereby contributing to literatures on search, corporate headquarters, and product entry.

INTRODUCTION

The question of how organizations respond to failure, disappointing feedback and other setbacks is a central one in management and organizational learning research (Argote, Lee, & Park, 2020; Dahlin, Chaung, & Roulet, 2018). Yet despite the subject's prominence and the large body of empirical work it has generated, studies of failure response have yielded inconsistent results. The behavioral theory of the firm established that when failure occurs, firms search for solutions to the problem (Cyert & March, 1963; March & Simon, 1958) and change their activities to improve future performance (Baum & Dahlin, 2007; Madsen & Desai, 2010). However, organizations do not always abandon activities associated with negative feedback (e.g., Eggers, 2012; Eggers & Suh, 2019; Maslach, 2016) and may indeed persist with such activities even after having experienced failure (e.g., Desai, 2015). These competing perspectives reflect

variations in organizational search (Billinger et al., 2014; Posen et al., 2018) and highlight the question of why some failures lead firms to change while others lead them to persist with existing strategies, technologies, or products.

Research has pointed to several reasons for this variation, including experience (Audia & Goncalo, 2007; Desai, 2008; Eggers & Suh, 2019), firm size (Audia & Greve, 2006), and the content of the feedback itself (Maslach, 2016). For example, some failures occur in familiar domains where the organization can employ accumulated experience and resources to find solutions, whereas others occur in novel domains where the firm has little history and limited understanding of the problem (Maslach, Branzei, Rerup & Zbaracki, 2018). We extend these arguments and build on related calls for more studies on cross-level organizational learning (Puranam & Maciejovsky, 2017; Schwab, 2007) by examining an important yet understudied source of variation in failure response: the influence of corporate headquarters, and more particularly that induced by the hierarchical, geographic, and cognitive proximity—collectively, corporate proximity—of the constituent business units to the corporate office.

Failures often occur within a multiunit organization where a corporate office partially determines business unit behavior (Karim, 2012; Menz, Kunisch & Collis, 2015; Kunisch, Menz & Collis, 2020; Feldman, 2020). Prior work has highlighted both the benefits (e.g., Ambos & Birkinshaw, 2010) and burdens (e.g., Decreton, Nell & Stea, 2019) of corporate intervention in business unit activities (Poppo, 2003). In the study of search, some research suggests that in a hierarchical structure, the corporate office may broaden business unit search activities (Bouquet & Birkinshaw, 2008; Rhee, Ocasio & Kim, 2019). Yet other work shows that hierarchical decision structures can constrain business unit search efforts following failure (Vissa, Greve & Chen, 2010; Gaba & Joseph, 2013; Sengul & Obloj, 2017). This contrast suggests the need to

more closely examine how failure response varies within multiunit hierarchical organizations, the subject of our analysis.

In this paper, we draw on theories of search (Cyert & March, 1963; Billinger et al., 2014; Posen et al., 2018), strategic human capital (Wright, Coff, & Moliterno, 2014), and attention (Ocasio, 2011) to argue that variations in organizational response to failure are due, in part, to differences in the proximity of business units to the corporate headquarters (Ambos & Håkanson, 2014; Beugelsdijk, Ambos, & Nell, 2018; Zaheer, Schomaker, & Nachum, 2012). Our primary thesis is that corporate proximity conditions (and improves) a business unit's local search process and is therefore associated with greater persistence following failure. To test these relationships, we study the U.S. medical device industry, where multiunit firms commonly exit markets due to product failures (what the FDA calls adverse events).[1] Following such exits, business unit managers must decide whether to try to fix the problem and reintroduce the product to the market or withdraw it permanently. Thus, reentry serves as an outcome of successful local search and our measure of persistence following failure. Reentry stands in contrast to outcomes of more distant search processes, such as permanent abandonment of the product market (Greve, 1995).

In support of our hypotheses, we find as a baseline that product failure-related exits are more likely to lead to reentry than market-related exits. This is consistent with the idea that solutions for product failure-related exits can be found more readily through local search (i.e., search within the same product market as the product failure). Second, we find that units that are more proximate to corporate headquarters are more likely to reenter the product market following a product failure-related exit. Further, we conduct mediated moderation analyses using

[1] https://www.fda.gov/safety/reporting-serious-problems-fda/what-serious-adverse-event

data on career paths of senior executives and text analysis of annual reports and find evidence for two mechanisms—vertical linkages and corporate attention—through which corporate proximity impacts business unit search. Examining the effects of such mechanisms reveal that the benefits of vertical linkages and attention are channeled toward supporting the unit's local search activities, resulting in greater likelihood of persistence and thus reentry. Finally, we find that the effects of proximity are contingent on the product market age, and the cause and severity of the product failure—all of which increase the likelihood that the corporate office will positively influence problem solving further increasing the likelihood of reentry.

This study makes three main contributions. First, we contribute to the behavioral theory of the firm and its implications for organizational learning and search (Argote & Miron-Spektor, 2011; Billinger et al., 2014; Desai, 2015; Eggers, 2012; Maslach, 2016; Posen et al., 2018) by drawing renewed attention to the role of the corporate proximity as a determinate of business unit response to failure. More specifically, we theorize and empirically demonstrate that corporate proximity operates at least in part through two mechanisms: vertical linkages and attention. This provides further insights into not only *whether* the corporate office has an impact on search processes, but also *how* based on the connections between the corporate office and the business unit. Second, our paper contributes to the literature on corporate headquarters (Goold, Campbell & Alexander, 1998; Menz et al., 2015; Bouquet, Morrison, & Birkinshaw, 2009; Feldman, 2020) by developing and testing new theory about the contingent effects of failure characteristics—in our case the cause and severity of the failure and product market age—on the relationship between corporate proximity and failure response. By doing so, we highlight corporate influence as a contingent phenomenon shaped by the implications of failure for the entire corporation and provide a more complete understanding of the function of corporate

headquarters in business unit decision making (Kunisch et al., 2020). Moreover, by conceptualizing and measuring proximity as a multidimensional construct, we extend the corporate headquarters literature's emphasis on geographic proximity and contribute to a better understanding of the factors underlying the effect of the corporate office. Third, we contribute to the literature on the determinants of persistence in product entry (cf. Fosfuri, Lanzolla, & Suarez, 2013; Suarez & Lanzolla, 2007). Along with conceiving entry in terms of change or novelty, this literature has tended to attribute persistence with existing products to limitations created by path-dependence, experience, and existing capabilities (Mitchell, 1989; Eggers, 2012). By focusing on corporate proximity as a driver of persistence, our research offers variation in corporate proximity as a new explanation for differences in entry and reentry across firms.

THEORY AND HYPOTHESES

Product Failure-Related Exit and Reentry

In this study, we examine search following product failure. We focus on whether firms persist, that is reenter product markets after a prior exit. As a first step, we distinguish between product failure-related exits and market-related exits. In line with Maslach (2016: 717), we define product failure-related exits as products removed from the market because they ostensibly do not meet predefined technical or usage requirements. We define market-related exits as those which do not involve technical or usage errors and are instead removed for other reasons including but not limited to the product lifecycle, competitive pressures, and other external causes.

Product failures that precede product exit may be rare and catastrophic, such as accidents (Baum & Dahlin, 2007; Haunschild & Sullivan, 2002), but may also be relatively common with more limited impact (Sitkin, 1992), such as adverse effects of drugs in the pharmaceutical

industry (Haunschild, Polidoro Jr, & Chandler, 2015) or product defects in the automotive industry (Haunschild & Rhee, 2004). In our medical device industry setting, such product failures are typically of the latter type, and are officially referred to as adverse events. In the United States, medical device manufacturers are required to investigate all adverse events and to report them to the U.S. Food and Drug Administration (FDA).[2] Although not all product failures prompt exit from the market, they regularly do. For example, in 2021, Medtronic exited the HeartWare ventricular assist device product market due to adverse events caused associated with delay or failure to restart the pump (Medtronic, 2021). In the same, year, Philips exited the continuous positive airway pressure (CPAP) devices market after evidence revealed that its product had a design flaw that increased risk of exposure to chemicals (Brockman, 2021).

Following a product failure-related exit, firms can either permanently abandon the product market or, after attending to the problem, reenter. Such decisions are likely to depend on whether solutions to the problem can be found through local search (Cyert and March, 1963). According to the behavioral theory of the firm, failure serves as a form of feedback and triggers problemistic search, a process of search to identify alternative actions (Cyert & March, 1963; Posen et al., 2018). Problemistic search is initially local in that managers search for causes and solutions close to prior ones and stop when a satisfactory solution has been identified. They only broaden their search when local solutions are not available or do not work (Billinger et al., 2014).

[2] The FDA requires all "mandatory reporters" to submit medical device reports of adverse events, and this category includes not only device manufacturers but also importers and device user facilities. Reports may also be submitted by "voluntary reporters," including healthcare professionals, patients, and consumers. Importantly, regardless of who reports an adverse event, device manufacturers must investigate, evaluate the cause, and take action in response (per the FDA Summary of MDR Requirements).

Following this search logic, we expect that product failure-related exits are more likely to result in successful local search than those caused by market-related factors. With product failure, the underlying cause will be related to the technology or how it is used—and thus falling mostly under the unit's control. Accordingly, managers will be able to draw on their accumulated experience and deep knowledge of the products and their users (e.g., healthcare providers) to diagnose potential causes and identify solutions. Because the failure occurs in a familiar domain, solutions to the problem are more likely to involve an incremental adjustment (e.g. new parts, better training), increasing the likelihood the unit will stick with and fix the existing product (cf. Maslach, 2016). In other words, search efforts are likely to yield viable local solutions.

In contrast, market-related exits involve causes which generally do not fall within the firm's immediate control. Such exits can be prompted by technological obsolescence related to introduction of innovations by competitors (de Figueiredo & Kyle 2006) or from competitors' abandonment of those markets via strategic contagion (Greve, 1995), both of which signify that the firm's related knowledge and experience have become obsolete (Katila & Ahuja, 2002) and that response requires more "distant" alternatives. In these cases, the focal firm is more likely to engage in more distant search efforts—including investment in research and development (Eggers, 2012)—because the firm cannot rely solely on its product market experience and existing knowledge to solve the problem at hand. Strategic responses following a market-related exit may require substantial changes to the firm's technologies (Tripsas, 2009) as well as a shift in strategy (Burgelman, 1994). Such exits are thus more likely to be associated with the permanent abandonment of the existing product market and its associated technology trajectory, and with the pursuit of entirely new product markets (Lieberman, Lee, & Folta, 2017).

In sum, following product failure-related exit, firms will be more likely to attempt to fix the product and subsequently reenter rather than abandon the product market compared with market-related exits, because product failure-related exits are more likely to induce a successful local search response. This logic suggests our baseline hypothesis:

Hypothesis 1. Compared to market-related exits, product failure-related exits are associated with a greater likelihood of product market reentry.

Corporate Proximity, Product Failure-Related Exit, and Reentry

Complex organizations are typically comprised of business units and a corporate office of executives who monitor performance while formulating policies and strategy. Whereas early research focused on the allocative efficiency of such vertical division of labor (Chandler, 1962; Williamson, 1985), more recent work suggests that the corporate hierarchy also shapes business units' search activities and thus their responses to failure (Gaba & Joseph, 2013; Rhee et al., 2019). In accordance with this work, we argue that a business unit's corporate proximity will affect its response to product failure-related exits because of its role in buisness unit search.

We first note that corporate proximity is multidimensional. The first dimension, *hierarchical* proximity, is the distance between the corporate office and its business units in terms of vertical structure or "layers" (Rajan & Wulf, 2006; Reitzig & Maciejovsky; Zhou, 2013); the second, *geographic* proximity, is the spatial distance between the business unit and corporate headquarters (Baaij & Slangen, 2013); and the third dimension, *cognitive* proximity reflects the extent to which headquarters and business units share similar types of experiences (Bertrand & Mol, 2013; Nooteboom et al., 2007).[3]

[3] While each of these dimensions of proximity is conceptually distinguishable, they are highly correlated. Therefore, we expect them to have directionally similar, additive impact on the mechanisms through which the corporate office impacts business unit failure response.

We build our theory by linking these three dimensions of corporate proximity, via the mechanisms of *vertical linkages* and *corporate attention,* to reentry following product failure-related exit. Vertical linkages refer to business unit managers with corporate office experience. Corporate office experience has been shown to be important for information access and transfer (Karim & Williams, 2012; Williams & Mitchell, 2004). Corporate attention refers to the deliberate allocation of attention to a constituent unit and reflects a positive form of intervention by the corporate office (Bouquet & Birkinshaw, 2008: 578; Ocasio 2011). In subsequent robustness checks, we examine the operation of such mechanisms in supporting our hypotheses.

We suggest that corporate proximity will lead to increased vertical linkages, as follows. First, hierarchical proximity provides corporate staff with a chance to gain line experience at a level closely commensurate with their functional level at headquarters. Corporate offices often populate business unit management roles with "their own people" in order to train them and garner more control, or because managers seek out such opportunities. Second, geographic proximity (e.g., co-location) makes it easy to relocate managers from the corporate office to the business unit, in part because managers may want to stay in the same location (Edwards, Chikhouni, & Molz, 2019). Third, cognitive proximity (e.g., shared experience) means those in the corporate office are more likely to have business unit-relevant task knowledge (Dokko, Wilk, & Rothbard, 2009; Karim & Williams, 2012), and hence, may be more willing and able to transfer to the unit. Thus, we posit that across all dimensions, corporate proximity should lead to increased vertical linkages.

In turn, vertical linkages will aid the business unit's local search in several ways. Vertical linkages should increase the effectiveness of local search due to greater ease of finding and transferring relevant information within the corporate office. Direct linkages enable groups to

develop stronger transactive memory systems (Argote et al., 2018) or knowledge of who knows what (Lewis, 2003; Ren & Argote, 2011). Linkages underlying transactive memory systems not only increase knowledge acquisition but also ease the exchange of that knowledge (Heavey & Simsek, 2015). Since linkages build trust, they improve private knowledge flow and make complex or tacit information easier to exchange (Uzzi, 1996). Easier exchange should increase the chances of successful local search.

Accordingly, vertical linkages make it easier for business unit managers to locate corporate-level managers who can help the unit with the process required to address the problem and support the unit in related activities. These activities include liaising with the FDA and navigating the internal approval process within the corporation. Successfully navigating these processes is necessary, given that firms are subject to audits assessing their regulatory compliance (FDA, 2018). For example, with greater corporate proximity, managers can more readily access relevant corporate contacts concerning quality assurance and regulatory compliance, which facilitate the internal approvals which are likely necessary to get the failed product back on the market.

In principle, corporate proximity should also provide the business unit with greater corporate attention. Hierarchically proximate business unit managers often have a direct reporting relationship with the corporate office, which may increase formal interaction. Similarly, geographically proximate units are less likely to be strategically isolated (Bouquet & Birkinshaw, 2008) or to fall "off the radar screen of headquarters" (Birkinshaw, Bouquet, & Ambos, 2007: 43), and provide for more frequent informal interactions (Hwang, Singh, & Argote, 2015). More frequent formal and informal interactions will serve to establish the limited attention of the corporate office and especially the selection of business unit issues and activities

to which the corporate office devotes time and effort (Ocasio & Joseph, 2005). Cognitive proximity (i.e., shared experience) increases the salience of business unit activities for corporate executives. Research shows that groups focus more on common information than on information that members uniquely possess (Stasser & Titus, 1985). Further, managers may communicate more because they have a common understanding of their shared experiences (Daft & Weick, 1984). Consequently, cognitively proximate units should receive more sustained attention (Ambos, Ambos, & Schlegelmilch, 2006).

By increasing corporate attention, greater proximity should increase reentry following product failure-related exit, because such attention should increase the prioritization and comprehension of the failure by the corporate office. First, sustained attention to the business unit will make their product failures more prominent (Dellestrand & Kappen, 2012; Kiesler & Cummings, 2002), such that the corporate office is likely to prioritize their attention towards failures of more proximate units (Ambos, Ambos & Schlegelmilch, 2006; Kumar, 2013). That is, greater attention to the business unit will help ensure that the business unit's problems will stay atop the corporate agenda until a satisfactory solution is found (Yu et al., 2019).

Second, greater corporate attention afforded by corporate proximity should lead to enhanced comprehension of the problem at hand and favorably influence corporate impressions and priorities (Ambos, Ambos & Schlegelmilch, 2006; Kumar, 2013). With greater attention, corporate managers may have a better appreciation for how the underlying technology operates that goes well beyond its superficial features (Grégoire, Barr, & Shepherd, 2010; Grégoire & Shepherd, 2012) and thus have a better handle on the unique aspects of the failure (Li et al., 2013; Shepherd et al., 2017). Even in absence of a technical understanding, proximate corporate managers are a likely to have a better appreciation for the preferences of the business unit

experiencing the failure, which can alter how they intervene in the business unit's problem-solving activities (Bouquet, Morrison, & Birkinshaw, 2009). With a better understanding of the business unit's preferences, corporate interventions are more likely be beneficial. In the presence of corporate proximity, the corporate office should be more inclined to support the business unit in its local search activities, and less likely to re-allocate resources away from the failed product toward more successful products or subunits (Joseph et al., 2016; Eggers & Kaul, 2018).

In summary, we propose that corporate proximity increases vertical linkages between the business unit and the corporate office and increases the attention from the corporate office that the business unit receives. This dynamic will allow for better access to information and greater prioritization and comprehension of the problem by the corporate office, which improves local search following failure, increasing the likelihood of reentry following product failure-related exit. This logic suggests our second hypothesis:

> *Hypothesis 2. Greater corporate proximity increases the (positive) relationship between product failure-related exit and product market reentry.*

Corporate Proximity and the Role of Product Failure Characteristics

Our theorizing above suggests that corporate proximity enhances local search after product failure-related exit, and thereby increases the likelihood of product market reentry (persistence following failure). Building on that logic, we further argue that the effect of corporate proximity increases when the corporate office is more likely to get involved in the search process. The likelihood of corporate involvement will increase with the product failure's potential to negatively impact the business unit's and overall firm performance. As organizations are especially sensitive to loss (Bromiley, 2010), and corporate executives are responsible for the overall performance of the enterprise (Chander, 1962), the corporate office is more likely to influence business unit search when the failure concerns established product markets or for

failures which the corporation may more likely to be held responsible—those caused by the technical errors of the product itself (rather than user errors) or especially severe failures. *Established product markets* are those which are more mature, having existed for a relatively long period, and stand in contrast to product markets that are new and in a nascent stage. *Technical errors* involve defects of the product and/or the underlying technology (e.g., flawed design or defective parts), whereas *user errors* involve failure caused by the usage of the product (e.g., non-adherence to instructions, poor maintenance). *Severe product failures* are those that cause significant harm, that is, are associated with serious injury or death.

Established product markets are likely to serve as part of the firm's existing technological knowledge and capabilities (Chatterji & Fabrizio, 2014) and, with this, failures in established product markets may have significant implications in terms of overall financial performance. These financial implications increase the likelihood that the corporate office will get involved and support the business units' local search. Similarly, product failures involving technical errors and that are severe may open the corporation up to risk in the form of defective product liability claims.[4] In particular, firms are more likely to be held liable for technical errors clearly linked to design, manufacturing, or labeling flaws than for user errors linked to product use or maintenance (Ekelman, 1988). Similarly, the firm is more likely to be the subject of a lawsuit when the failure is particularly severe (Lennox & Li, 2020). Severe failures are more visible and draw more external and internal attention (Madsen, 2009; Desai, 2011; Dahlin et al., 2018). In both cases, the corporate office is more likely to get involved given the potential for negative spillovers that could impact other units and products sold by the corporation.

[4] Medical device companies were subject to the possibility of litigation from patients for FDA approved products at least until the U.S. Supreme Court, in *Riegel v. Medtronic (2008),* i.e., during our analysis period.

Though business unit search can often benefit from corporate-level involvement, however, business units may not always welcome it. Business units often eschew corporate involvement due to the increased demands and drain on business unit time that accompany it (Bouquet & Birkinshaw, 2008: 594). Business units may fear that the full cost of engaging the corporate office in problem solving is likely to outweigh the benefits of getting headquarters involved since attracting corporate attention will unnecessarily increase corporate scrutiny of all their activities. This cost is especially acute for less proximate business units because when units lack connections with the corporate office, they are limited in their ability to direct corporate attention to avoid excessive interference with operations. Absent positive corporate attention, the corporate office may view the business unit's failure unfavorably and shift resources away from the unit as a whole and towards those without such failures (Joseph et al., 2016).

On the other hand, depending on the features of the failure, business units may see it as helpful or even necessary to get the corporate office involved. Business unit may be more willing to bear the cost and involve the corporate office especially when corporate information is perceived as valuable (Gupta & Govindarajan, 2000; Perez-Nordtvedt, Kedia, Datta, & Rasheed, 2008). A key source of value is perceived relevancy (Schulz, 2003): the more relevant the knowledge is to the problem, the more valuable it is for the unit, and the greater the willingness of the unit to obtain it. When the failure occurs in an established product market or is caused by a product-related, technical error (rather than a user error) the corporate office is more likely to have relevant knowledge. The corporate office has access to the R&D activities of all of its business units and often engages in R&D activities itself (Argyres & Silverman, 2004). As a result, it is likely to hold relevant technical knowledge associated with the business units established products (Helfat & Raubitschek, 2000). The corporate office is likely to be less

helpful with nascent technologies for which they have little experience, and for failures caused by user errors, such as those caused by non-adherence to instructions. Notably, the latter may be addressed by rewriting instructions or adding user training and may not require exit or search and is usually managed at the business unit level. Hence, the business unit may not bother seeking corporate help in either of these instances.

Business units may also have a greater willingness to accept corporate involvement in search efforts if the exit is associated with especially severe product failure. In this case, the business unit may view interacting with the corporate office as unavoidable given that severe product failures could negatively impact customer demand for the business unit's other products or those of other units in the firm (e.g., a severe outcome or technological issue with a certain medical device could discourage doctors from using any of the firm's products) (Lei, Dawar, & Lemmink, 2008). Further, since proximity increases formal and informal interactions (via vertical linkages) and the overall visibility of the unit at corporate (via corporate attention), the business unit may not be able to avoid disclosing a severe failure, enhancing these effects. In other words, given the visibility of a proximate unit and the (increased) visibility of a severe failure, the business unit may have no choice but to proactively engage the corporate office, which should increase the effectiveness of local search activities and subsequent persistence.

To summarize, when product failure-related exits occur in established markets, are caused by technical errors (rather than user errors), or the associated effects are severe, the corporate office is more likely to influence business unit search activities, which—when paired with close proximity and corresponding access to relevant knowledge and favorable corporate attention—should increase the likelihood of reentry following exit. This suggests our final hypotheses:

Hypothesis 3a. *The effect of corporate proximity increases more for products in established product markets compared to non-established product markets.*

Hypothesis 3b. *The effect of corporate proximity increases more for product failure-related exits involving technical errors compared to those involving user errors.*

Hypothesis 3c. *The effect of corporate proximity increases more for severe product failures compared to non-severe failures.*

METHODS

Data and Sample

We tested our hypotheses by constructing a sample of business units that operated between 1983 and 1996 in the U.S. medical device industry, a sector which is ideal for this purpose for several reasons. First, because medical devices are regulated by the FDA, we were able to closely track failures at the product level. Second, using several linked sources of data enabled us to observe product market exits, and product market reentries. Third, there is substantial variation in corporate proximity within and across medical device firms.

To build our analytical sample, we collected data from the Medical Device Register (MDR). The MDR is a directory of U.S. medical device manufacturers that publishes comprehensive data—including each manufacturer's product portfolio, number of employees, annual revenue, location, ownership, and other descriptive information—for each year at the business unit level (Cecchino, 2010; Chatterji, Cunningham, & Joseph, 2019; Prasek, 1999). Next, we linked the MDR data to the FDA Medical Device Reporting database, which summarizes reports of medical device-related adverse events during our 1984–1996 study period. Finally, we matched the MDR to the LexisNexis Corporate Affiliations directories, which provide data on the corporate hierarchy of firms. Compustat provided corporate financial data.

Given our interest in business units that are part of a hierarchical organization, our main sample excludes all stand-alone firms,[5] those that we could not match with the Corporate Affiliations data, and those that lacked key corporate or business unit-level data.[6] Our analytical dataset is at the business unit–product market–year level, focusing on predicting product market reentry in previously exited markets.[7] The final sample consists of 4,760 business unit–product market–year observations comprising 229 unique reentries to product markets after exit by 157 business units in 686 different product markets (1,003 unique business unit–product market dyads).

Explanatory Variables

Product market reentry. The dependent variable in our study is a binary variable that is set to 1 for the year that a business unit reenters the focal product market (and 0 otherwise). We determined business units' reentry into product markets from the MDR. We recorded product market reentry whenever a business unit offered a product in a market where it did not offer a product in the previous year but did have offerings in prior years. For example, Zimmer offered products in the metal knee joint prosthesis market (product code HRZ) until 1986 but offered none in 1987; yet Zimmer returned to again offer said products in 1988, which we therefore code as product market reentry.

[5] We also performed the same analysis while including stand-alone firms; for this purpose, we assigned a distance value of 0 to these firms and controlled for them by incorporating an indicator variable for their presence. We obtained statistically similar results (results available from authors).

[6] According to the *t*-tests we used to compare the sample with business units that could not be matched with the Corporate Affiliations dataset, our sample includes business units that are significantly larger in terms of sales and number of products. The implication is that our study's sample includes relatively larger business units, which is not surprising when one considers that smaller firms are less likely to have available information about their corporate structure.

[7] Note that we use the full sample of business unit–product market–year observations to predict product market exit in Table A1 in Appendix A.

Experience of product failure. We identified product failure-related exits by linking exits with experience of product failure in that product category. We measured product failure by using adverse events reported to the FDA. We define product failure a product not meeting predefined technical or usage requirements. Correspondingly, an adverse event involves a malfunction of a medical device due to technical or user errors. We coded the experience of product failure with an indicator variable set to 1 only if the focal business unit experienced any adverse event within the preceding three years (including the focal year) in the focal product market.[8] We use a binary measure because, according to our interviews with managers at medical device firms, it is the first occurrence of an adverse event which triggers internal search efforts, and that the process of responding to adverse events does not change with the number of occurrences. We consider exits that do not involve a product failure to be market-related exits, which serves as the base category for the analyses.

Corporate proximity. We measure the proximity of headquarters to the business unit using a composite measure of hierarchical, geographic, and cognitive proximity, in line with Ambos and Håkanson (2014) who suggest using multiple measures for distance.

Hierarchical proximity. This variable measures the number of hierarchical layers between the focal business unit and its corporate office. Because firms seldom make structural information publicly available, we draw on multiple sources, including LexisNexis Corporate Affiliations directories, annual reports, books, and news articles. Hierarchical distance measures the levels between the business unit and the corporate office and varies from 0 to 4 in our data. For instance, the business unit Zimmer was two layers beneath its corporate office during our analysis (Bristol Myers Squibb); accordingly, we assigned it a hierarchical distance of 2. For ease

[8] We find consistent results with alternative time frames (i.e., adverse events within the past two years).

of interpretation, we reverse-coded hierarchical distance to measure *hierarchical proximity* by subtracting each unit's hierarchical distance from the maximum value of hierarchical distance in the sample (which is =4).In practice, this means that *hierarchical proximity* of a business unit immediately beneath the headquarters (initially coded as "1") was reverse-coded to a value of 3, so that a higher value indicates greater proximity.

Geographic proximity. This variable measures the physical distance (in miles) between the corporate office and the business unit. We first obtained the addresses and ZIP Codes of the entities involved from various sources: the MDR, LexisNexis Corporate Affiliations directories, Compustat, and company websites. We then obtained each location's latitude and longitude before using the "great circle" distance formula to calculate geographic distance as follows:

$$(Geographic\ distance)_i = C \times \arccos[\sin(Lat_i)\sin(Lat_j) + \cos(Lat_i)\cos(Lat_j)\cos(|Long_i - Long_j|)],$$

Where $C = 3{,}437$ is a constant that converts results to miles on the Earth's surface and where *Lat* and *Long* denote latitude and longitude (converted into radians) of the main office of the focal unit *i* and its corporate headquarters *j*. In line with extant research (Chakrabarti & Mitchell, 2013; Sorenson & Stuart, 2001), we take the natural logarithm of the raw value of geographic distance to account for the non-linear increase in the effect of that distance. We then reverse-code geographic distance to create *geographic proximity* by subtracting the value of geographic distance from the maximum value of geographic distance in the sample (8.84), so that higher values indicate greater geographic proximity to the corporate office.

Cognitive proximity. We measure this variable using two sub-indicators: *corporate similar product experience* and *corporate product failure experience*. Following prior research on cognitive distance (Nooteboom et al., 2007; Wuyts et al., 2005), we measure *corporate similar product experience* as the correlation—in the shares of products for 19 medical specialty

areas (e.g., cardiology)—between the business unit and the corporate office. This measure reflects the similarities in organizational focus across medical specialty areas. *Corporate product failure experience* identifies the degree of shared product failure experience between the corporate office and the business unit. In accordance with Dutt and Joseph (2019)'s operationalization of measuring shared experience between the corporate and the business unit, we code *Corporate product failure experience* as 0 if neither the business unit nor the corporate office experienced an adverse event in the medical specialty of the focal product market, 1 if only one of either headquarters or the business unit experienced an adverse event, and 2 if both the corporate office and the focal business unit have experienced an adverse event.

To construct our composite measure of corporate proximity, we standardize all of the above proximity sub-indicators via *z*-scores and then add them. We use a composite measure for three reasons: because we are interested in proximity generally; because the logic behind each dimension predicts similar relationships; and because the different measures of proximity are highly correlated.[9] However, we also include analyses that use each measure individually, which produce similar results (see Appendix B for these results).

Established product markets. Following Chatterji and Fabrizio (2014), we operationalize *established product markets* using the age of the product market based on the FDA Premarket Notifications and Premarket Approval (PMA) databases. The FDA classifies medical devices into product categories of similar purposes or functions and assigns each a unique product code. For example, replacement heart valves (code DYE) were first introduced in 1983, and so this variable takes a value of 10 for this product market in 1993 (that is, 1993-1983=10). Product categories emerge when they are sufficiently different from existing categories, and the time

[9] For example, the correlation between hierarchical proximity and geographic proximity is greater than 0.7.

elapsed since product market introduction forms a defensible proxy to measure the degree to which a focal product market becomes established.

Technical error-driven product failure. We identify the cause of product failure from the FDA Medical Device Reporting database, and code product failure as *technical error-driven* if its cause is solely attributable to the medical device itself (i.e., fault in the product) or as *user error-driven* if it is precipitated by a user error.

Severe product failure. We measure the product failure's severity using the FDA categorization of severity, which distinguishes adverse events according to whether they were associated with a malfunction, serious injury, or death. We code a product failure as *severe* (that is, we assign it a value of "1") when it is associated with a serious injury or death of a patient and as *non-severe* ("0") if it only involves a malfunction.

Control Variables

Business unit controls. To accommodate the possibility of underperforming units engaging in greater change or risk taking (Greve, 1998), or being subject to greater scrutiny from headquarters, we control for the focal unit's performance relative to aspirations. Thus, we measure A_{it}, the aspiration level of unit i in year t, as a weighted moving average of its performance: $\alpha P_{it-1} + (1 - \alpha)A_{it-1}$. Here, P_{it-1} represents performance (i.e., sales) of unit i in year $t - 1$, A_{it-1} denotes unit i's aspiration level from the prior year, and α is the weight given to performance and to the prior aspiration level.[10] We spline the variable at 0 to allow for separate slopes of performance above and below aspirations, and we control for *Above aspiration* (*Unit P – A < 0)* and *Below aspiration (Unit P – A > 0)*. We also account for corporate pressure on units by controlling for *Unit importance*, as the ratio of the focal business unit's sales to corporate's

[10] We use $\alpha = 0.5$ to maximize the model fit, but our results are robust to alternative values of α.

overall sales (Gaba & Joseph, 2013). Furthermore, our regression models include *Unit age* to control for the effect of business unit experience on reentry.

In addition, we control for business units' *Number of products in medical specialty area*,[11] since units with more products may, on the one hand, have fewer surplus resources available for reentry or, on the other hand, be better prepared for reentry in light of their experience with other product markets. We control for the extent of a business unit's concentration of products in its medical specialty area via *focus in medical specialty*, defined as the business unit's total number of products in the medical specialty of the focal product market divided by that unit's total number of products. We control for business units' *reentry experience*, using the total number of previous reentries, as accumulated experience can imply competence or strategic consistency. We also control for *Product failure in other product*s within the business unit's product portfolio for two reasons: such events might draw attention away from the focal product; and the business unit could learn from product failures related to other products and then apply that knowledge to the focal product. We code this variable as 1 only if there was an adverse event associated with a business unit product—other than the focal product—that is in the same medical specialty area as the focal product.[12]

Corporate controls. To rule out that corporate-level differences could explain our results, we control for *Corporate size* using total sales of the corporation (in millions USD). We also control for firm profitability using *Corporate ROA* (return on assets). Further, we control for

[11] We also run the regressions using the total number of products in all medical specialties and obtain statistically similar results. We use the number of products in the medical specialty area because it is probably more relevant to the focal product market and also yields a better model fit.

[12] We consider incidents involving other products only when those products are within the same medical specialty area—that is, because the experience of product failures in these products is more relevant. However, we obtain statistically equivalent results when coding the variable with reference to incidents involving *any* of the firm's products.

Corporate slack—calculated as the firm's ratio of selling, general, and administrative expenses to sales (Bromiley, 1991)—because slack may be associated with variations in monitoring (Levinthal & March, 1981), which may affect reentry. We control for *Corporate reentry experience* using the total number of previous reentries at the corporate level. We also control for *Number of business unit*s of the focal corporation in the U.S. medical device industry.

Product market controls. We control for the regulatory class of the focal product market (Class I, II, or III), which captures the level of risk and commensurate regulation associated with a device (where higher class is riskier). To capture competition, we control for *Number of incumbents* in the product market. Because exit and entry of other firms may influence the focal business unit's decision to reenter, we include *Exit by other firms* and *Entry by other firms*, or number of firms that have exited and entered (respectively) the focal product market that year.

We also control for aggregate economy factors driving reentry using year fixed effects and include medical specialty fixed effects to control for any time-invariant subindustry-level factors driving reentry.

Model Specification

We undertook a discrete event history analysis via the following complementary log-log model to test our hypotheses (Allison, 1984):

$$\Pr(reentry_i = 1 \mid \mathbf{x}_{it-1}) = 1 - \exp(-\exp(\mathbf{x}_{it-1}\beta)),$$

where **x** is a vector of explanatory and control variables that predict product market reentry. In the context of our study, discrete event history analysis is preferable to continuous event history analysis because we do not know the precise timing of reentry within each year. Moreover, this method yields parameter estimates that are consistent with those obtained from continuous models (Allison, 1984) and has been used in several prior studies examining entry (e.g., Moeen,

2017; Stephan et al., 2003). Our unit of analysis is at the business unit–product market–year level: we observe a business unit's potential reentry into each product market each year. We view all business units that have not yet reentered the focal product market after product exit as potential (re)entrants; it follows that business units (1) enter the risk set when they exit from the focal product market and (2) remain in the risk set until they reenter that product market (or until the observation period ends). To facilitate interpretation, we mean-centered all explanatory variables prior to creating interaction terms (Aguinis, Edwards, & Bradley, 2017). To rule out spurious co-occurrence effects, we lagged all explanatory and control variables by one year.

Controlling for Selection and Alternative Explanations

In all non-experimental research, endogeneity is a concern. Though it would be ideal to assign firms randomly into groups, "allocate" product failures and different levels of corporate proximity to each group and then observe subsequent reentry decisions, doing so would be infeasible. Since the exact timing of product failure is largely exogenous however, and because corporate structure and location—and thus proximity—rarely change (Raveendran, 2020), concerns of omitted variable bias and reverse causality are less salient in our study. For example, firms are unlikely to change in corporate proximity (between business unit and headquarters) following a product failure or exit,[13] which helps to alleviate concerns that unobserved factors might simultaneously cause the business unit to change its proximity to headquarters *and* increase the likelihood of reentry. For additional robustness, though, we run a falsification test that uses future values of explanatory variables (e.g., the value in year $t + 2$ or $t + 3$) to predict

[13] The correlation between a business unit's *hierarchical proximity* at t and $t - 1$ is 0.996, which is indicative of its stable nature. Moreover, *Geographic proximity* does not change in any case for our sample during the period we examine.

reentry in year *t* (Chatterji & Toffel, 2010). We find no statistical evidence of such relationship, which provides additional evidence that our results are not subject to reverse causality.

Another potential source of bias in our estimates is that business units' decisions to exit are not random. For instance, exit may also depend on corporate proximity, which would contaminate our proximity-related reentry results. To address this possibility, we use the inverse propensity weight (IPW) method to account for selection on observables in the differential likelihood of exit across various factors (see Appendix A for results). To implement this approach, we first estimate the likelihood of a business unit's exit from the product market (see Table A1). We then omit observations with non-overlapping propensity scores and assign each observation in the sample a weight of $1/(1 - p)$, where p denotes the propensity to exit (Robins, Hernan, & Brumback, 2000; Tan, 2010). Figure A1 presents the kernel density plot of the propensity scores and thereby illustrates the ex-ante differences between business unit products that exit and those that do not. Figure A2 depicts the kernel density plot of the post-trimmed and weighted samples. Table A2 illustrates the balance between the exit and non-exit samples both before and after trimming and weighting. The mean bias decreases from 9.0 in the raw sample to 2.8 in the sample that is trimmed and weighted, which provides evidence of balance across the sample.[14] The results we report use IPW; results with non-weighted observations are consistent.

RESULTS

Table 1 reports descriptive statistics and bivariate correlations for the variables used in our analysis. The baseline rate of reentry is 4.8%, and nearly 19 product market reentry events occur each year, on average. Table 2 presents the discrete event history analysis' results that predict the likelihood of reentry. Model 1 is the base model. In terms of control variables, the

[14] A mean bias of less than 5 is typically viewed as an indicator of balance (Caliendo & Kopeinig, 2008).

results indicate that units performing above aspiration levels are less likely to reenter, consistent with prior work suggesting high performance leads to accrual of resources or confidence, allowing for more slack-driven distant search (Chen & Miller, 2007). Older firms are also less likely to reenter (more likely to change), as accumulated experience and resource endowments may enable them to take greater risks (Audia & Greve, 2006).

Model 2 tests Hypothesis 1. We find that *experience of product failure* is positively associated with the likelihood of reentry ($p = .015$), confirming the hypothesis. Though reentry is itself a relatively rare event, product failure-related exit more than doubles the likelihood of reentry (increasing it by 2.2 percentage points (p.p.) from 2.0% to 4.2%).

Insert Tables 1–2 about here

Model 3 tests Hypothesis 2 by including *corporate proximity* and the interaction between *experience of product failure* and *corporate proximity.* The model provides evidence that corporate proximity positively moderates the relationship between product failure-related exit and the likelihood of reentry ($p = .002$), which supports Hypothesis 2. The results from Model 3 imply that experiencing product failure increases the likelihood of reentry by 4.1 p.p. (from 1.1% to 5.2%) when the business unit is proximate to the corporate office (*corporate proximity* = 1 standard deviation above the mean) but only by 2.2 p.p. (from 1.7% to 3.9%) when the unit is more distant from headquarters (*corporate proximity* = mean) with all other variables held at their mean values. This relationship is visually represented in Figure 1.

Insert Figure 1 about here

Additionally, we find a direct negative effect of *corporate proximity* on reentry ($p < .001$). Though we did not hypothesize this relationship, this finding indicates that business units with greater proximity to headquarters are less likely to reenter product markets following a market-related exit. This may be because corporate offices tend to favor abandonment and resource reallocation for this type of failure or if existing knowledge appears obsolete.

Models 4 examines whether the positive interaction of corporate proximity and the experience of product failure on product market reentry is greater for established product markets. We test Hypothesis 3 by a three-way interaction term among *experience of product failure*, *corporate proximity*, and *established product market.* We include all lower-level terms (i.e., the paired two-way interaction terms among the three variables) in these models. As hypothesized, we find that the positive interaction between corporate proximity and experience of product failure on the likelihood of product market reentry is greater for established product markets ($p = .032$). Overall, we find support for Hypothesis 3a.[15] These results imply that, in established product markets (1 standard deviation above the mean), increase of one standard deviation in corporate proximity from the mean increases re-entry after product failure by 3.2 p.p. (from 1.8% to 5.0%) compared to 0.7 p.p. (from 1.9% to 2.6%) in less established product markets.

Models 5 to 8 test Hypotheses 3b and 3c, which predicted that the positive interaction is greater for product failures involving technical errors and severe product failures, respectively. Because we only observe cause and severity conditional on occurrence of adverse events, these

[15] We also reran analyses using a split-sample approach using the median level of *established product market*. We obtain consistent results; that is, we find statistical evidence of the moderation effect of corporate proximity only in the subsample with high levels of *established product market* and products in the primary medical specialty area of the business unit.

analyses include regressors of adverse events split by type rather than three-way interactions.[16] Results show that the interaction of corporate proximity and product failures is positive only for product failures involving technical errors (b = 0.360, p = .019) and severe product failures (b = 0.346, p = .005). In material terms, this means for product failures involving technical failure, one standard deviation increases in corporate proximity from the mean increases re-entry by 2.8 p.p. (from 2.9% to 5.7%) and for severe product failures 2.9 p.p. (from 3.8% to 6.7%). In contrast, we fail to find any significant statistical evidence of the interaction of corporate proximity for both product failures involving user errors (p = .138) and non-severe product failures (p = .451). These findings support Hypotheses 3b and 3c.

Supplemental Analyses

To provide some additional evidence in support of our theorizing, we test the two main mechanisms proposed for the influence of corporate proximity on the effect of product failures on reentry: (1) vertical linkages in terms of business unit executives who had previously worked at the corporate office and (2) corporate attention provided to proximate units.

Vertical linkages. To measure such linkages, we track the career paths of senior executives (as in Williams & Mitchell, 2004) using the MDR's relevant directory, which includes data on the executives who hold positions in advertising, marketing, production, and research, as well as on the chief executive officer. If an executive of a unit previously held or holds a concurrent position in the corporate office, then we assume a vertical link exists between the unit and the corporate office. The average number of vertical links is 0.75 for each unit–year.

[16] Because *technical error-driven product failure* and *severe product failure* are subsets of *experience of product failure*, the analyses will rest on a smaller sample of product failure, compared to our main models, resulting in a decrease in statistical power.

Table 3 reports the results of our analysis, which splits the sample into units with or without vertical linkages. Models 9 and 10 are for units with vertical linkages, whereas Models 11 and 12 are for units without. In Model 9, we find a positive interaction of corporate proximity and experience of product failure (p = .028), confirming that corporate proximity positively moderates the relationship between product failure and product reentry when there are vertical linkages between the unit and the corporate office. In contrast, the relationship is negative (p = .006) in Model 12 (i.e., for units without vertical linkages). However, a note of caution is warranted: the coefficient in Model 12 is fairly large and noisily estimated due to the small number of reentries in this subsample, which itself is consistent with our theorizing. Nevertheless, corporate proximity is associated with few reentries when vertical linkages are low. Overall, these analyses provide supportive evidence for our arguments on the mechanism of vertical linkages.

Insert Table 3 about here

Corporate attention. We also conduct a mediated moderation analysis (Hayes, 2013; van Kollenburg, 2020) to determine if corporate attention is indeed a mechanism underlying corporate proximity effects. Mediated moderation tests the extent to which a variable mediates a focal moderating effect (Muller, Zudd, & Yzerbyt, 2005) . To conduct this analysis, we measure the level of corporate attention using mentions of units in the firm's annual reports (Plourde, Parker, & Schaan, 2014). We collected annual reports from Mergent Archives and the ProQuest Historical Annual Reports database and were able to source 479 annual reports covering 91 business units in our final sample. To measure corporate attention, we use the number of mentions in the annual report. We normalize the frequency by the total pages in the annual report

to capture the level of relative attention to the business unit and because longer reports can result in greater absolute number of mentions of units. Because of some missing data for some firms, we use average number of normalized mentions per year across the sample period.

If corporate attention is a mechanism mediating the moderating effect of corporate proximity on the experience of product failure, then (a) corporate attention should moderate the effect of product failure; (b) the moderating effect of corporate proximity should become 0 (or decrease in magnitude) when corporate attention and its interaction with product failure is included in the model; and (c) corporate proximity should be correlated with corporate attention (see Hayes, 2013). Table 4 presents the results of our mediated moderation analysis. Models 13 and 14 replicate the original results for Hypothesis 2 and confirm the moderating effect of corporate proximity on product failure and product reentry. In Model 15, we introduce *corporate attention* and its interaction with *experience of product failure* and observe that *corporate attention* positively moderates the effect of product failure ($p < .001$). In Model 16, when both *corporate proximity* and *corporate attention* are included in the model, we find no statistical evidence of the moderating effect of *corporate proximity* ($p = .270$), while the coefficient of the interaction term *experience of product failure* × *corporate attention* remains positive ($p = .032$. Model 17 has *corporate attention* as the dependent variable and shows that *corporate proximity* is positively associated with *corporate attention* ($p < .001$). Collectively, these results provide supportive evidence that corporate attention is a mechanism that underlies our findings on corporate proximity.

Insert Table 4 about here

DISCUSSION

This study examines the impact of corporate proximity on business unit response to failure. Our findings suggest that corporate proximity, which creates greater vertical linkages with and attention from the corporate office, enhances a business unit's local search activities and thereby increases its likelihood of reentry following a product failure-related exit. Although in general, corporate proximity means greater corporate monitoring and a tendency toward permanent abandonment of exited product markets, product failure-related exits in the presence of corporate proximity leads to greater corporate support for business units' local search efforts, and thereby to increased persistence with the product following failure. In turn, we hypothesize and show that the influence of corporate proximity is amplified for product failures for which the corporate office is more likely to get involved and when the business unit is more likely to accept corporate assistance (i.e., for products in established markets and for technical or severe failures).

Contributions

First, we contribute to the behavioral theory of the firm and organizational learning (Argote & Miron-Spektor, 2011; Billinger et al., 2014; Posen et al., 2018), and more specifically to the literature on firm responses to failure (e.g. Desai, 2015; Eggers, 2012; Maslach, 2016) by incorporating the role of corporate proximity in influencing business unit responses to failure. Although prior studies have established that hierarchy within a multiunit structure could affect local search, such studies tended to focus on the effects of search efforts differences at different hierarchical levels (Gaba & Joseph, 2013; Joseph et al., 2016; Eggers & Kaul, 2018) or to compare units within (and independent of) a hierarchical structure (Vissa et al 2010; Rhee et al 2018). By focusing on variation in proximity between the corporate office and business units and on the role of vertical linkages and attention, we bring forth new theoretical ideas that unpack the corporate-business unit relationship to explain *how* a corporate hierarchy shapes a business unit's

problemistic search and thereby *how* proximity relates to business unit's persistence or change following failure. Doing so, we contribute new explanations (vertical linkages and cognitive attention) for how corporate proximity can form an important driver shaping business unit's persistence or change following failure, and help reconcile prior research's contrasting findings on the effect of hierarchy on search by highlighting the importance of business unit's proximity to the corporate office. Our research thus provides a starting point for future researchers to consider how cognitive processes associated with failure and the complex structure of organizations bind the conditions under which failure results in successful search.

Second, our study contributes to the research on the role of corporate headquarters (Menz et al., 2015; Nell & Ambos, 2013; Kunisch, Menz, & Collis, 2020) and answers calls for more investigation into how a corporate office affects the strategic decision making of its subunits (Feldman, 2020; Foss, 1997; Goold, Campbell, & Alexander, 1998; McGahan & Porter, 1997; Menz et al., 2015). Research on MNCs suggests that the effects of corporate proximity (usually geographic) are largely uniform: typically, proximity is thought to decrease communication costs and increase monitoring and control of units (e.g., Baaij & Slagen, 2013; Dellestrand & Kappen, 2012; Hansen & Løvås, 2004). Extending these ideas, we theorize and find evidence that the effects of corporate proximity are not uniform, but are contingent on the characteristics of failure i.e., severity, cause, and the locus of failure. By theorizing and empirically demonstrating the effects of failure characteristics in moderating the impact of corporate proximity, we highlight corporate influence as a contingent phenomenon shaped by the implications of failure for the entire corporation. In doing so, we provide a more complete understanding of the function of corporate headquarters in business unit decision making (Kunisch et al., 2020). Furthermore, we also extend the literature's focus on geographic proximity (e.g., Baaij & Slagen, 2013;

Dellestrand & Kappen, 2012; Hansen & Løvås, 2004) by taking a multidimensional approach to proximity which again allows for a more nuanced understanding of the effects of the corporate office on its subunits This approach offers a broader theoretical understanding of the factors that underpin the relationship between proximity and vertical linkages and attention discussed above. Although in our setting, hierarchical, geographic, and cognitive proximity are highly correlated and directionally reinforcing, future research may want to consider the conditions where their effects might diverge. For example, successful exploration (i.e., distant search) may require close hierarchical proximity but distant cognitive proximity in order to provide the business unit with corporate support, on the one hand, but also allow it to break from current models and pursue new technological trajectories, on the other hand.

Our final contribution is to the literature on determinants of product reentry and persistence (cf. Fosfuri, Lanzolla, & Suarez, 2013; Suarez & Lanzolla, 2007). The literature on product entry rarely examines post-exit activities (Zachary et al., 2015) and has largely neglected the case of reentry into the same product market post-exit. Beyond providing an empirical contribution by documenting the phenomenon of reentry, we also contribute theoretically by associating product failure-related exit, proximity, and reentry, and hence reframing reentry as persistence. Conceptualization of reentry as persistence theoretically distinguishes reentry from de novo entry which often represents change or novelty. Our study therefore complements those which have examined similar phenomena but have largely attributed such behavior to path dependence (Mitchell, 1989), technological trajectories (Eggers 2012) or competitor effects (Greve 1995). In parallel to such explanations, our focus on corporate proximity highlights the importance of a firm's internal structure on such reentry persistence. Our study sheds new light

on variation in entry (and reentry) behavior across firms. It suggests a role for the corporate structure in explaining such variation and ultimately, in firms' product scope.

Given that reentry incurs costs (O'Brien & Folta, 2009) and is influenced by managerial factors (Helfat & Eisenhardt, 2004), understanding how structural variation can shape reentry is of value to managers making decisions about proximity via structural design, location, and managerial hiring across units. Although executives are unlikely to make frequent changes to the physical location of corporate or unit, they may use other ways to channel (and redirect) attention (cf. Ocasio, 2011; Shepherd et al., 2017), including via changes to structure or cognitive ties. Naturally, more work is required to further understand the performance consequences of proximity's effects on failure response, and how and when firms might want to adjust their proximity choices. To deal with recurring problems or opportunities, firms may want to amplify these processes to improve performance. For example, future research could investigate how different configurations of various proximity levers can be used to create performance-enhancing levels of reentry following failure.

Limitations

We recognize that our study has limitations. First, because we only have access to annual data on entry and exit, we are unable to capture more granular reentry events that may also reflect learning (e.g., reentry in the same year as exit). Second, we recognize that while product failures may cause exits, they do not always do so. While we take several steps to reduce bias relating to selection and ensure we are tying product failures to exits within the same narrow product market, we cannot claim that such an exit is caused by the preceding failure in every case. However, the presence of such "false positives" likely serves as a more conservative test of

our predicted relationship between product failure and reentry as we are less likely to observe such relationship if the events are unrelated to the exit in the first place, since the likelihood of reentry for "false positives" would be lower than the likelihood of reentry for product failure-related exits, and the same as market-related exits. Consequently, the effect size we find of the relationship between product failure and reentry is likely to be smaller than the true effect. Third, our sample window is limited to 1984 to 1996 due to the availability of digitized Medical Device Register (MDR) and corporate proximity data. However, this should not impact the generalizability of our findings as the current industry practices and FDA process for adverse events have not changed significantly. Further, adverse events remain strategically important failures in this industry. Ideally, additional research will corroborate the generalizability of our findings using more recent medical device data or data from other contexts. Lastly, although we explore the processes by which corporate proximity can affect response to failure and provide tests of our mechanism, we are unable to measure learning directly. We also recognize that our supplemental analyses to test the mechanisms underpinning the effects of corporate proximity are still based on indirect proxy measures, and thus we do not capture the level of corporate involvement directly or measure knowledge flows for each corresponding level of corporate proximity. Helpfully, though, the relationships we document are robust across different measures of proximity. Nonetheless, we hope that future work will examine and measure how corporate proximity shapes business units' learning from failure in greater detail.

Conclusion

This paper explores how corporate proximity conditions the business unit's response to failure. We theorize and show that corporate proximity aids the unit's problemistic search following product failure because of the linkages and attention that proximity bestows. The

additional efficiencies in the business unit's local search process yield a higher likelihood that the firm will persist following failure and thus reenter previously exited product markets. Further, we empirically demonstrate that the effects of corporate proximity depend on the relevance of corporate knowledge as well as the business unit's motivation to seek out corporate assistance. Our study thus contributes to a behavioral understanding of the decision to persist rather than change following failure, the role of the corporate office in business unit search processes, and the phenomenon of product market reentry. We believe that structure and other *within*-firm sources of variation in organizational learning are phenomena meriting further study.

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Table 1. Descriptive statistics and correlations ($N = 4{,}760$)

	Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1	Product market reentry	0.048	0.214											
2	Experience of product failure	0.076	0.265	0.02										
3	Corporate proximity	0.159	2.868	-0.10	0.34									
4	Established product markets	8.084	4.095	0.11	-0.05	-0.08								
5	Technical error-driven product failure	0.043	0.203	0.02	0.69	0.22	-0.05							
6	User error-driven product failure	0.036	0.185	0.01	0.67	0.23	-0.02	-0.04						
7	Severe product failure	0.055	0.228	0.03	0.84	0.30	-0.05	0.44	0.71					
8	Non-severe product failure	0.058	0.233	0.01	0.86	0.31	-0.04	0.50	0.68	0.63				
9	Below aspiration	-0.341	0.325	0.02	-0.01	-0.08	0.08	-0.03	0.02	-0.01	-0.02			
10	Above aspiration	0.639	0.313	-0.04	0.06	0.16	-0.06	0.01	0.06	0.06	0.04	0.02		
11	Unit importance	0.299	0.522	-0.02	0.11	0.30	0.07	0.06	0.09	0.08	0.12	0.06	0.14	
12	Unit age	7.767	2.948	-0.16	-0.01	0.10	-0.65	0.04	-0.04	0.02	-0.02	-0.12	0.09	-0.06
13	Number of products	11.452	22.727	0.09	0.13	-0.13	0.07	0.14	0.04	0.08	0.11	0.04	-0.06	-0.04
14	Medical specialty area focus	0.296	0.312	0.01	0.15	0.09	0.04	0.10	0.11	0.13	0.13	0.07	-0.05	0.07
15	Reentry experience	0.695	4.925	-0.01	0.01	-0.12	0.02	0.03	-0.02	0.02	-0.01	0.00	-0.02	-0.04
16	Product failure in other products	0.374	0.484	0.02	0.32	0.19	0.08	0.20	0.23	0.26	0.30	-0.07	0.10	0.08
17	Corporate sales	4.214	6.976	0.07	-0.04	-0.26	-0.10	0.00	-0.04	-0.02	-0.03	-0.06	0.03	-0.24
18	Corporate ROA	0.087	0.102	0.02	0.00	-0.07	0.03	0.04	-0.03	0.01	-0.01	-0.06	0.09	-0.28
19	Corporate slack	0.375	0.157	0.02	0.01	-0.03	0.07	-0.01	0.02	0.01	0.01	0.03	-0.08	0.42
20	Corporate reentry experience	1.312	6.955	-0.02	-0.01	-0.19	0.05	0.01	-0.02	0.00	-0.03	0.01	-0.01	-0.06
21	Number of business units	6.098	4.968	-0.03	0.05	-0.07	-0.04	0.04	0.04	0.05	0.04	-0.10	0.05	-0.18
22	Class II	0.533	0.499	-0.01	0.09	0.11	-0.06	0.04	0.08	0.07	0.09	-0.01	0.00	0.06
23	Class III	0.032	0.175	-0.02	0.17	0.13	0.13	0.01	0.22	0.20	0.18	0.02	-0.01	0.08
24	Number of firms in product market	5.332	10.284	0.03	-0.05	-0.02	-0.08	-0.05	-0.02	-0.04	-0.03	-0.04	0.05	-0.04
25	Exit by other firms	0.109	0.407	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.01	-0.01	0.02
26	Entry by other firms	0.064	0.261	-0.02	-0.02	0.02	-0.07	-0.02	-0.01	-0.02	-0.01	-0.02	0.02	0.01

(continued on next page)

Table 1 ***(continued)***

	Variables	12	13	14	15	16	17	18	19	20	21	22	23	24	25
13	Number of products	-0.03													
14	Medical specialty area focus	-0.03	0.42												
15	Reentry experience	-0.02	0.25	0.00											
16	Product failure in other products	-0.06	0.11	0.04	0.09										
17	Corporate sales	0.14	0.16	-0.03	0.09	0.00									
18	Corporate ROA	-0.01	0.08	-0.05	0.04	0.13	0.05								
19	Corporate slack	-0.04	0.03	0.07	0.04	0.09	-0.22	-0.23							
20	Corporate reentry experience	-0.04	0.16	-0.01	0.70	0.10	0.11	0.06	0.07						
21	Number of business units	0.04	0.01	-0.16	-0.01	0.15	0.15	0.24	-0.04	0.03					
22	Class II	0.01	-0.10	-0.06	-0.06	-0.02	-0.04	0.01	-0.02	-0.08	-0.01				
23	Class III	0.01	0.01	0.13	-0.02	0.10	-0.05	-0.01	0.08	-0.02	0.00	-0.19			
24	Number of firms in product market	-0.02	-0.14	-0.14	-0.04	0.00	0.03	0.00	-0.04	-0.01	0.12	0.02	-0.09		
25	Exit by other firms	-0.11	-0.05	-0.05	-0.03	-0.01	-0.03	-0.01	-0.02	-0.04	0.01	0.09	-0.01	0.13	
26	Entry by other firms	0.02	-0.04	-0.05	-0.02	0.03	-0.01	0.01	0.02	0.01	0.05	0.06	-0.04	0.27	0.04

Correlation coefficients whose magnitudes exceed 0.03 are significant at the 5% level.

Table 2. Discrete event history analysis of product market reentry

Variables	Model 1		Model 2		Model 3		Model 4	
Experience of product failure (H1)			0.755*	(0.311)	0.834***	(0.240)	0.741*	(0.326)
Corporate proximity					-0.142***	(0.041)	-0.113*	(0.046)
Experience of product failure × Corporate proximity (H2)					0.253**	(0.083)	0.237*	(0.105)
Established product markets							0.087	(0.046)
Experience of product failure × Established product market							-0.115	(0.071)
Corporate proximity × Established product market							0.023*	(0.010)
Experience of product failure × Corporate proximity × Established product market (H3a)							0.042*	(0.020)
Technical error-driven product failure								
User error-driven product failure								
Technical error-driven product failure× Corporate proximity (H3b)								
User error-driven product failure × Corporate proximity								
Severe product failure								
Non-severe product failure								
Severe product failure× Corporate proximity (H3c)								
Non-severe product failure× Corporate proximity								
Below aspiration	0.001	(0.004)	0.001	(0.003)	0.000	(0.001)	0.001	(0.002)
Above aspiration	-0.005**	(0.002)	-0.004**	(0.002)	-0.003*	(0.001)	-0.004*	(0.002)
Unit importance	-0.065	(0.187)	-0.101	(0.191)	-0.015	(0.192)	-0.033	(0.203)
Unit age	-0.271***	(0.057)	-0.276***	(0.058)	-0.263***	(0.062)	-0.258***	(0.065)
Number of products in medical specialty	0.007*	(0.003)	0.006*	(0.003)	0.006*	(0.003)	0.006*	(0.003)
Focus in medical specialty	-0.173	(0.430)	-0.191	(0.428)	-0.115	(0.406)	-0.142	(0.414)
Reentry experience	0.162	(0.239)	0.153	(0.232)	0.175	(0.226)	0.193	(0.237)
Product failure in other products	-0.528**	(0.194)	-0.674***	(0.186)	-0.717***	(0.186)	-0.658**	(0.214)
Corporate sales	0.054***	(0.009)	0.054***	(0.009)	0.050***	(0.009)	0.051***	(0.009)
Corporate ROA	2.492*	(1.062)	2.614*	(1.059)	2.013*	(0.941)	1.137	(0.874)
Corporate slack	0.198	(0.635)	0.303	(0.649)	0.058	(0.673)	0.048	(0.699)
Corporate reentry experience	-0.220	(0.236)	-0.215	(0.229)	-0.231	(0.224)	-0.244	(0.235)
Number of business units	-0.018	(0.022)	-0.021	(0.022)	-0.037	(0.023)	-0.027	(0.022)
Class	0.464**	(0.173)	0.421*	(0.180)	0.440*	(0.180)	0.510**	(0.189)
Number of firms in product market	0.014*	(0.006)	0.015*	(0.006)	0.017**	(0.006)	0.015*	(0.006)
Exit by other firms	-0.204	(0.219)	-0.216	(0.220)	-0.256	(0.226)	-0.258	(0.229)
Entry by other firms	0.111	(0.520)	0.154	(0.525)	0.171	(0.492)	0.159	(0.458)
Constant	-5.731***	(0.724)	-5.803***	(0.729)	-5.721***	(0.791)	-5.080***	(0.820)
Observations	4,760		4,760		4,760		4,760	
Log likelihood	-6,926		-6,893		-6,754		-6,627	
Degrees of freedom	44		45		47		51	
Wald $\chi 2$	509.5***		570.3***		544.1***		589.5***	

Robust standard errors in parentheses

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 2 ***(continued)***

Variables	Model 5		Model 6		Model 7		Model 8	
Experience of product failure (H1)								
Corporate proximity			-0.120**	(0.042)			-0.150***	(0.042)
Experience of product failure × Corporate proximity (H2)								
Established product markets								
Experience of product failure × Established product market								
Corporate proximity × Established product market								
Experience of product failure × Corporate proximity × Established product market (H3a)								
Technical error-driven product failure	0.962*	(0.399)	0.912**	(0.342)				
User error-driven product failure	-0.290	(0.795)	-0.242	(0.439)				
Technical error-driven product failure× Corporate proximity (H3b)			0.360*	(0.154)				
User error-driven product failure × Corporate proximity			-0.292	(0.197)				
Severe product failure					0.924*	(0.436)	0.791**	(0.284)
Non-severe product failure					0.231	(0.447)	0.265	(0.358)
Severe product failure× Corporate proximity (H3c)							0.346**	(0.123)
Non-severe product failure× Corporate proximity							-0.111	(0.147)
Below aspiration	0.001	(0.003)	0.000	(0.002)	0.001	(0.003)	0.000	(0.001)
Above aspiration	-0.004**	(0.002)	-0.004*	(0.001)	-0.004**	(0.002)	-0.003*	(0.001)
Unit importance	-0.094	(0.191)	0.019	(0.178)	-0.115	(0.195)	-0.024	(0.193)
Unit age	-0.281***	(0.057)	-0.262***	(0.060)	-0.279***	(0.058)	-0.255***	(0.063)
Number of products in medical specialty	0.006	(0.003)	0.006*	(0.003)	0.006*	(0.003)	0.006*	(0.003)
Focus in medical specialty	-0.181	(0.430)	-0.096	(0.406)	-0.212	(0.425)	-0.141	(0.400)
Reentry experience	0.165	(0.235)	0.188	(0.235)	0.152	(0.231)	0.175	(0.223)
Product failure in other products	-0.639***	(0.184)	-0.633***	(0.184)	-0.696***	(0.190)	-0.694***	(0.192)
Corporate sales	0.054***	(0.009)	0.050***	(0.009)	0.054***	(0.009)	0.050***	(0.009)
Corporate ROA	2.592*	(1.043)	2.010*	(0.974)	2.641*	(1.054)	1.741	(0.908)
Corporate slack	0.273	(0.647)	-0.056	(0.647)	0.356	(0.656)	0.061	(0.673)
Corporate reentry experience	-0.220	(0.233)	-0.246	(0.233)	-0.216	(0.228)	-0.228	(0.222)
Number of business units	-0.020	(0.023)	-0.031	(0.023)	-0.021	(0.022)	-0.037	(0.023)
Class	0.419*	(0.183)	0.415*	(0.187)	0.391*	(0.185)	0.445*	(0.182)
Number of firms in product market	0.015*	(0.006)	0.016**	(0.006)	0.015*	(0.006)	0.016**	(0.006)
Exit by other firms	-0.199	(0.216)	-0.216	(0.218)	-0.244	(0.225)	-0.290	(0.235)
Entry by other firms	0.138	(0.523)	0.162	(0.496)	0.160	(0.528)	0.177	(0.494)
Constant	-5.837***	(0.728)	-5.682***	(0.794)	-5.804***	(0.734)	-5.507***	(0.790)
Observations	4,760		4,760		4,760		4,760	
Log likelihood	-6,889		-6,769		-6,876		-6,722	
Degrees of freedom	46		49		46		49	
Wald $\chi 2$	577.1***		570.1***		572.1***		555.5***	

Robust standard errors in parentheses

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 3. Split-sample analysis of vertical linkages

Variables	Vertical link Model 9		Vertical link Model 10		No vertical link Model 11		No vertical link Model 12	
Experience of product failure	2.409***	(0.644)	-9.662	(5.711)	1.394***	(0.404)	-23.755*	(9.258)
Corporate proximity	0.015	(0.141)	0.096	(0.148)	-0.833***	(0.153)	-1.669***	(0.361)
Experience of product failure × Corporate proximity			1.991*	(0.908)			-10.650**	(3.909)
Controls included	Yes		Yes		Yes		Yes	
Observations	2,276		2,276		2,145		2,145	
Log likelihood	-2,499		-2,461		-2,417		-2,376	
Degrees of freedom	44		45		44		45	
Wald χ^2	324.2***		337.9***		381.9***		367.2***	

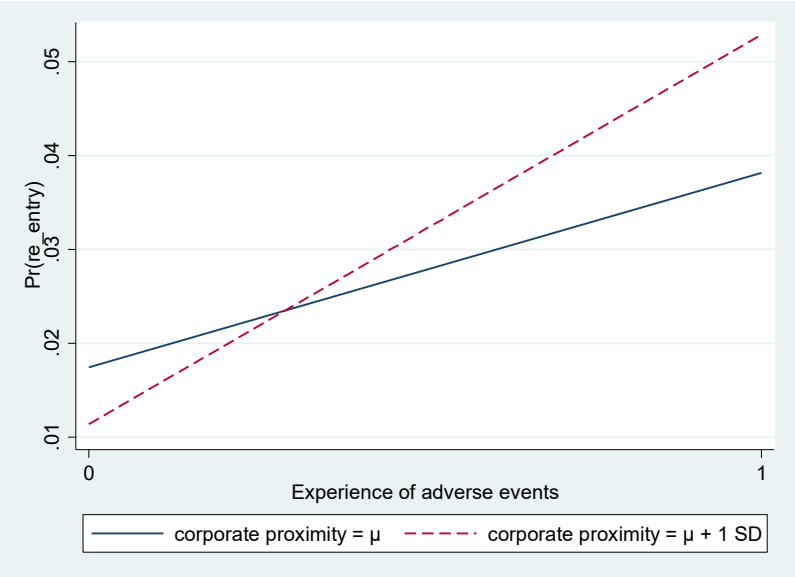
Robust standard errors clustered at the business unit and product level are reported in parentheses.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 4. Mediated moderation analysis of corporate attention ($N = 3,619$)

Variables	Reentry Model 13		Reentry Model 14		Reentry Model 15		Reentry Model 16		Corporate attention Model 17	
Experience of product failure	0.788*	(0.351)	1.024***	(0.273)	0.631*	(0.284)	0.207	(1.072)		
Corporate proximity			-0.163**	(0.060)			-0.339**	(0.104)	0.120***	(0.006)
Experience of product failure × Corporate proximity			0.322**	(0.106)			0.476	(0.432)		
Corporate attention					0.343*	(0.167)	1.132**	(0.521)		
Experience of product failure × Corporate attention					1.376***	(0.391)	1.125*	(0.524)		
Controls included	Yes		Yes		Yes		Yes		Yes	
Log likelihood	-4,395		-4,274		-4,287		-4,094			
Degrees of freedom	45		47		47		49		45	
R^2									0.539	
Wald χ^2	496.3***		467.5***		471.5***		460.9***			

Robust standard errors clustered at the business unit and product level are reported in parentheses.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Figure 1. Interaction effects of corporate proximity on product market reentry



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