Boundaries as opportunities: A multilevel investigation of resilience

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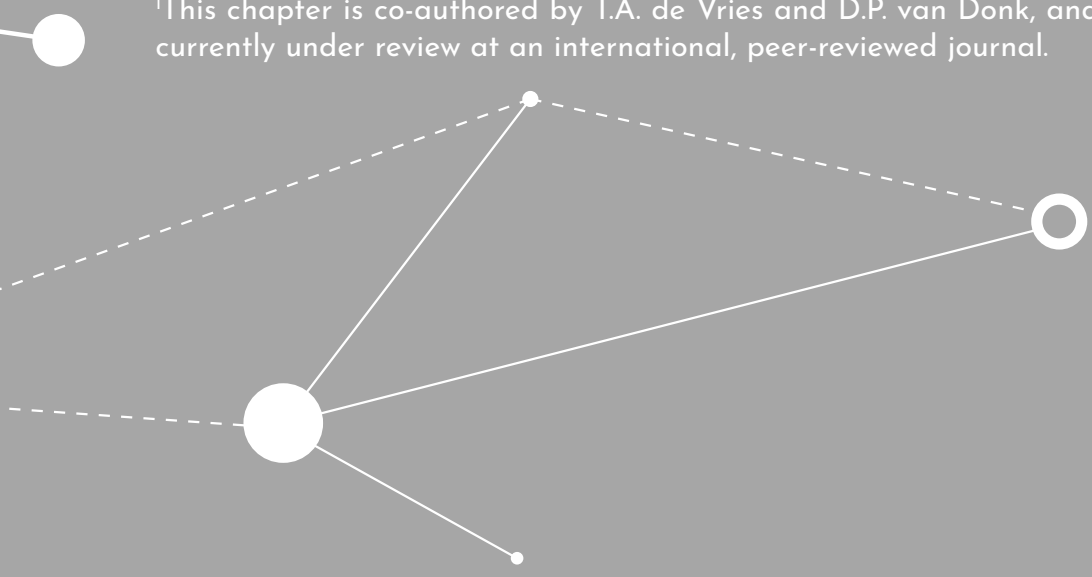
CHAPTER 2

IMPROVING CROSS-FUNCTIONAL TEAMS' EFFECTIVENESS DURING SUPPLY CHAIN DISRUPTIONS:

The importance of information scouting and internal integration[1]

[1]This chapter is co-authored by T.A. de Vries and D.P. van Donk, and is currently under review at an international, peer-reviewed journal.



Abstract

Organizations increasingly rely on cross-functional teams with representatives from different functional departments to deal with supply chain (SC) disruptions. These teams may use their broad range of connections and expertise to gather or scout relevant information, enabling them to develop integrative disruption countermeasures and, as such, increase their organizations' resilience. Despite their potential, cross-functional teams often struggle to attain information scouting's prospective benefits and fail to resolve disruptions effectively. The present study draws from group information-processing theory and explores when and how cross-functional teams can realize information scouting's full potential in managing SC disruptions. We assert that cross-functional teams' ability to benefit from information scouting is contingent on the degree to which the team shares information and aligns decisions internally. Without such internal integration, team members' information-scouting efforts during SC disruptions may be uncoordinated and possibly redundant. We further propose that this moderating role of internal integration is strengthened when cross-functional teams face a higher likelihood of disruptions in their organizations' SC. In more vulnerable SCs, cross-functional teams experience more intense information-processing requirements when confronted with SC disruptions. We find support for our predictions using multi-source, multi-informant data from 80 cross-functional teams exposed to SC disruptions in a realistic SC management simulation.

2.1 | Introduction

To deal with disruptions in their supply chain (SC), organizations increasingly rely on cross-functional teams (da Silva Poberschnigg, Pimenta, & Hilletofth, 2020; Sawyerr & Harrison, 2020). Cross-functional teams comprise representatives from different functional departments and can, as such, typically possess a broad range of connections and expertise for accessing or "scouting" information from individuals external to the team (within or outside of the organization) when dealing with organizational problems (Ancona & Caldwell, 1988; Stolze et al., 2018; Tasheva & Hillman, 2019). The inherent diversity of cross-functional teams has further been suggested to enable these teams to use scouted information for developing integrated countermeasures that may limit SC disruptions' consequences for their organizations (Sawyerr & Harrison, 2020; Uitdewilligen & Waller, 2018). As such, cross-functional teams may reduce the negative performance impacts of SC disruptions (i.e., increase organizational resilience; Blackhurst et al., 2011; Scholten et al., 2020).

Despite the confidence in cross-functional teams for increasing organizational resilience through enhanced information scouting, there is little supportive evidence of this relationship in SC research. In fact, while recognizing the benefits of information scouting for performing challenging tasks, insights from related team effectiveness research suggest that there are important barriers that may hinder cross-functional teams in effectively executing such activities to deal with unexpected situations (Carter et al., 2020; Park, Grosser, Roebuck, & Mathieu, 2020). Specifically, team research indicates that information scouting is a particularly time- and energy-consuming activity (e.g., Crawford & LePine, 2013; Davison et al., 2012) that may threaten internal team processes (e.g., Gibson & Dibble, 2013; Marrone, 2010). As a result, many cross-functional teams have been unsuccessful in scouting information and have failed to resolve disruptions (e.g., Ellis, 2006; Mosier & Fischer, 2010; Uitdewilligen & Waller, 2018). Given our limited understanding of cross-functional teams in SC contexts and the lack of empirical SC research relating team-level processes to organizational resilience (Mena et al., 2020; Scholten et al., 2020), scholars have called for more research to enhance our understanding regarding cross-functional teams' effectiveness in enhancing their organizations' resilience (e.g., da Silva Poberschnigg et al., 2020; de Vries et al., 2021; Uitdewilligen & Waller, 2018).

The present study offers such research by drawing from group information-processing theory (GIPT; Hinsz, Vollrath, & Tindale, 1997) as an influential conceptual perspective on how teams can process and use external information to accomplish complex tasks, such as resolving SC disruptions (de Vries et al., 2021; Humphrey & Aime, 2014). In line with GIPT's notions on intragroup information sharing (e.g., Park & DeShon, 2018; van Knippenberg, 2017), we

propose that internal integration within a cross-functional team strengthens the positive association between the team's information scouting and its organization's resilience. Extending GIPT's insights on the conditional role of the task environment (Crawford & LePine, 2013; Uitdewilligen & Waller, 2018), we further expect that the level of SC vulnerability determines whether a lack of internal integration will inhibit a cross-functional team from benefiting from information scouting to increase its organization's resilience. Using multi-source, multi-informant data from 80 groups functioning as cross-functional teams exposed to SC disruptions in a realistic SC management simulation, we find support for our predictions.

These results reveal that aligning decisions and available information across team members is as important for a cross-functional team to increase its organization's resilience as information scouting itself, especially when the organization's vulnerability to SC disruptions is high. Accordingly, our study contributes by identifying contingencies to attaining information scouting's benefits that may both explain why not all cross-functional teams in crisis situations have been successful in their information-scouting efforts (Carter et al., 2020; Uitdewilligen & Waller, 2018), and, more generally, help reconcile the inconclusive findings on information scouting's benefits from team research (Park et al., 2020; van Knippenberg, 2017). Moreover, we contribute to the scarce empirical research on the use of cross-functional teams for minimizing the consequences of SC disruptions (e.g., Blackhurst et al., 2011; da Silva Poberschnigg et al., 2020; Scholten et al., 2020). We specifically extend prior research on a cross-functional team's *internal* functioning during SC disruptions (cf., de Vries et al., 2021) by examining when and how such a team can use information and expertise from *outside* of the team to increase its organization's resilience. We thereby respond to recent calls for more behavioral research in SC management and resilience literature (Fahimnia et al., 2019; Mena et al., 2020; Pournader et al., 2020). In particular, we illustrate how both the degree of information scouting that individuals engage in and how well they align decisions and available information within their cross-functional team shape organizational resilience. Managers can use our insights to better configure the information scouting and internal integration of the cross-functional teams that they rely on to deal with disruptions in their SC.

2.2 | Theoretical background and hypothesis development

2.2.1 | Organizational resilience and cross-functional teams

An organization's resilience is reflected in the degree to which it withstands or diminishes a drop in operational and financial performance when facing

adverse events in its production process or SC (e.g., malfunctioning production equipment, delayed delivery of raw materials; Ambulkar, Blackhurst, & Grawe, 2015; Blackhurst et al., 2011). A resilient organization is able to minimize the negative performance impact of such disruptions and "bounce back" to the same—or even better—level of performance as prior to the disruptions (Sheffi & Rice, 2005, p. 41). A resilient organization may further be able to prepare preventive measures for an imminent SC disruption and avoid the disruption from harming its performance at all, or even prevent the disruption from occurring in the first place (Habermann, Blackhurst, & Metcalf, 2015; Jüttner & Maklan, 2011). In contrast, a large drop in performance signifies that an organization faced difficulties developing a probable solution to the SC disruption. In such a situation, the disruption continues to hurt functionality and can cause major performance issues for the organization (Kim, Chen, & Linderman, 2015; Manhart, Summers, & Blackhurst, 2020).

To enhance their resilience, organizations increasingly rely on cross-functional teams (e.g., da Silva Poberschnigg et al., 2020; de Vries et al., 2021; Sawyerr & Harrison, 2020). Although cross-functional teams may exist on all levels of an organization, most cross-functional teams used for disruption management comprise mid- or high-level managers from different functional departments (Blackhurst et al., 2011). These teams often act on behalf of the organization as a whole to manage key organizational decisions and problems (e.g., supplier selection, monitoring market developments; Majchrzak, More, & Faraj, 2012; Wong, Boon-Itt, & Wong, 2011). Such teams may ensure resilience by allowing organizations to develop more integrative solutions to SC disruptions (e.g., Blackhurst et al., 2011; de Vries et al., 2021; Scholten et al., 2014). Specifically, the diverse members of cross-functional teams are particularly well-positioned for gathering and combining task-relevant information necessary for dealing with SC disruptions. Such information gathering is typically referred to as "information scouting" in the management literature (Ancona & Caldwell, 1988, p. 473; see also Ancona & Caldwell, 1992). As task-relevant information is often technical and "rich," information scouting is facilitated through members' interpersonal (face-to-face) interactions with individuals external to their team, both within and outside of their organization (Joshi, Pandey, & Han, 2009; Marrone, 2010).

SC research stresses the importance of information scouting, noting that sourcing and processing of relevant information is essential for ensuring organizational resilience (e.g., Heckmann, Comes, & Nickel, 2015; Manhart et al., 2020; Reimann, Kosmol, & Kaufmann, 2017). Evaluations of past disruptions have, however, shown that even cross-functional teams often struggle to attain the prospective benefits of information scouting (e.g., Ellis, 2006; Mosier & Fischer, 2010; Uitdewilligen & Waller, 2018). Recently, de Vries et al. (2021) similarly

acknowledged cross-functional teams' struggles during SC disruptions, but focused on such teams' ability to integrate already available internal information, as opposed to our focus on external information.

2.2.2 | Cross-functional teams as information processors

An influential theoretical perspective that may help explain when cross-functional teams realize the full potential of information scouting for their organization's resilience is offered by GIPT (Hinsz et al., 1997). GIPT's central premise is that teams, much like individuals, process relevant and available information to perform complex tasks. This processing of information emerges among team members such that each member's unique information and ideas must be accessible to others inside the team for teams to succeed (Humphrey & Aime, 2014; Park & DeShon, 2018). Accordingly, GIPT suggests that the intensity and pattern of interactions among team members determine whether teams can capitalize on externally obtained information (Hinsz et al., 1997; Mesmer-Magnus & DeChurch, 2009). GIPT further submits that the characteristics of the task environment may place a premium on a team's ability to acquire and use external information (Crawford & LePine, 2013; Uitdewilligen & Waller, 2018). Combining these conceptual insights from GIPT with SC research, we suggest that, when decisions and available information are efficiently aligned across team members (i.e., internal integration), a cross-functional team can better process and, subsequently, use scouted information to increase its organization's resilience. We further propose that these benefits of internal integration increase when an organization is more vulnerable to disruptions within its SC (see Figure 2.1).

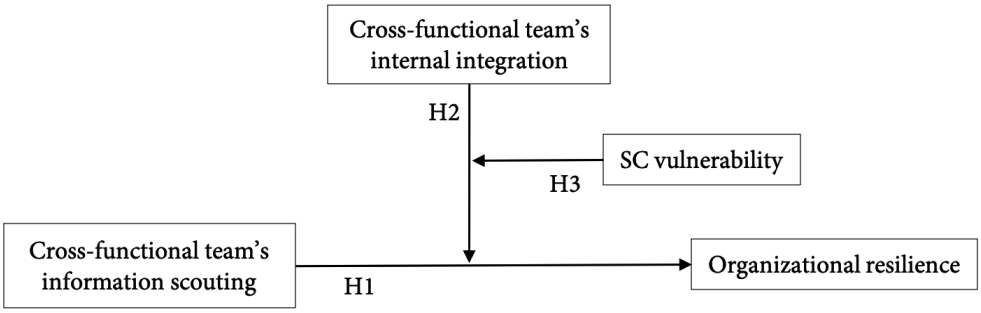


Figure 2.1 | Conceptual framework

2.2.3 | Information scouting and organizational resilience

Both GIPT (e.g., Mesmer-Magnus & DeChurch, 2009; Uitdewilligen & Waller, 2018) and SC research (Blackhurst et al., 2011; de Vries et al., 2021) suggest that a cross-functional team is more likely to effectively manage SC disruptions when it accesses a broad range of information and expertise outside of its organization. In the absence of such information scouting, a cross-functional team is restricted to the information and expertise already available within the team to deal with SC disruptions. The cross-functional team is then likely to lack important insights regarding the causes and consequences of the disruptions, which prevents it from developing efficient and fully effective responses (Blackhurst et al., 2011; da Silva Poberschnigg et al., 2020). When a cross-functional team engages in information scouting, however, it can collect all relevant outside information and expertise regarding the SC disruptions at hand. Doing so enables the team to create a comprehensive view of the overall situation and obtain insights into responses that could be effective (Crawford & LePine, 2013; Uitdewilligen & Waller, 2018). Collecting relevant information from outside constituents, such as SC partners, governmental bodies, or even competitors, further allows a cross-functional team to map its organization's external environment during SC disruptions (Scholten & Schilder, 2015; Zhao et al., 2019). Disruption countermeasures can, as such, be aligned with those of SC partners and implemented with the increased confidence that they do not duplicate or counteract other countermeasures in the SC (Ancona & Caldwell, 1988; van der Vegt et al., 2015). Therefore, we hypothesize:

> Hypothesis 1. There is a positive relationship between information scouting by an organization's cross-functional team during SC disruptions and the organization's resilience.

2.2.4 | The moderating role of internal integration

GIPT submits that sharing and discussing relevant information within the team is an important "collective information-processing mechanism" (Park & DeShon, 2018, p. 633) and, as such, a prerequisite for a team to take well-informed and coordinated actions in response to external information (e.g., Ellis, 2006; Mesmer-Magnus & DeChurch, 2009; Uitdewilligen & Waller, 2018). At the level of the overall organization, SC research similarly puts forward that effectively and efficiently sharing information and aligning decisions across functional departments (i.e., internal integration) is imperative for both organizational performance (e.g., Flynn, Huo, & Zhao, 2010; Schoenherr & Swink, 2012) and risk management (e.g., da Silva Poberschnigg et al., 2020; Riley, Klein, Miller, & Sridharan, 2016). Such internal integration at the organizational level can

be realized through alignment between the different functional managers who constitute the organization's cross-functional team. Combining these insights from GIPT and SC research, we therefore propose that internal integration within a cross-functional team will strengthen the positive relationship between the team's information scouting during SC disruptions and organizational resilience.

Specifically, in cases where a cross-functional team engages in high levels of information scouting, but generally fails to coordinate decisions and available information internally, team members may be unaware of information that is already held by other members and, in turn, collect redundant or duplicate information (Mesmer-Magnus & DeChurch, 2009; Wong et al., 2011). Lacking such a shared awareness and failing to align their efforts may further prevent a cross-functional team's members from using relevant information effectively for mitigating the SC disruptions' adverse impact (Ellis, 2006; Williams, Roh, Tokar, & Swink, 2013). Such difficulties with using available information efficiently and effectively have proven to be a main impediment to successful disruption responses (Scholten & Schilder, 2015; Uitdewilligen & Waller, 2018). When information scouting results mainly in information that is redundant or used ineffectively, it thus represents a labor-intensive activity that is unlikely to promote resilience. Moreover, team members who spend considerable time and energy on gathering information from outside the team and little on coordinating within the team may inadvertently reduce their sense of team cohesion and feel less responsible for developing effective disruption responses on behalf of the team (Gibson & Dibble, 2013; Marrone, 2010). A cross-functional team is, therefore, less likely to benefit from its information-scouting efforts in managing SC disruptions and increasing its organization's resilience when it is not integrated well internally (da Silva Poberschnigg et al., 2020; Riley et al., 2016).

In contrast, members of a well-integrated cross-functional team share available information and align decisions and efforts with one another (Flynn et al., 2010; Williams et al., 2013). Accordingly, these members are more aware of relevant information and problem-solving expertise possessed by others inside their team. Such pooling of members' individually held information and expertise allows the overall team to more easily identify the information and expertise that are not available within the team, yet could be relevant for effective disruption responses (Park & DeShon, 2018; Schoenherr & Swink, 2012). Moreover, because members' actions are generally aligned within an internally integrated cross-functional team, their information-scouting efforts are also likely to be well coordinated. Scouting may then more quickly yield the information required for successful disruption responses, as members are unlikely to waste valuable time and energy on gathering redundant or duplicate information (Crawford & LePine, 2013; van Knippenberg, 2017). Being better

informed of one another's activities and capabilities further enables team members to share available information with those inside their team who benefit most from it. A cross-functional team that is well integrated is, therefore, more likely to effectively use the unique information and expertise residing with its functionally diverse members to develop integrative countermeasures (Flynn, Koufteros, & Lu, 2016; Majchrzak et al., 2012). Overall, internal integration may help a cross-functional team to realize information scouting's benefits and to use it to swiftly and effectively contain SC disruptions' adverse consequences for the organization (da Silva Poberschnigg et al., 2020; Uitdewilligen & Waller, 2018). We therefore propose:

> Hypothesis 2. The positive relationship between information scouting by an organization's cross-functional team during SC disruptions and the organization's resilience is strengthened when the team's internal integration is higher.

2.2.5 | The contextual role of SC vulnerability

GIPT suggests that the characteristics of the task environment determine a team's information-processing requirements for successful task completion (e.g., Hinsz et al., 1997; Mesmer-Magnus & DeChurch, 2009; van Knippenberg, 2017). Accordingly, the benefits of a team's access to relevant outside information will increase as the task environment becomes more challenging or complex, where GIPT similarly notes that "the importance of integrative efforts depends on the complexity of the team task" (Crawford & LePine, 2013, p. 41).

In managing SC disruptions, an important source of such complexity for a cross-functional team is its organization's vulnerability to these disruptions (Kim et al., 2015). Specifically, SC vulnerability refers to the likelihood that an organization will experience SC disruptions and, as such, reflects the risk exposure of the organization's SC (Heckmann et al., 2015; Jüttner & Maklan, 2011). Correspondingly, SC vulnerability includes the threat or manifestation of actual disruptions and close calls, which denote "events that have the potential to, but did not, result in loss" (Habermann et al., 2015, p. 507; Perrow, 1999). Low SC vulnerability is typically characterized by an organization having a stable and skilled workforce and suppliers in geographical areas that are not prone to risks, such as hurricanes or earthquakes (Bode & Wagner, 2015; Peck, 2005). In such situations, SC disruptions are unlikely, and an organization requires few investments in its resilience (Pettit et al., 2010; Sheffi & Rice, 2005). A cross-functional team occasionally tasked with resolving a single SC disruption under these conditions will likely face manageable information-processing requirements and can focus more fully on collecting relevant information for dealing with

the SC disruption at hand (Crawford & LePine, 2013; Uitdewilligen & Waller, 2018). If SC vulnerability is low, we thus propose that internal integration is not a prerequisite for a cross-functional team to benefit from information scouting in handling SC disruptions and increasing its organization's resilience.

Highly vulnerable SCs are, on the contrary, often characterized by organizations that are susceptible to labor disputes and greatly depend on suppliers in risk-prone areas across the globe (Pettit et al., 2010; Wagner & Bode, 2006). A cross-functional team that needs to manage SC disruptions under such circumstances typically faces more intense information-processing requirements and considerable time pressure, as disruptions may be more frequent and possibly even co-occur (Bode & Wagner, 2015; Rudolph & Repenning, 2002). When the corresponding information-scouting efforts of such a team are, however, not accompanied by high levels of internal integration, team members will likely remain incapable of combining the scattered information necessary for resolving the SC disruptions at hand (Uitdewilligen & Waller, 2018; Wong et al., 2011). The high information-processing requirements and time pressure may also exacerbate the other difficulties associated with low internal integration, such as redundant or duplicate information and reduced team cohesion (Ellis, 2006; Pagell, Fugate, & Flynn, 2017). Moreover, in these demanding circumstances, a cross-functional team's members may feel overwhelmed and focus their information-scouting efforts only within their own work domain, ignoring or overlooking relevant information in other domains (de Vries et al., 2021; Hinsz et al., 1997). Consequently, prior empirical team research has revealed that outward-focused teams that lack internal integration experience considerable difficulties in handling challenging external environments (e.g., Ellis, 2006; Gibson & Dibble, 2013; Uitdewilligen & Waller, 2018). We argue, therefore, that low internal integration will inhibit a cross-functional team from benefiting from information scouting to increase its organization's resilience under high SC vulnerability.

In contrast, when a cross-functional team's members coordinate available information and efforts with one another, they are more likely to establish a clear and complete overview of the extensive information-processing requirements that characterizes high SC vulnerability (Flynn et al., 2016; Williams et al., 2013). Such an overview is particularly important to discern possible interdependencies that may exist between quickly succeeding or even co-occurring disruptions in vulnerable SCs (Bode & Wagner, 2015; Rudolph & Repenning, 2002). As internal integration further allows team members to coordinate and divide their information-scouting efforts, the extensive information-processing requirements are less likely to overwhelm individual members. Instead, the more organized information flows will minimize members' redundant efforts and allow them

to make better informed decisions under these demanding circumstances (Crawford & LePine, 2013; de Vries et al., 2021). A cross-functional team that is well-integrated internally is thus more likely to efficiently use and, as such, benefit from the varied information that members have obtained through information scouting (Kim & Schoenherr, 2018; Wong et al., 2011), enabling such a team, in turn, to more swiftly develop responses to disruptions in vulnerable SCs and increase its organization's resilience (Blackhurst et al., 2011; Riley et al., 2016). Consequently, if the levels of both information scouting and internal integration are high, the inherent diversity of a cross-functional team makes it particularly well equipped to develop the timely and integrative countermeasures necessary for effectively managing disruptions in case of high SC vulnerability (e.g., da Silva Poberschnigg et al., 2020; Sawyerr & Harrison, 2020; Uitdewilligen & Waller, 2018). Hence, we predict:

> Hypothesis 3. The moderating effect of a cross-functional team's internal integration on the relationship between the team's information scouting during SC disruptions and organizational resilience is strengthened when SC vulnerability is higher.

2.3 | Methodology

2.3.1 | Research setting

Because it is unethical—if not virtually impossible—to intentionally expose organizations to situations of (supply) disruptions, experiment- or simulation-based research designs are broadly considered most appropriate for studying organizations' responses to such situations (Ro et al., 2016; van der Vegt et al., 2015). Consequently, we collected data using a highly realistic SC management simulation to study a large sample of comparable cross-functional teams' information-scouting activities in response to SC disruptions. The simulation called The Fresh Connection (TFC) is used as an experiential learning tool by renowned companies (e.g., DuPont, Philip Morris, Coca-Cola, Toyota) and universities (e.g., Massachusetts Institute of Technology, Rotterdam School of Management, University of Vienna) worldwide. Previous research has also established TFC's value in offering unique insights into team behavior and decision-making (e.g., Brazhkin & Zimmerman, 2019; De Leeuw, Schippers, & Hoogervorst, 2015), such as when undertaking innovation projects (Perez-Franco, 2016) or in response to SC disruption warnings (de Vries et al., 2021). We specifically extend prior research that has used TFC for exploring the importance of internal team processes for organizational resilience (e.g., de Vries et al., 2021), and use TFC in the present research to collect data on how

external team processes can help cross-functional teams to effectively manage SC disruptions.

In TFC, a group of four individuals assumes the role of the management team of a beverage producer, comprising four functional roles (i.e., purchasing, sales, operations, SC). The beverage company has experienced severe performance declines, and the cross-functional team's top priority is, correspondingly, to prevent bankruptcy. The purchasing manager is in charge of selecting and negotiating with suppliers that may differ from one another in terms of location, quality and reliability, and price. The sales manager is responsible for setting the terms of delivery with the company's customers, including agreements on service levels, sales volume and price, and promotional pressures. Production facilities and warehouses are overseen by the operations manager, requiring decisions related to aspects such as work shifts and staff training. Finally, the SC manager needs to make sure that decisions concerning inventory and safety stock levels are aligned with the company's overall SC strategy. In the occasional situation that a group has five members, TFC includes a fifth role—the *watch role*—that has no direct decision-making power but can offer general support and coordination across all functions.

In the present study, time and budget constraints inhibited us from collecting data from a representative sample of our population of interest: professionals working in SC management. Instead, we collected data from a smaller (convenience) subpopulation comprising postgraduate students participating in a strategic SC management course at a Dutch university. Nearly all students in this subpopulation (93%) followed the course as part of their postgraduate program on SC management. The remaining 7% of students followed the course as an elective in other business-related postgraduate programs, such as marketing or (international) business administration. The participants were, on average, 24 years old (s.d. = 1.92 years), and 33% of them were female. In addition, close to 91% of the participants were European (e.g., Dutch, German, Greek), with the other participants originating from non-European countries such as China, the U.S., and Indonesia. We selected this particular subpopulation as the involved students were close to attaining their postgraduate degree and had a good understanding of SC management. The university's alumni records offer support to the students' level of expertise, as many students who graduated from this postgraduate program started working in functions such as *supply chain analysist* or *supply planner.* We further expected this subpopulation to be representative of our population of interest, as students have been shown to perform indistinguishably from executives in a wide variety of managerial tasks in experimental settings (cf. Bolton, Ockenfels, & Thonemann, 2012; Wheeler, Shanine, Leon, & Whitman, 2014).

Prior to participating in TFC, all students received reading material and careful instructions on the different functional roles and the mechanisms of the simulation. Central to these instructions was a group session explaining and demonstrating each role's decision-making possibilities in the simulation. To ensure comparable member composition, we provided students with strict rules on the composition of the groups they should form to participate in the simulation (e.g., each team contained members from different national and educational backgrounds to ensure diversity). Within teams, members could decide how to assign roles, enabling them to adopt roles closest to their area of expertise and interest. The functional roles further held no formal hierarchical rank such that there were no formal power differences within teams. Teams were also free to choose how to organize their decision-making. During the simulation, members were collocated and could freely interact inside and outside their team.

The simulation consisted of six consecutive decision-making episodes, each representing six months. Teams typically had four to five days to complete each episode and concluded the entire simulation within six weeks. During each decision-making episode, the cross-functional teams were confronted with real-time and interdependent decision-making dilemmas that could affect more than one functional work domain. Teams, therefore, needed to coordinate and integrate all members' decisions to perform well. Each decision-making episode further allowed teams to revise or revoke operational decisions made in a previous episode to avoid unduly affecting performance in subsequent episodes. The decision-making episodes are, as such, designed to be independent, yet the settings and decisions of the previous episode would stay in place if teams decided not to implement any changes in the current episode. Moreover, during the first three decision-making episodes, the cross-functional teams worked in relatively stable external environments and encountered no SC disruptions. After the third episode, however, the teams were randomly exposed to SC disruptions. Given our study's focus on these disruptions, we thus concentrated on the teams' overall aggregated performance and resilience across the fourth, fifth, and sixth (final) decision-making episodes, as compared to their overall performance during the first three episodes in which no disruptions emerged.

We motivated the students in our study by awarding bonus grade points to the best-performing teams. The students further had to complete two written assignments related to the simulation, and to present and defend their adopted SC strategy in the simulation once to the course instructors, who acted as the company's supervisory board. During the presentation, the course instructors provided no feedback that could guide teams' decision making within the simulation and provide them with a competitive advantage. Overall, we monitored five distinct cohorts of students across a period of five consecutive

semesters (2017–2019) such that our final dataset comprised 80 unique teams, including a total of 330 students. The same configuration of the simulation was used across all cohorts during the data-collection period.

2.3.2 | Data collection

We followed recommendations by Ketokivi and McIntosh (2017) and collected our data in a longitudinal manner, using different sources and multiple informants. Following each decision-making episode, we retrieved objective log files from the simulation containing information on each cross-functional team's number of SC disruptions and performance outcomes. In addition to these objective data, we asked all participants to fill out a brief questionnaire prior to beginning the next episode and before we communicated the outcomes of the previous episode. The questionnaires were identical for each episode and included questions regarding the participants' degree of information scouting and the decision-making processes within their team during that episode. The overall response rate across all questionnaires was 99.2 percent; thus, non-response bias is unlikely to influence our results. For every episode, we assessed interrater reliability within teams and combined members' responses to construct team-level variables after establishing that aggregation was statistically justified. This combination of collecting data from more than one type of source and using multiple informants per team allowed us to circumvent common method bias (Flynn, Pagell, & Fugate, 2018; Ketokivi & McIntosh, 2017). In addition, the longitudinal nature of our data collection enabled us to measure our outcome variable at a later point in time than our independent (moderator) variables, thereby alleviating concerns for reverse causality. That is, we assessed organizational resilience at the end of the simulation, whereas we measured our other variables of interest prior to and during the simulation. This measurement approach corresponds with our focus on the consequences of a cross-functional team's information scouting for its organization's resilience.

2.3.3 | Measures

Organizational resilience. We operationalized organizational resilience as the degree to which a cross-functional team could maintain or even improve its company's performance while dealing with SC disruptions (Ambulkar et al., 2015; Bode et al., 2011). Specifically, we assessed whether a cross-functional team resisted a negative change in its company's performance when facing SC disruptions, compared to the company's baseline performance achieved when it did not face SC disruptions. To capture the baseline performance, we calculated each company's average performance over the course of the first three decision-making episodes (i.e., before its exposure to SC disruptions). Next, we

determined the company's performance at the end of the final three decision-making episodes (i.e., after its exposure to SC disruptions). We then statistically estimated—rather than directly observed—change in company performance in our regression analyses by controlling for baseline performance when predicting company performance at the end of the final three decision-making episodes. After controlling for baseline performance, we added our key study variables to the regression model and estimated their impact on the change in company performance at the end of the final three decision-making episodes. A negative coefficient indicates that higher scores on a variable resulted in a performance decrease (i.e., lowered resilience), whereas a positive coefficient indicates that higher scores on a variable resulted in performance being maintained or improved (i.e., heightened resilience).

We relied on companies' return on investment (ROI) scores as an indication of their performance. The ROI is calculated by the simulation software as the ratio of gross revenue minus operation costs over investments. Examining an organization's ROI as a measure of its performance is a widely adopted approach to assess the organization's success in handling risks and disruptions in its SC (e.g., Brandon-Jones, Squire, Autry, & Petersen, 2014; Manhart et al., 2020).

Information scouting. Adopting a network-analysis approach, we operationalized information scouting as the number of interactive ties that a cross-functional team established and maintained with individuals outside their team to exchange information (de Vries, Walter, van Der Vegt, & Essens, 2014; Reagans, Zuckerman, & McEvily, 2004; Tsai, 2002). While qualitative or descriptive approaches (e.g., interviews, scale items) can offer rich insights into the nature and purpose of external team processes, a network approach is better suited for capturing the frequency and pattern of external interactions (e.g., Joshi et al., 2009; Marrone, 2010; Park et al., 2020). In other words, adopting a network-analysis approach enabled us to more accurately assess the degree to which cross-functional teams' members engaged in information scouting to increase their company's performance during the simulation. To determine teams' number of interactive ties, we built on de Vries et al. (2014) and included a network-type item in the questionnaire that we administered after each decision-making episode. Specifically, we provided participants with a list of all individuals participating in the simulation and asked them to select all those inside and outside their team with whom they had talked during that episode to get advice, exchange information, or coordinate decisions.

Within each cohort, we combined participants' responses for the three decision-making episodes with SC disruptions to construct the participants' overall information-scouting network across these three episodes. These networks included a tie between two individuals when they had interacted

with each other in at least one of the three episodes. We made the information-scouting networks symmetrical (Luke, 2015) such that a tie from individual A to individual B was also included for individual B, even though individual B might not have acknowledged having this tie with individual A. In doing so, we corrected for participants who may have overlooked particular individuals in answering the questionnaire item (some cohorts included more than 100 students). After filtering out ties internal to the team, we summed members' external ties for each cross-functional team, where ties with a specific individual held by multiple team members were only counted as one tie. Accordingly, this measure captures a cross-functional team's overall number of interactive ties with individuals outside their team during the three decision-making episodes that included SC disruptions, thereby accurately reflecting the team's level of information scouting (Joshi et al., 2009; Marrone, 2010).

Internal integration. We used de Vries et al.'s (2021) measure of internal integration within cross-functional teams, which was adapted from Lewis's (2003) coordination scale. Within this five-item scale, team members (representing different functional departments) are asked to indicate how well and smoothly they had worked together in completing a task. Specifically, in the questionnaire that we administered after each decision-making episode, we asked team members to express their agreement with the following statements regarding the preceding episode on a five-point Likert scale (1 = completely disagree; 5 = completely agree): "We worked together in a well-coordinated fashion"; "We had very few misunderstandings about what to do"; "We needed to backtrack and start over a lot" (reverse scored); "We accomplished the task smoothly and efficiently"; and "There was much confusion about how we would accomplish the task" (reverse scored).

The corresponding Cronbach's alpha for the three decision-making episodes with SC disruptions was 0.62 for the fourth episode, 0.70 for the fifth episode, and 0.70 for the sixth episode. We further checked whether aggregating individual participants' values for internal integration to the team level was statistically justified following Woehr et al. (2015) and others (e.g., Bliese, 2000; Klein & Kozlowski, 2000). For each of the three decision-making episodes with SC disruptions, all values for within-team agreement (i.e., $r_{wg[j]}$) and between-team differences (i.e., ICC[1] and ICC[2]) fell within the acceptable range and justified aggregation, especially when considered in combination. That is, the mean $r_{wg(j)}$ was 0.80 in the fourth episode, 0.79 in the fifth episode, and 0.75 in the sixth episode. The ICC(1) values were, respectively, 0.24, 0.22, and 0.27. The corresponding ICC(2) values were 0.56, 0.54, and 0.60.

SC vulnerability. We measured SC vulnerability by summing for each cross-functional team the number of SC disruption threats and actual SC disruptions

that it encountered during the three decision-making episodes with SC disruptions (Habermann et al., 2015; Perrow, 1999). During these final episodes, the simulation software was programmed to expose the cross-functional teams to disruption warnings, which were displayed in the simulation's "risk map" and/or announced in emails. A warning contained information about a threatening SC disruption that could endanger, for example, the supply of raw materials to the teams' company (e.g., cargo ships being hijacked by pirates, hurricanes blocking shipment routes) or the company's internal operations (e.g., strikes in warehouses). Participants were unaware of which SC disruptions they could face while making their decisions in the first three decision-making episodes. Participants were also not informed that a threatening SC disruption would always turn into an actual disruption if not properly addressed. Instead, the risk map showed cross-functional teams what the expected frequency of a specific type of disruption was (e.g., once every year) and its potential impact (e.g., 50% longer delivery lead-time). All cross-functional teams could experience the same types of SC disruptions. However, whether they actually experienced these disruptions—and their associated warnings—was contingent upon the teams' decisions regarding, for instance, sourcing strategies (e.g., suppliers in regions prone to pirate attacks) and operational strategies (e.g., excessive workload in warehouses leading to strikes). In addition, each supplier that cross-functional teams had within an affected region resulted in a separate SC disruption and/or threat thereof. Consequently, the number of SC disruptions and threats that cross-functional teams experienced during the simulation varied, and we used this variance to measure our contextual study variable "SC vulnerability."

2.3.4 | Control variables

Prior team research has demonstrated that an individual's experience across multiple functional domains (i.e., *intra*personal functional diversity) can predict the behavior of that individual within a team. In particular, an individual with higher intrapersonal functional diversity is more likely to share information within the team, as well as better equipped to identify and approach relevant individuals outside of the team (Bunderson & Sutcliffe, 2002; Joshi et al., 2009). A cross-functional team's aggregate level of intrapersonal functional diversity may, therefore, confound the effect the team's *inter*personal functional diversity that arises because members represent different functional domains. Accordingly, to rule out intrapersonal functional diversity as an alternative explanation for our results, we controlled for such diversity within the cross-functional teams included in our analyses. To gauge team-level intrapersonal functional diversity, we first consulted the university's records to determine the different under- and postgraduate programs that each participant had been enrolled in. Next,

we followed de Vries et al. (2014) and calculated each participant's breadth of functional diversity using Bunderson's (2003) adaptation of Blau's (1977) heterogeneity index. We then averaged the resulting intrapersonal functional diversity scores across a cross-functional team's members to arrive at a team-level measure of intrapersonal functional diversity.

Similar to Cheng et al. (2020), we additionally controlled for general student ability in examining our hypothesized relationships. Specifically, students who generally perform better are also more likely to be better at solving dynamic problems such as typically posed in experiments or simulations (Levine, Bernard, & Nagel, 2017). To measure general student ability, we obtained the students' GPA for their postgraduate program directly from the university's records. We computed the average GPA across all members within a cross-functional team to determine general student ability at the team level.

2.3.5 | Data analysis

Because all cross-functional teams had a single (independent) observation for each of the variables of interest, ordinary least squares multiple regression analyses were appropriate to test our conceptual framework (Aguinis, Gottfredson, & Culpepper, 2013; Hair, Black, Babin, & Anderson, 2013). To ease interpretation of our results, we standardized all predictor variables to have a mean of zero and a standard deviation of one prior to the analyses.

2.4 | Results

2.4.1 | Descriptive statistics

Table 2.1 presents the descriptive statistics and bivariate correlations for the (unstandardized) variables of interest. As explained above, we estimated—rather than observed directly—organizational resilience as the change in organizational performance following SC disruptions, so this variable could not be included in Table 2.1. However, the positive and significant correlation between organizational performance before and after SC disruptions *(*$r = .61$, $p \leq .01$*)* supports our inclusion of these two constructs to statistically estimate change in organizational resilience (i.e., organizational resilience). The positive and significant correlations between general student ability and organizational performance following SC disruptions *(*$r = .29$, $p \leq .01$) and between intrapersonal functional diversity and baseline organizational performance *(*$r = .26$, $p \leq .01$) further justify including these two variables as covariates in our analyses. Finally, the significant, direct correlations of internal integration with organizational performance following SC disruptions ($r = .58$, $p \leq .01$) and baseline organizational performance *(*$r = .39$, $p \leq .01$) are

in line with prior research suggesting the benefits of cross-functional integration for organizational performance (e.g., Schoenherr & Swink, 2012; Wong et al., 2011). Despite these moderate correlations, no problems with multicollinearity were found, as the variance inflation factor scores ranged from 1.156 to 1.812 (Hair et al., 2013). We further examined the data with respect to the normality assumption underlying linear regression analyses, and found that all of our variables' residuals approximated normal distributions.

Table 2.1 | Means, standard deviations and correlations

	Mean	s.d.	1	2	3	4	5	6
1 Organizational performance following SC disruptions	0.04	0.19						
2 Baseline organizational performance	0.04	0.10	.61**					
3 General student ability	7.23	0.39	.29**	.33**				
4 Intrapersonal functional diversity	0.45	0.13	.09	.26**	−.07			
5 Information scouting	4.95	5.48	.28**	.10	.14	.08		
6 Internal integration	3.81	0.37	.58**	.39*	.29**	−.03	.15	
7 SC vulnerability	8.13	2.98	−.09	−.03	.07	−.07	−.06	−.07

Notes: SC = supply chain. $N = 80$ teams. * $p \leq .05$, ** $p \leq .01$ (two-tailed).

	Organizational resilience					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Intercept	0.043 (0.017)**	0.043 (0.016)**	0.043 (0.014)**	0.038 (0.014)**	0.038 (0.015)**	0.038 (0.014)**
Baseline organizational performance	0.111 (0.018)**	0.109 (0.018)**	0.084 (0.017)**	0.080 (0.017)**	0.074 (0.017)**	0.064 (0.017)**
General student ability	0.020 (0.018)	0.015 (0.017)	0.002 (0.016)	0.003 (0.016)	0.007 (0.016)	−0.004 (0.016)
Intrapersonal functional diversity	−0.015 (0.017)	−0.017 (0.017)	−0.006 (0.015)	−0.007 (0.015)	−0.008 (0.015)	−0.003 (0.015)
Information scouting (H1)		0.041 (0.016)**	0.034 (0.015)*	0.025 (0.015)	0.021 (0.016)	0.021 (0.015)
Internal integration			0.070 (0.016)**	0.079 (0.017)**	0.083 (0.017)**	0.097 (0.017)**
Information scouting × Internal integration (H2)				0.037 (0.019)*	0.039 (0.019)*	0.044 (0.018)*
SC vulnerability					−0.014 (0.015)	−0.029 (0.016)
Information scouting × SC vulnerability					−0.016 (0.024)	−0.044 (0.025)
Internal integration × SC vulnerability					0.024 (0.018)	0.057 (0.021)**
Information scouting × Internal integration × SC vulnerability (H3)						0.079 (0.029)**
Model Fit						
R^2	0.390	0.437	0.549	0.571	0.585	0.624
R^2 (adjusted)	0.366	0.407	0.518	0.536	0.531	0.570
R^2 change	0.390	0.047	0.112	0.023	0.013	0.040
F change	16.205**	6.216**	18.352**	3.862*	0.739	7.294**

Notes: SC = supply chain. N = 80 teams. Unstandardized regression coefficients are shown; standard errors are noted within parentheses.

* $p \leq .05$, ** $p \leq .01$ (two-tailed).

Table 2.2 | Results of regression analysis

2.4.2 | Hypothesis testing

Table 2.2 summarizes the results of our regression analyses. The model fit statistics indicate that each estimated model fits significantly better than its preceding model, with the exception of Model 5. Model 1, with a relatively high adjusted R2 of 0.366, is an essential step in our model development and serves as a starting point for introducing our variables of interest. Our complete model (Model 6) explains a total of 57.0% of the variance in organizational resilience. Hypothesis 1 predicted a positive relationship between information scouting and organizational resilience. To test this hypothesis, we regressed organizational resilience on information scouting in Model 2. As shown in Table 2.2, we found a positive and significant relationship ($B = 0.041$, $SE = 0.016$, $p \leq .01$), providing support for Hypothesis 1. Indeed, a cross-functional team that engaged in higher levels of information scouting was associated with higher organizational resilience.

Hypothesis 2 posited that internal integration accentuates the positive relationship between information scouting and organizational resilience. To test this hypothesis, we first regressed organizational resilience on internal integration in Model 3, before regressing organizational resilience on the multiplicative term of information scouting × internal integration in Model 4. As shown in Table 2.2, we found a positive and significant interactive relationship ($B = 0.037$, $SE = 0.019$, $p \leq .05$; see Model 4), providing support for Hypothesis 2. In the simple slope analyses depicted in Figure 2.2, we plotted the relationship between information scouting and organizational resilience at lower (−1 s.d.) and higher (+1 s.d.) levels of internal integration (Cohen et al., 2014). At lower levels of internal integration, the relationship between information scouting and organizational resilience is nonsignificant ($B = -0.012$, $SE = 0.027$, n.s.). By contrast, at higher levels of internal integration, information scouting is significantly and positively associated with organizational resilience ($B = 0.062$, $SE = 0.020$, $p \leq .01$). These results indicate that higher information scouting is only associated with higher organizational resilience under high internal integration.

Hypothesis 3 predicted that SC vulnerability accentuates the moderating effect of internal integration on the relationship between information scouting and organizational resilience. To test this hypothesis, we first regressed organizational resilience on SC vulnerability and its two-way interaction effects with information scouting and internal integration in Model 5. We then regressed organizational resilience on the multiplicative term of information scouting × internal integration × SC vulnerability in Model 6. As shown in Table 2.2, we found a positive and significant three-way interactive relationship ($B = 0.079$, $SE = 0.029$, $p \leq .01$; see Model 6), providing support for Hypothesis

3. In the simple slope analyses depicted in Figures 2.3a and 2.3b, we respectively plotted the moderating effect of internal integration under low (−1 s.d.) and high (+1 s.d.) SC vulnerability (Cohen et al., 2014).

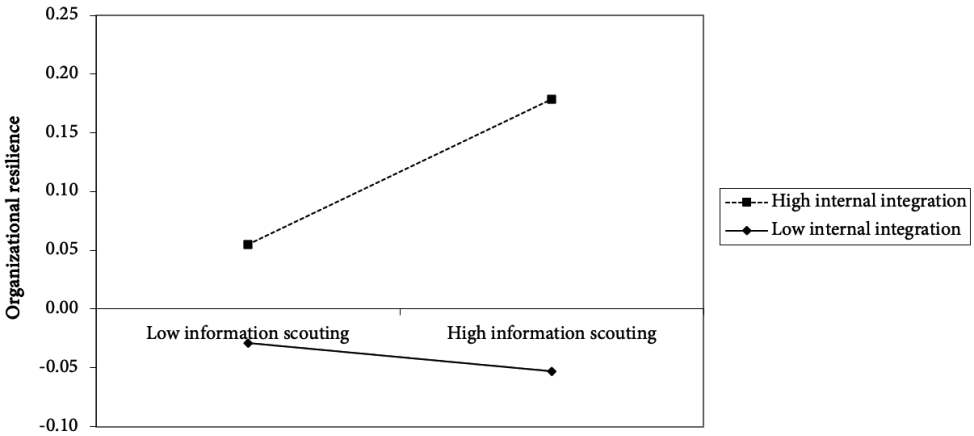


Figure 2.2 | Interaction between internal integration and information scouting (H2)

The slopes for low and high internal integration depicted in Figure 2.3a are not significantly different from each other (t = −1.074, df = 69, n.s). In line with our predictions, internal integration is thus not a moderator of the relationship between information scouting and organizational resilience under low SC vulnerability. In contrast, the relationship between information scouting and organizational resilience under high SC vulnerability is critically contingent upon internal integration. Specifically, the slopes for low and high internal integration depicted in Figure 2.3b are significantly different from each other (t = 3.418, df = 69, $p \leq .01$). While the relationship between information scouting and organizational resilience is positive under high internal integration (B = 0.100, SE = 0.039, $p \leq .01$), it becomes negative when internal integration is low (B = −0.146, SE = 0.056, $p \leq .01$). Following our expectations, information scouting by a cross-functional team that is integrated well internally is thus associated with an increase in organizational resilience under high SC vulnerability. Contrary to our predictions, however, information scouting by a cross-functional team that lacks internal integration under these demanding circumstances is associated with a decrease in organizational resilience. Combined, these results demonstrate that, for a cross-functional team to effectively manage SC disruptions and strengthen organizational resilience, it needs to match its degrees of both information scouting and internal integration with the level of SC vulnerability it faces.

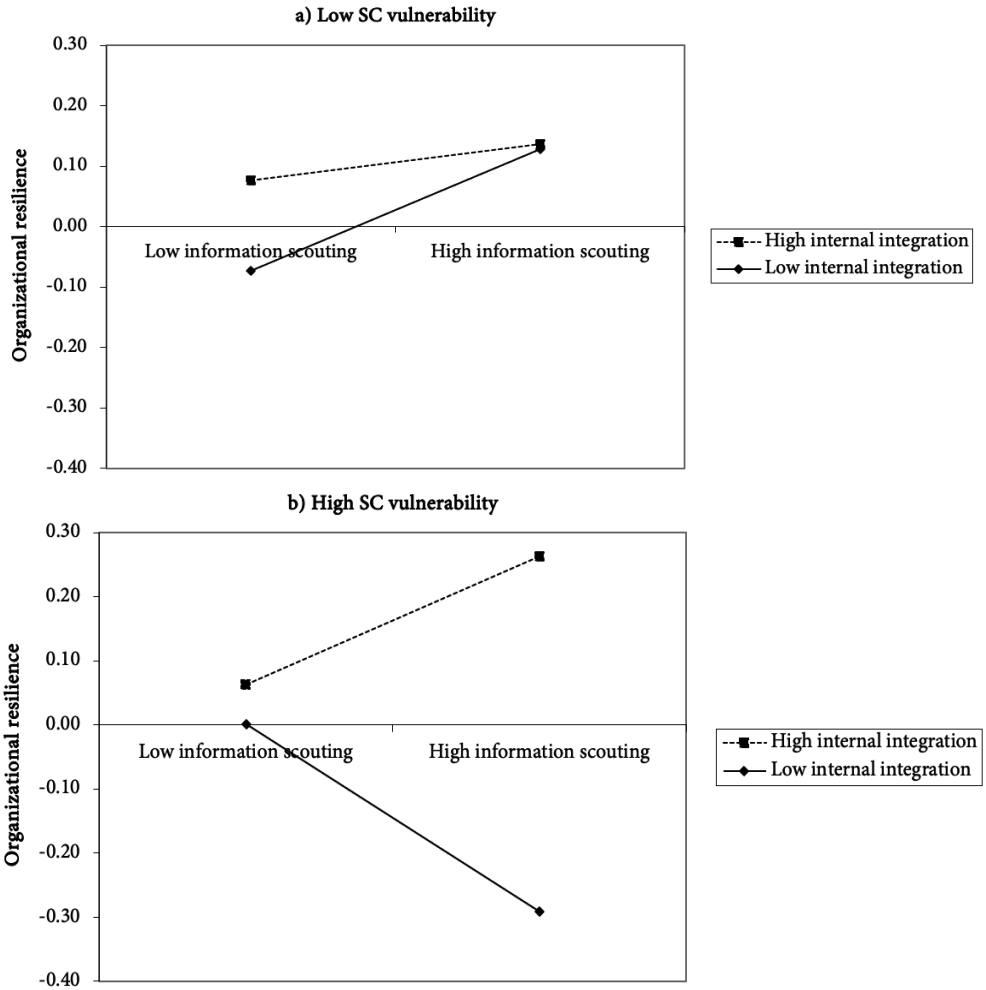


Figure 2.3 | Three-way interaction between SC vulnerability, internal integration, and information scouting (H3)

2.4.2 | Robustness checks

To ascertain the robustness of our results, we followed best-practice recommendations (e.g., Cuervo-Cazurra et al., 2016) and checked whether we would continue to find support for our hypotheses if we excluded the two control variables from our analyses. After excluding general student ability and intrapersonal functional diversity, we continued to find support for a direct and positive relationship between information scouting and organizational resilience (H1; B = 0.043, SE = 0.016, $p \leq .01$). This relationship also continued to be attenuated by internal integration (H2; B = 0.036, SE = 0.018, $p \leq .05$). Finally, the three-way interactive relationship of information scouting, internal integration, and SC

vulnerability too remained positive and significant (H3; $B = 0.078$, $SE = 0.028$, $p \leq .01$). As a second robustness check, we determined whether cross-functional teams' scores significantly differed across the five cohorts used for collecting our data. To do so, we added dummy variables for these different cohorts to our estimated models. None of these dummies was significantly associated with organizational resilience, nor did their inclusion significantly alter the outcomes of our analyses. Combined, these checks confirm the robustness of our results.

2.5 | Discussion and conclusion

2.5.1 | Implications for theory

Although cross-functional teams have broadly been suggested to increase organizational resilience (e.g., Blackhurst et al., 2011; da Silva Poberschnigg et al., 2020), it remains unclear when such teams may realize their full potential in managing SC disruptions (e.g., de Vries et al., 2021; Uitdewilligen & Waller, 2018). To address this issue, we draw from GIPT and introduce information scouting as a predictor that can determine whether a cross-functional team is able to minimize SC disruptions' adverse impact on its organization. We find supportive evidence that a cross-functional team that engages in high levels of information scouting can gather the external information and expertise needed for developing effective countermeasures, thereby ensuring its organization's resilience. We further find that the benefits of a cross-functional team's information scouting are critically dependent upon internal conditions within the team, as well as external conditions related to its organization's SC. Internally, a cross-functional team needs to be well-integrated to enable effective information scouting. Such internally integrated information scouting by a cross-functional team is, in turn, particularly important when it faces many external threats of SC disruptions (i.e., high SC vulnerability). Surprisingly, our findings reveal that a cross-functional team that engages in high levels of information scouting while lacking internal integration may even *decrease* its organization's resilience when operating under high SC vulnerability.

These results have important implications for the way scholars think about cross-functional teams, and their role in ensuring organizational resilience to SC disruptions. Prior SC and team studies have often conceptualized teams as closed, isolated work systems that do not or cannot seek external resources for completing complex tasks (e.g., Chen, Neubaum, Reilly, & Lynn, 2014; Stevens & van Schaik, 2020), such as dealing with SC disruptions (e.g., de Vries et al., 2021). We relaxed this closed-system assumption and introduced a conceptual framework in which we consider that members of a cross-functional team may need to engage in external activity to gather outside resources and information

(i.e., information scouting) for ensuring the organization's resilience to SC disruptions. We further show how the benefits both of this external activity, but also of an internal activity (i.e., internal integration) are influenced by external team conditions (i.e., SC vulnerability). As such, our study answers calls within team research for a better understanding of team functioning in completing complex tasks under high time pressure (e.g., Park et al., 2020; Uitdewilligen & Waller, 2018), as well as for more realistic perspectives on teams as open systems (e.g., Carter et al., 2020; Humphrey & Aime, 2014; Marrone, 2010). More importantly, we believe this open-systems approach provides fertile ground for developing a more complete understanding of the functioning of cross-functional teams in SC contexts and, more generally, in organizations.

Second, our study adds to the growing body of research on behvioral operations in the SC literature. Scholars in this field increasingly recognize that outcomes at an organizational or even SC level are determined by individuals and the teams in which they are embedded (e.g., Carter, Meschnig, & Kaufmann, 2015; Fahimnia et al., 2019; Schorsch, Wallenburg, & Wieland, 2017; Timmer & Kaufmann, 2019). We contribute additional details to these insights by identifying specific human behaviors (e.g., information scouting, internal integration within a cross-functional team) that may form the microlevel, behavioral foundations for an organization's ability to effectively manage SC disruptions. In doing so, we answer calls "to study supply chain risk and resilience at a much more granular or *micro* level, where the unit of analysis shifts from the organization to the individual decision-maker" (Mena et al., 2020, p. 986, emphasis in original; Reimann et al., 2017; Scholten et al., 2020). Relatedly, following recommendations of Eckerd et al. (2021) and others (e.g., Fahimnia et al., 2019; Scholten et al., 2020), we demonstrate how a simulation-based study design can be used to advance research on behavioral operations.

Third, we advance the extant SC literature on cross-functional integration. This literature typically assumes that the mere presence of cross-functional teams may ensure effective internal integration within organizations (e.g., Flynn et al., 2016; Oliva & Watson, 2011; Stolze et al., 2018). Our findings offer support to the potential benefits of such cross-functional integration at an organizational level, yet they also point to important internal and external contingency conditions that may determine the degree to which organizations employing cross-functional teams may realize these benefits. We demonstrate that merely putting members from different functional departments in a team will not automatically lead to improved coordination and information flows among these departments. Importantly, however, existing SC research has neither identified nor examined the processes that may ultimately explain why cross-functional teams may or may not ensure internal integration within organizations (de Vries et al., 2021).

We take a first step in resolving this scarcity of SC research on the intricacies of internal integration at lower levels of analysis (Stolze et al., 2018), and point future SC research to the need for a better understanding about how cross-functional teams foster organizations' internal integration and, in turn, enhance organizations' performance. Furthermore, we offer empirical validation of the mostly anecdotal evidence on the pivotal role that cross-functional teams may play in ensuring organizational resilience (cf., Blackhurst et al., 2011; da Silva Poberschnigg et al., 2020; Scholten et al., 2014; see de Vries et al., 2021, for a recent exception).

2.5.2 | Implications for practice

Our findings may help guide organizations in using cross-functional teams as an effective instrument to facilitate the information scouting required for managing SC disruptions. Most importantly, merely establishing such a team as broadly suggested in extant literature will not help without considering their internal functioning. Our findings reveal that the information-scouting efforts of a cross-functional team are pivotal in increasing organizational resilience in the presence of SC disruptions, especially as the organization's vulnerability to such disruptions increases. However, being integrated well internally is a critical determinant of whether cross-functional teams can realize these benefits and capitalize on the obtained information to the organizations' advantage. Specifically, our findings reveal that managers should be cautious in stimulating a cross-functional team to engage in information scouting under demanding circumstances when the team lacks internal integration. In such situations, information scouting may only serve to disconnect members from their team, leading to information overload and inefficient use of members' unique capacities and knowledge. To ensure that team members continue to feel connected to the team and responsible for the team's functioning, managers may draw from the literature on team cohesion (e.g., Carbonell & Rodríguez Escudero, 2019; Mathieu, Hollenbeck, Knippenberg, & Ilgen, 2017) and stimulate members to work from the same location, organize daily team meetings, and allow for informal or social interactions among members. Our findings, therefore, point managers to appropriate conditions under which a cross-functional team can realize the full potential of information scouting and, as such, increase its organization's resilience, even under particularly challenging circumstances.

2.5.3 | Limitations and directions for future research

The present research has several important strengths, including the use of multi-source, multi-informant data from a large sample of cross-functional teams that were studied over time in a relatively controlled setting. Nevertheless, some

limitations need to be considered when interpreting our findings. First, we were unable to collect data from our population of interest (professionals working in SC management); therefore, we relied on a convenience subpopulation comprising postgraduate students participating in a strategic SC management course. Both the convenience sampling and our use of student participants may limit the generalizability of our findings. The concerns regarding student participants may, however, be somewhat alleviated considering that prior research has illustrated that they perform indistinguishably from executives in experimental settings (e.g., Bolton et al., 2012; Wheeler et al., 2014). Nevertheless, we encourage future studies to replicate our research using probability (e.g., random or stratified) sampling designs to select representative samples from our population of interest to determine the extent to which our findings are generalizable. We further encourage such studies to sample participants with a more diverse cultural background, as the large majority of the participants in the present research was European.

A second limitation is that we were unable to experimentally manipulate our independent and moderator variables, and that the number of control variables we could consider instead was also limited. Consequently, we were unable to eliminate potential confounding effects of omitted variables—that is, variables that we could not include in our analyses but possibly influenced our results by correlating with both our independent (moderator) variables and organizational resilience (e.g., Ketokivi & McIntosh, 2017; Lu et al., 2018). We reduced this concern to some extent, however, both by collecting data in a longitudinal manner from multiple sources and multiple informants. These remedies notwithstanding, we fully acknowledge that further research is needed to ascertain the robustness of our results, and we recommend the use of experiments in which all predictor variables can be controlled or manipulated. Alternatively, future research could include important variables that we could not consider or statistically control for, such as whether a cross-functional team's decisions are directed by one or two central members (de Vries et al., 2021) and what these members' personality traits are (Timmer & Kaufmann, 2019); both approaches have been shown to play an important role in how effectively a cross-functional team can manage SC disruptions.

A third potential limitation concerns our information-scouting measure. With regard to this measure, one might argue that the fact that participants could only interact with other individuals who participated in the simulation limited their opportunities for contacting actual SC partners. In reality, information scouting will also involve approaching an organization's suppliers, buyers, and other external parties for relevant information (Fugate, Thomas, & Golicic, 2012; Scholten & Schilder, 2015). This concern is somewhat mitigated, however, by the

fact that much of the information related to these external parties is available within the simulation (e.g., likelihood and cause of disruptions, impact of relationship-specific investments on duration of disruptions) and that interacting with other participants may point team members to information they have not found or sufficiently considered themselves yet. Moreover, these other participants likely face similar difficulties, and sharing and discussing possible solutions with them might yield relevant ideas and perspectives on resolving a cross-functional team's own issues. As a result, our information-scouting measure realistically reflects a cross-functional team's efforts to collect relevant outside information within the controlled environment of our research setting. Nevertheless, future research is needed to explore more fully how real-time information scouting targeted at external parties, such as an organization's suppliers and buyers, can assist a cross-functional team in increasing its organization's resilience. Also, future research could consider a cross-functional team's information-scouting efforts directed at individuals inside its own organization (e.g., members approaching other individuals from their functional department for relevant information).

In addition to addressing the present study's limitations as suggested above, future research could build on our findings to explore in more depth the intricacies of the design or configuration of a cross-functional team's information-scouting activities. Prior research suggests, for example, that how information is collected and by whom may be as important as information being collected in the first place (Joshi et al., 2009; Marrone, 2010). Specifically, information-scouting activities may be most efficiently executed when they are performed by only one or a few individuals (centralized) and when these individuals can focus exclusively on these activities (specialized). These configurations of information scouting may, in turn, become more important as the demands upon a cross-functional team become more intense or when the team's size increases (Crawford & LePine, 2013; Gibson & Dibble, 2013). Accordingly, we recommend that future research explores in greater detail how the configuration of information-scouting efforts determine these efforts' effectiveness for increasing organizational resilience.