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Multilevel Investigation of Team Learning Behavior:

Boundary Spanning and Psychological Safety as Antecedents

팀 학습 행동에 대한 다수준적 탐색:

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오 수 진

Multilevel Investigation of Team Learning Behavior:

Boundary Spanning and Psychological Safety as Antecedents

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이 논문을 심리학석사 학위논문으로 제출함
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ABSTRACT

As organizations increasingly rely on teams for the fundamental unit of learning, researchers have given much attention to how teams learn new information and knowledge. They have concentrated on team-level factors and found some critical antecedents (e.g., team psychological safety, team learning orientation) that would enhance the team learning behavior. However, the heavy focus on the certain level of analysis constrained our knowledge whether individual-level antecedents could influence higher-level learning interaction or not. This is because a team is a social system involving both individuals and team context makes the team learning a fundamentally multi-level phenomenon.

In this regard, using multi-level dataset, the present study seeks to test a multilevel model, based on a multilevel theory of team learning emergence. It was explained that boundary spanning is a critical individual-level antecedent of team learning, which is known for enhancing external learning. Specifically, I argue that boundary spanning has a cross-level upward influence on team learning behavior. Drawing from a concept of social and vicarious learning, this study explains how products of individual external learning propagate to other teammates. The current study also hypothesizes that team psychological safety enhances team learning behavior, and team learning behavior mediates the positive effect of psychological safety to team creativity. Data was collected from teams in

start-up firms to increases the generalizability of previous findings on this team-level relationship. In addition to quantitative analysis, supplementary qualitative analysis (i.e., semi-structured interview) was conducted in order to complement the limitation of cross-sectional study design.

The results indicated that boundary spanning exerted an upward influence on team learning behavior. In the team-level analysis, the results showed that team learning behavior mediates the positive influence of team psychological safety on team creativity, thus confirming the previous evidence in the start-up context. Additional interviews with the current employees in various industries also supported the process through which team learning behavior emerges from boundary spanning. This study provides empirical evidence on both team-level and individual-level antecedent of team learning behavior. The study contributes to team learning and boundary spanning literature that is currently lack in multilevel, especially an upward influence approach. Implications for managers, along with limitations and future research directions are also discussed.

Keyword: Team learning behavior, boundary spanning, team psychological safety, team creativity, multilevel analysis, startup

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INTRODUCTION

Big things have small beginnings.

-from T.E. Lawrence in *Lawrence of Arabia*

Organizations increasingly rely on teams to enhance their ability to learn in a competitive, fast-changing environment (Senge, 1990). Organizations have shifted the work structures from individual to team-based tasks (Devine, Clayton, Philips, Dunford, & Melner, 1999), making teams as an important unit that incorporates individuals' diverse skills, expertise, and knowledge to solve complex problems. This transformation highlights the importance of a team's ability to internalize knowledge and new insight. Its ability would determine the extent to which organizations successfully adapt to the emerging pressures and challenges. In sum, teams have turned into building blocks that enable rapid and flexible response of organizations.

For this reason, the emergence of teams as the fundamental unit of learning has drawn scholars' attention to the topic of team learning (Senge, 1990). A team can be defined as those who are embedded in a larger social system and perform tasks together with a sense of shared commitment (Guzzo & Dickson, 1996). Particularly, team learning is a vital mechanism through which teams coordinate their knowledge and actions to develop performance capabilities and to adapt to changes in their environment

(Edmondson, Dillon, & Roloff, 2006). Grounded on the decades of findings in organizational learning, researchers have reported several antecedents of team learning phenomena. For instance, the shared belief that a team is safe for interpersonal risk-taking (i.e., team psychological safety) is a psychological environment that fosters a willingness to engage in team learning behavior (Edmondson, 1999). Scholars have also identified that certain behaviors of team leaders (e.g., involving members in decision making) and team learning orientation can predict the level of team performance (Sarin & McDermott, 2003; Bunderson & Sutcliffe, 2003).

Interestingly, though, researchers have rarely identified individual-level antecedents of team learning. The reason may stems from the fact that team learning literature has not been clear about levels of analysis issues (Bell, Kozlowski, & Blawath, 2012). Even if it did, it mainly emphasized team learning's collective, team-level nature (Edmondson et al., 2006). However, just as team learning is a building block of a bigger system's ability to learn (i.e., organizational learning), individual-level antecedents could also play a significant role in promoting a team's learning behavior. Thus, the traditional perspective on team learning behavior is limited in that it neglects how higher level phenomena (e.g., team learning behavior) can arise from lower level phenomena (e.g., individual behavior). A team, however, is a social system in which certain behaviors and interactions among individuals can yield changes in structure or collective phenomena. It can be crucial to understand what kinds of interactions and behaviors at

the lower level could facilitate team learning behavior.

Taking individuals into account is not to challenge the tenet that teams are more central unit than individuals for organizational learning. Rather, this approach highlights the way in which team learning occurs at the first place; an interaction among “individuals.” Thus, to thoroughly account how team learning takes place in interpersonal context, one should understand how and what kind of individual-level antecedents trigger team members to engage in social interaction of learning. The dearth of research on these critical individual-level antecedents leaves our understanding of team learning behavior as a multilevel phenomenon incomplete (for reviews of traditional perspectives on team learning, see Edmondson et al., 2006).

More recently, Bell, Kozlowski, and Blawath (2012) suggested theoretical considerations for understanding multilevel, dynamic nature of team learning. Instead of viewing team learning as a static team-level phenomenon, these researchers emphasized that team learning is an emergent phenomenon that encompasses both individual and team simultaneously. When individuals in team context learn complex knowledge and skills, they influence and are also influenced by the learning process of their teammates through mutual interactions (e.g., sharing and exchanging knowledge). As a result, the team learning emerges. Some empirical evidence supported this team learning emergence by using human training group and agent-based computer simulation (Grand, Braun, Kuljanin, Kozlowski, & Chao, 2016). The theoretical, as well as empirical advances,

have highlighted the importance of multilevel considerations of team learning.

However, some limitation hinders our understanding of team learning as a multilevel phenomenon. Despite its theoretical elaboration, empirical evidence mainly depends on the subject groups who had never met with each other and participated by using computers without face-to-face interaction. Existing research, therefore, has not yet addressed important questions; how team learning behavior in real-world workgroups emerges from individual-level activities. These questions are crucial because knowing the emergent nature of team learning does not extend our knowledge of when and how individuals are more likely to engage in teams' knowledge building behavior.

The aims of the current study are two folds. First, this study uses field and supplementary interview data and tests a multilevel model, integrating theories of emergence (bottom-up effects or an upward influence) within a multilevel framework of team learning. By doing so, I seek to demonstrate that individuals' behavioral antecedent spurs the emergence of team learning. Specifically, the current study proposes boundary spanning as a multi-level antecedent, which is known for externally oriented learning (Kozlowski & Bell, 2008; Bresman, 2010). To theorize a cross-level influence of boundary spanning on team learning behavior, this study draws on social learning, as well as vicarious learning literature. The current study explains how the propagation of external learning product among

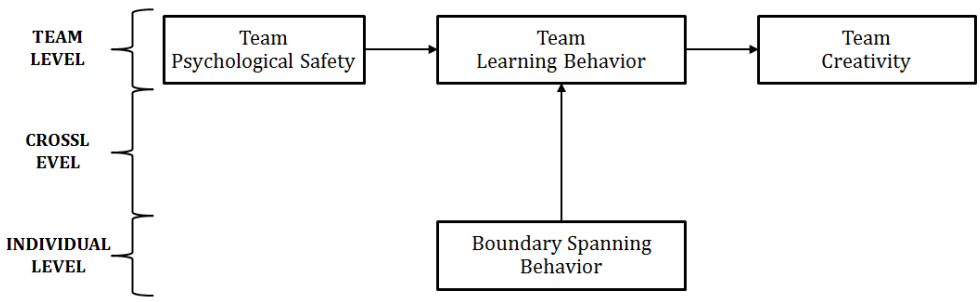
individuals take place.

Second, in an attempt to capture the comprehensive picture, the present study investigates a team level antecedent of team learning behavior. To be specific, I hypothesize that team psychological safety facilitates team learning behavior, and team learning behavior will subsequently increase team creativity (Edmondson, 1999; Edmondson, Dillon, & Roloff, 2006). The current study further hypothesizes that team learning behavior will mediate the positive effect of psychological safety on team creativity. To extend previous research, I utilized data obtained from start-up firms. Since the majority of previous research has been conducted using traditional forms of teams, this study may validate the generalizability of the previous findings. Figure 1 describes the hypothesized model of the current study.

The current study contributes to team learning literature for several reasons. First, the present inquiry would extend our understanding of how individuals' behavior produces an upward influence on teams to engage in learning behavior. By doing so, this study may incorporate theoretical foundation of emergent phenomena with team learning, which has been consistently implied but rarely been tested. Second, the present study may provide knowledge in how external learning product can be integrated into internal team learning behavior. A lens encompassing both internal and external learning may suggest the importance of external information and knowledge for the onset of internal learning behavior. Third, this study extends the research context which has been previously limited to teams

operating in large corporations. The current context of start-up firms would not only increase the validity of previous findings but also reflect growing importance of entrepreneurial firms.

Figure 1. Theoretical Model of the Current Study



THEORETICAL BACKGROUND AND HYPOTHESES

Current Approach to Team Learning

Empirical studies on team learning have three theoretical roots (Edmondson et al., 2007); 1) learning curve in operational settings (outcome improvement), 2) psychological experiments on the coordination of knowledge (task mastery), and 3) field research on the learning process in teams (group process). The present study adopts third perspective viewing team learning as group *process* rather than as an outcome. This approach defines learning process (or learning behavior) in teams as "ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (Edmondson, 1999). Viewing team learning as a behavioral process reflects a typical assumption that group processes mediate the effect of team input to output (Input-Process-Output model; Ilgen, Hollenbeck, Johnson, & Jundt, 2005, for a review). When measured by the survey, team learning process (i.e., team learning behavior) can be evidence that team learning has occurred before team performance. Thus, the perspective viewing learning as a process has been utilized as a valid, as well as useful approach in examining team learning in field settings. In accordance with previous field studies, the current study focuses on process (i.e., behavior) part of team learning.

The current study also integrates "bottom-up" multilevel

perspective (Kozlowski & Klein, 2000) with team learning behavior. Multilevel perspective explains organizational phenomena based on top-down or bottom-up processes. Top-down processes reflect contextual influences on lower levels of the system. On the other hand, bottom-up processes pertain to how characteristics of lower-level properties (e.g., knowledge, actions) emerge to form collective phenomena through their interactions. For instance, positive interactions among team members could yield team cohesion, just as interactions among atoms result in molecular structure (Miller, 1978; Kozlowski & Klein, 2000).

The bottom-up perspective to *team learning* has a key assumption about learning (Kozlowski & Bell, 2008). Learning is a psychological change that fundamentally occurs within an individual (Kozlowski & Salas, 1997). Individuals acquire knowledge and information from their experience and then link it to existing knowledge structure so that they can use it to improve performance. However, learning can also occur in social contexts such as teams. When team members share knowledge, information, and insights through social communication, products of individual learning are transmitted among members via communication, collaboration, and vicarious observation. With individual-level knowledge amplified among team members, learning emerges as a collective phenomenon (Kozlowski & Bell, 2008).

When applied this assumption, team learning *behavior* may reflect the “process” part of team learning emergence. Kozlowski and Bell (2008)

describe how individual knowledge spreads among team members, by using terms such as collaboration and information exchange. However, learning in a social context can occur more broadly through other numerous actions as described in team learning behavior (e.g., seeking feedback, sharing information, asking for help, talking about errors, and experimenting; Edmondson, 1999). For example, team members who learned from his or her experience can suggest new ideas when giving feedback to others during a team meeting. Then, other members can discuss his or her ideas to understand them and, furthermore, improve their current working process and outcomes. Through an array of these activities, team members can detect changes in their environment and obtain others' fresh viewpoint, information, and knowledge. Thus, the traditional concept of team learning behavior (i.e., a process part of team learning; Edmondson et al., 2007) can be applied to team learning emergence, by viewing that team learning behavior is a process through which individual learning propagates among team members.

Also, the present study embraces an assumption that individuals' actions may contribute to characteristics of the broader context (cross-level upward influence; Griffin, 1997)[①]. Although the explanatory mechanism of bottom-up emergence is useful in understanding micro-to-macro phenomena,

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① Preacher, Zyphur, and Zhang (2010) explains the effects characterized by a Level-1 variable predicting a Level-2 outcome by using various terms, such as bottom-up effects (Kozlowski & Klein, 2000), micro-macro or emergent effects (Croon & van Veldhoven, 2007), and cross-level upward influence (Griffin, 1997).

it does not specify how interactions among individuals are triggered or intensified. Are there any antecedents that foster the emergence of team learning behavior? It is important to note the bottom line of the emergence to account this question. In doing so, I adopt Griffin's (1997) explanation that "individuals within a work environment not only react to the work situation as they perceive it but also act to create that situation." For example, when individuals help other teammates, group norms about helping behavior can be strengthened after a series of reciprocal interaction (e.g., other group members spontaneously help each other). Griffin (1997) found that individual positive affect had a cross-level upward influence on task interaction among group members, which resulted in increased group cohesion. This result indicates that higher-level constructs can emerge as a consequence of interaction among individuals, especially spurred by a specific behavior.

In sum, the current approach to team learning seeks to integrate the theoretical explanation of bottom-up effects and empirical evidence of a cross-level upward influence. I assume that team learning behavior can occur from team members' interactions that can be triggered by individual-level actions.

Team-Level Relationships:

Team Psychological Safety, Learning Behavior, and Creativity

Team psychological safety refers to "a shared belief that a team is

safe for interpersonal risk-taking" (Edmondson, 1999). The shared belief tends to be implicit in most cases, but sometimes can be openly discussed among team members. One of the essences of team psychological safety is interpersonal risk-taking. The interpersonal risk-taking does not mean a careless sense of permissiveness; it is a sense of confidence that other team members will not embarrass or depreciate one's image and status for speaking up (Kahn, 1990; Edmondson, 1999). In this regard, psychological safety differs from group cohesiveness (a state of social integration) which may reduce willingness to dissent or challenge others' ideas (Janis, 1982). The building block of risk-taking can be characterized by interpersonal trust and mutual respect, one's willingness to be vulnerable to others' actions (Robinson, 1996). Similar to a concept of psychological climate, team psychological safety reflects the way people cognitively appraise a team context for risk-taking and whether they hold a similar perception about it (James, Joyce & Slocum, 1988).The shared tacit belief for interpersonal risk-taking has been tested as a critical antecedent and moderator of learning (Tucker, Nembhard, & Edmondson, 2007; Choo, Linderman, & Schroeder, 2007), information sharing (Butler, 1999), and team effectiveness (Edmondson, 1999; Chandrasekaran & Mishra, 2012).

Particularly, scholars have argued that team psychological safety may provide a favorable environment for team creativity (Edmondson & Mogelof, 2006). Team creativity can refers to "the production of novel and useful ideas concerning products, services, processes, and procedures by a

team of employees working together (Amabile, 1988; Shin & Zhou, 2007). While individual creativity largely depends on one's creativity-relevant knowledge, skills, and personality (Amabile, 1996; Zhou, 2003), team creativity involves not only individual characteristics but also team process through which team members share, build upon, and critique ideas together (Pirola-Merlo & Mann, 2004). These integral team activities in generating creative ideas can be perceived as risky for individuals such that they could apprehend for being seen as ignorant or even incompetent by others for speaking up (Edmondson, 2003). In this regard, having the "right" climate is vital for team members in seeking feedback about novel ideas and challenging the status quo without fear of judgment and embarrassment. Without such environment, team members will try to minimize the risk of harming their images by not asking a seemingly naïve question. Team psychological safety can allow team members to shake off their worries for being ridiculed or rejected, and to speak up to suggest potentially inventive ideas. Thus, when team psychological safety is high, team members can be more likely to speak up for their divergent ideas and share opinion about others' perspectives, which would increase generation of creative outcomes.

Hypothesis 1: **Team psychological safety is positively related to team creativity.**

Team psychological safety would facilitate team learning behavior by alleviating concern about other's reactions that can be a potential threat

and embarrassment (Edmondson, 1999). During team learning process, team members participate in an ongoing process of reflection and action, such as discussing errors, seeking the feedback on their work, and asking questions. This active interaction process inevitably involves sharing of each other's opinions on how to improve the current teamwork process and results. Thus, if team members are afraid of being harmed own image and seen as incompetent because of their opinions, they would refuse to voice up during reflection and a variety of learning actions. This self-censorship could not only preclude the opportunity to improve teams' knowledge state using valuable feedback but also impair the efficacy of reflection on results and errors. In contrast, if team members feel they are respected and trust not to be judged by others, they would relax their guard and openly speak up during experimentation, discussion, and reflection process. Edmondson (1999) examined this enabling role of psychological safety on group learning behavior. Her multi-method investigation showed that building mutual trust and a shared perception of safety for risk-taking predicted team learning behavior. Moreover, Tucker et al., (2007) found out in dozens of intensive hospital care units that psychological safety climate fostered learning activities (i.e., learn-what, learn-how) and implementation of the new practices. Thus, I hypothesize that team psychological safety will increase team learning behavior.

Hypothesis 2: **Team psychological safety is positively related to team learning behavior.**

Team learning behavior should increase team creativity because it improves the current team process to a more adaptive one that is potentially helpful for generating unique and useful products. Notably, researchers have argued that learning is an essential criterion for enhancing creativity and innovation (Brown & Duguid, 1991; Gong, Huang, & Farh, 2009; Hirst, van Knippenberg, & Zhou, 2009). Team learning *behavior* is particularly pertinent to team creativity. To generate creative outcomes as a team, the team should integrate and further elaborate knowledge and information each member holds to engender creative outcomes as a group (van Knippenberg, 2017). Thus, it can be important to make teams' work process adaptive to the change of an environment. If teams fail to notice gaps in its plans and make changes in work process accordingly, they would not be able to generate novel and useful ideas that keep abreast of the trend. When a team actively engages in sharing knowledge or ideas, seeking feedbacks, experimenting them, and reflecting upon results (Homan, van Knippenberg, van Kleef, & De Dreu, 2007; Edmondson, 2003), teams could equip with unique knowledge and information based on their adaptive team process. From these learning products and interpersonal work process, teams with a high level of learning behavior will be able to come up with creative ideas. Thus, the present study hypothesizes that team learning behavior would increase team creativity.

Hypothesis 3: **Team learning behavior is positively related to**

team creativity.

Although it is true that team psychological safety facilitates the core element of team creativity (i.e., interpersonal risk-taking), it would not directly affect team creativity. In a psychologically safe environment, risk-taking of team members should be first manifested in team learning behaviors. While sharing and giving critiques on new information and knowledge without fear or apprehension, teams could translate team psychological safety into a generation of novel and useful ideas. Thus, learning behavior should mediate the positive effects of team psychological safety on team creativity.

Hypothesis 4: **Team learning behavior mediates the positive relationship between team psychological safety and team creativity.**

Upward Influence of Individual-level Boundary Spanning on Team Learning Behavior

The present study argues that individuals' boundary spanning influences team learning behavior by two micro-macro conceptualizations (i.e., bottom-up emergent phenomena, cross-level upward influence). To reflect the nature of emergent phenomena, the present study explains a two-step process through which boundary spanning influence team learning behavior: 1) an individual's learning from external sources, and 2) propagation of learning product in teams through vicarious social learning

and task-related interaction.

First, individual learning takes place when engaging in external activities beyond team boundary (Wong, 2004). While learning within team boundary (i.e., local learning) refers to knowledge acquisition and sharing among teammates, learning beyond team boundary (i.e., distal learning) originates from external activities, such as boundary spanning (Bresman, 2010). Because of distinct learning sources (group members versus external environment), the content of local learning and distal learning differs. To be specific, the product of local learning is relatively familiar and preexisting in that team members perform the similar tasks and also share the same memory systems (Wong, 2004). On the contrary, exposure to external environment triggers changes in cognitive functioning owing to a variety of knowledge and perspective of external sources (de Varies et al., 2014). For instance, when engaging in task-coordinating activity with external actors who have different perspective and knowledge, an individual should adjust own behavior to the novel contexts and develop complex strategies to overcome differences in opinions and background (Kline & Floyd, 1990; Wilson, 1990). During the adjustment, he or she could digest and synthesize new, otherwise unseen information and perspective to the current knowledge system. The recent evidence found that external learning indeed enhanced innovative performance as it derives from newly acquired knowledge and information (Wong, 2004).

Second, boundary-spanning individuals' external learning products

(i.e., information and knowledge) may spread in team members through the social learning process. One of the most important outcomes of external learning is unique information, knowledge, and perspectives. With these learning products, boundary-spanning individuals would interact with other teammates during official or unofficial team meetings. During the task-related interactions, boundary-spanning individuals would seek feedbacks for their new information to test its validity and usefulness. Then, other teammates need to reflect upon and discuss it to decide whether to adjust their current teamwork process. During this interaction, team members as a whole may partake in discussing errors of new information and sometimes experiment boundary-spanning individuals' ideas and suggestions. As a result, teams engage in learning behavior, which is triggered by others in social context.

Some empirical evidence supports this propagating role of external knowledge. Sutton and Hargadon (1996) found that knowledge coming from external sources stimulates group members to consider how to combine diverse knowledge for a novel solution (Sutton & Hargadon, 1996). Team boundary spanning literature also showed that team members tended to engage in knowledge-transfer behaviors after a team's cumulative external contact (Zellmer-Bruhn, 2003). This evidence implies that influx and propagation of external knowledge via individuals' boundary spanning should manifest in team learning behavior.

This social learning process especially pertains to vicarious learning

(Bresman, 2013). Vicarious learning from external actors allows a team to learn from others' prior similar experiences (e.g., changing routines; Bresman, 2006). Previous literature on vicarious learning originally assumed that other-oriented learning is a team-level phenomenon and takes place when teams find useful resources from the *outside*. However, vicarious learning could also occur between *internal* team members. Although usual intra-team interaction based on preexisting knowledge and perspective rarely leads to novel learning from others, knowledge acquired from others' boundary spanning is non-redundant to the current team knowledge pool such that perceived as useful (Ancona & Caldwell, 1992; Granovetter, 1983). Given that people tend to learn from one another in a social context (Bandura, 1984), team members will try to internalize learning product of boundary-spanning individuals through discussion and reflection. As this series of interaction takes place, a team as a whole would undergo learning process through which they give and take questions or feedbacks, apply to own workflows, and consequently modify actions. In sum, individual boundary spanning would increase team learning behavior, as products of external learning propagate other-oriented learning in a team.

Hypothesis 5: **Individual boundary spanning behavior positively relates to team learning behavior.**

Methods

Sample and Procedure

Data were collected from 46 work teams in 21 young technology-based startups located in Korea, representing a wide range of industries including computer systems, electronic communication, and online-to-offline commerce platform. Following existing literature on new ventures or startups (e.g., Beckman and Burton, 2005, Beckman, 2006), the cutoff age for these firms were *ten* years old (M = 4.2 years). I chose young technology-based organizations as participants for two reasons. First, nascent firms heavily rely on external partners and groups outside of the organization to develop and grow beyond constrained resource (McDougall, Shane, & Oviatt, 1994). For these firms, active boundary spanning effort is an important channel to gather knowledge and combine it with existing one as a whole (Yli-Renko, Autio, & Sapienza, 2001). In a similar vein, it is imperative for workgroups in these firms to acquire external knowledge, which is unique and valuable compared to the one within the boundary. Second, according to the previous review literature (Marrone, 2010), the current knowledge in individual and team-level boundary-spanning behaviors are largely limited to the conventional form of organization (e.g., a corporate). Thus, it can be informative to investigate cause and effects of boundary spanning behavior in different organizational settings and team types.

I initially distributed a total of 281 questionnaires to these organizations, and the respondents returned 204 valid questionnaires (45 leaders and 159 subordinates), yielding a response rate of 72.5 percent. Following Simons, Pelled, and Smith (1999), I excluded the teams with less than 50 percent within-group response rate (three leaders and six members). In the final analysis sample, data from 42 valid teams (42 leaders and 153 subordinates) were used. The average team size was 5.40 (*SD* = 2.37), ranging from 3 to 10. The study participants included 63.9% males, with an average age of 30.03 years (*SD* = 3.04). On average, the participants had worked in their organization for 14.11 months (*SD* = 8.84). Most participants (93%) possessed an undergraduate degree or higher.

Measures

Since all measures were in English, the survey items were translated and back-translated into Korean (Brislin, 1980), by two bilingual master's students major in organizational psychology. Data were collected from two different sources for the study variables. To be specific, all team members responded to the scales for the team-level variables (i.e., team psychological safety, team learning behaviors) and the individual-level variables (i.e., boundary spanning behaviors). To minimize the potential problem of common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), only a team leader answered to the team-level outcome variable (i.e., team creativity),

For the team-level measures (i.e., team psychological safety, team learning behavior), it is necessary to show the appropriateness of data aggregation from the individual-level to team-level property (Harrison, Price, Gavin, & Florey, 2002). To justify the aggregation, I calculated the within-group agreement (r_{wg}; James, Demaree, & Wolf, 1993), as well as intra-class correlation coefficients, ICC (1) and ICC (2).

Boundary spanning: I assessed boundary-spanning behaviors (i.e., task-coordinator activity, scout activity) of team members adapting Ancona and Caldwell's (1992) 8-item scale. Because the measure was intended for design project teams, the items were modified to reflect start-up context. Respondents indicated the extent to which they engaged in boundary-spanning behavior (e.g., task-coordinator activity: "I coordinate activities with external groups"; scout activity: "I collect technical information/ideas from individuals outside of the team.") *during the past week*. The one-week time frame was used to make sure a match between positive affect and boundary spanning behaviors. Response format consists of a five-point scale, anchored by one (*not at all*) and five (*to a very great extent*). Cronbach's alpha for the scale was .86. Responses to task-coordinator activity (five-item) and scout activity (three-item) were averaged to form an overall boundary spanning behavior score.

The current study hypothesized a cross-level bottom-up effect of boundary spanning. Since a bottom-up effect is statistically analyzed at the between-group level in Multilevel Structural Equation Modeling method

(Preacher et al., 2010), aggregation statistics were calculated to ensure the aggregation of team members' data to the team level. Multiple aggregation indices justified that aggregation was appropriate: Median r_{wg}= .88, mean r_{wg}= .80, intra-class correlation (ICC) (1) = .20, ICC (2) = .51. *F* value for the ICC (1) was statistically significant ($p < .05$).

Team psychological safety: Team psychological safety was measured using Edmondson's (1999) 7-item scale. Sample items were "Members of this team are able to bring up problems and tough issues," "It is safe to take a risk on this team." Cronbach's alpha for the scale was .75. Response format consists of a five-point scale, anchored by one (*strongly disagree*) and five (*strongly agree*). Multiple aggregation indices justified aggregation of individual responses to the team level: Median r_{wg}= .93, mean r_{wg}= .89, intra-class correlation (ICC) (1) = .16, ICC (2) = .45. Although the level of ICC (2) was below .50, the ICC (1) exceeded the generally accepted cutoff value of .12. In addition, *F* value for the ICC (1) was statistically significant ($p < .05$).

Team learning behavior: Team learning behavior was measured using Edmondson's (1999) 7-item scale. Respondents indicated their agreement with the statements such as "We regularly take time to figure out ways to improve our team's work processes." Cronbach's alpha for the scale was .73. Response format consists of a five-point scale, anchored by one (*strongly disagree*) and five (*strongly agree*). Multiple

aggregation indices justified aggregation to the team level: Median r_{wg}= .91, mean r_{wg}= .88, intra-class correlation (ICC) (1) = .20, ICC (2) = .52. *F* value for the ICC (1) was statistically significant ($p < .05$).

Team members were asked to report their teams' level of team learning behavior *during the past week.* The one-week time frame was chosen to match with that of other variables. This was to capture how boundary spanning has an upward influence on team learning behavior. If a longer time frame was used for team learning behavior, team members might have reported their general impressions of team learning behavior over extended periods (James, Brodersen, & Eisenberg, 2004).

Team creativity: Team creativity was measured by adapting Zhou & George's (2001) three-item measure of individual creativity to the team level. In accordance with previous studies (De Dreu & West, 2001; Pirola-Merlo & Mann, 2004), team leaders who were reliable sources of team information reported the level of team creativity. The response format consists of a five-point scale, anchored by one (*strongly disagree*) and five (*strongly agree*). Sample items were "Our team comes up with new and practical ideas for solving problems," "Our team easily develops new ways and procedures related to the task." Cronbach's alpha for the scale was .88. Moreover, team leader evaluated team creativity *during the past week* to match the time frame of team learning behavior. The one-week time frame also ensured that creativity measurement tapped team leaders' impressions of creativity of their team in one week other than the extended period.

Control variables. In the team-level analysis, I controlled for team size because of its influence on interaction pattern among members (Stewart, 2006). Employees' tenure in their teams (i.e., the number of months in a certain team position) was also controlled, given the impact of job experience on job performance (McDaniel, Schmidt, & Hunter, 1988).

Additionally, I controlled for team psychological safety (or psychological safety climate; Edmondson & Lei, 2014) *strength*. Climate strength (or consensus) refers to the level of the consensus among respondents' climate ratings (Lindell & Brandt, 2000). The dispersion in responses means that group members' perceptions of their team climate can vary across individuals. Because of its potential relationship with climate level, climate strength was used as a moderating contingency in previous research (Colquitt, Noe, & Jackson, 2002). However, since teams in the present study consist of a relatively small number of members to analyze perceptual diversity (Mean team size = 19.74 in Colquitt, Noe, & Jackson, 2002), I treated climate strength as a control variable. To this end, following Chan (1998) and Colquitt et al., (2002), I calculated the coefficient of variation, dividing the standard deviation of group members' perceptions of psychological safety by the group's mean level (Allison, 1978).

Measurement Analyses

Before testing the hypotheses, I performed confirmatory factor analysis (CFA) to examine the convergent and discriminant validity of the

study variables collected from the same source (i.e., team members). These variables include team psychological safety, team learning behavior, and boundary spanning behavior. Overall, four measurement models were assessed and compared: a single factor composing all three variables, two two-factor models in which 1) team learning behavior and boundary spanning behavior, and 2) team psychological safety and team learning behavior were loaded on a single factor and the hypothesized three-factor model. The tests were conducted at the individual level because the team-level sample size was too small for factor analysis.

The CFA results of the hypothesized three-factor model yielded a significant chi-square ($\chi^2 = 320.43$, $df = 165$, $p < .01$) and an acceptable fit to the data (CFI = .88; RMSEA = .07; SRMR = .07). The first alternative two-factor model fit the data significantly worse, $\Delta\chi^2 = 244.26$, $\Delta\ df = 4$, $p < .01$, CFI = .64, RMSEA = .11, SRMR = .10, as did the second two-factor model, $\Delta\chi^2 = 89.13$, $\Delta\ df = 2$, $p < .01$, CFI = .78, RMSEA = .08, SRMR = .08. The hypothesized three-factor model exhibited significantly better fit than a single factor model ($\Delta\chi^2 = 370.99$, $\Delta\ df = 5$, $p < .01$; CFI = .53, RMSEA = .12, SRMR = .11. These results support the discriminant validity among the current study variables.

Analytical Approach

The current research investigates the upward influence of boundary-spanning behavior on team learning behavior across the two levels. Thus, the multilevel nature of the analysis using the nested data violates an assumption of independence of observation for ordinary least squares (OLS) regression analysis. Moreover, the bottom-up effect cannot be addressed by using traditional approaches such as hierarchical linear modeling (HLM; Preacher, Zyphur, & Zhang, 2010). If a researcher using HLM aggregates individual-level variables to the group-level, assigning group means as scores on variables at the group level would reduce the variability of the data. It should lead to "inappropriate estimates of the standard errors of the regression parameters" (Croon & van Veldhoven, 2007).

To overcome these methodological limitations, the current study utilizes multilevel structural equation modeling methods (MSEM, Preacher et al., 2010) using Mplus (Muthén & Muthén, 2007). While a standard structural equation model yields the latent variables measured via indicator variables, the latent variable model in MSEM treats the lower level units as indicators for the unobserved group score. Since each subject belongs to only one group, the indicators differ among groups. By treating higher level (macro-level) units as the unit of analysis and lower level (micro-level) units as indicators, the bottom-up multilevel model can become structural equation model (Croon & van Veldhoven, 2007). By doing so, MSEM allows researchers to test not only multilevel indirect mediation but also

cross-level upward effects that were previously unavailable by the use of traditional multilevel modeling techniques (Preacher et al., 2010).

It is important to note that MSEM analyzes bottom-up effects innately at the between-group level (Preacher et al., 2010). Thus, researchers need to clarify the meaning of lower level variables (i.e., boundary-spanning behavior) at the between-group level of analysis and how that meaning is interpreted in an overall model (Preacher et al., 2010). In this study, the definition of team learning behavior represents a shared understanding and consensus among team members ("shared team property," Klein & Kozlowski, 2000; Chan, 1998). The conceptualization of team learning behavior as a team level variable requires aggregation of team members' responses. On the contrary, boundary spanning was defined as an individual external behavior that aims to coordinate efforts, share, and gather resources in the outer environment (Marrone et al., 2007). A measure of boundary spanning, such as "I coordinate activities with external groups," assessed the level of individual boundary spanning. Although differences between teams on the measure were at the group-level, the construct still innately reflected individual behavior (Preacher et al., 2010; Kang, Solomon, & Choi, 2015). This conceptual reason for each variable in different levels necessitates the use of MSEM techniques.

For example, Chen and colleagues (2013) suggested that individual innovative performance would emerge to the team level, thus exhibiting an upward influence on team innovation performance. In doing so, they

distinguished the meaning of average *individual* innovative performance (i.e., how team members creatively perform individual roles) from *team* innovative performance (i.e., how members effectively cooperate with each other to produce creative team outcome). When individual team members perform their roles in a more creative way (high average level of individual innovative performance), they can better orchestrate and leverage on other members' inputs (high level of innovative team performance) through modeling or mimic others' creative behavior (i.e., behavior modeling, social contagion). This research uses theories for emergent phenomena and explains that the meaning of lower level variables (i.e., individual level) at the between-group level of analysis is different from group level variables. Building on this concept of the bottom-up contribution of individual-level behaviors, the present study analyzes an upward influence of individual-level boundary spanning on team learning behavior.

Results

Table 1 presents descriptive statistics and correlations among the study variables. Table 2 shows hypotheses tests of the relationship among team-level variables using hierarchical regression analysis. The results of multilevel hypothesis testing are summarized in Table 2.

Table 1
Means, Standard Deviations, and Inter-Correlations of Variables

Variable	M	SD	1	2	3	4	5	6	7
Level-1									
1. BSB	3.35	.79	–						
Level-2									
2. TS	5.40	2.37	-.06	–					
3. TT	14.11	8.84	.03	-.12	–				
4. PSS	.01	.83	.15	.01	-.10	–			
5. TPS	3.88	.37	.19*	-.07	-.14	.52**	–		
6. TLB	3.25	.34	.28**	-.05	.07	.06	.31*	–	
7. TC	3.58	.64	.11	.11	-.42*	.30	.41**	.33*	–

Note: M = mean, SD = standard deviation, BSB = boundary spanning behavior, TS = team size, TT = team tenure, PSS = psychological safety strength, TPS = team psychological safety, TLB = team learning behavior, TC = team creativity.
Team-level means were assigned down to individual team members.
*$p < .05$, **$p < .01$.

Tests of Hypotheses

From Hypothesis 1 to 4, it is proposed that team learning behavior would mediate the positive effect of team psychological safety on team creativity. Control variables were entered in the models first, and testing variables were followed. As shown in Table 2, team learning behavior was treated as a dependent variable in Model 1 and 2. In Model 2, the results confirmed the positive relationship between the predictor and the mediating

variable (β = .39, p < .05). In Model 1 to 3 in which team creativity was treated as a dependent variable, team psychological safety was positively related to team creativity (β = .32, p < .05). However, when team learning behavior entered in Model 3, this relationship became non-significant (β = .20, p > .10). Instead, team learning behavior was positively related to team creativity (β = .29, p < .05). This result showed the mediating role of team learning behavior between the positive relationship between team psychological safety and team creativity. Overall, Hypotheses from 1 to 4 were supported.

Table 2
Hierarchical Regression Analysis of the Relationship among Team Psychological Safety, Learning Behavior, and Creativity

Variables	DV: Team Learning Behavior		DV: Team Creativity		
	Model 1	Model 2	Model 1	Model 2	Model 3
Step 1: Controls	-.05	-.02	.06	.09	.09
Team Size	-.05	-.02	.06	.09	.09
Team Tenure	.08	.11	-.39*	-.36*	-.39
Safety Strength	.07	-.13	.26	.10	.13
Step 2: Main effect					
Psychological Safety		.39*		.32*	.20
Learning Behavior					.29*
R^2	.01	.12	.25	.32	.40
ΔR^2		.11*		.07*	.08*

Note: N = 42 teams. All entries are standardized regression coefficients.
*p < .05, **p < .01.

To test Hypothesis 5, I examined the cross-level relationship between boundary-spanning behavior (Level 1) and team learning behavior

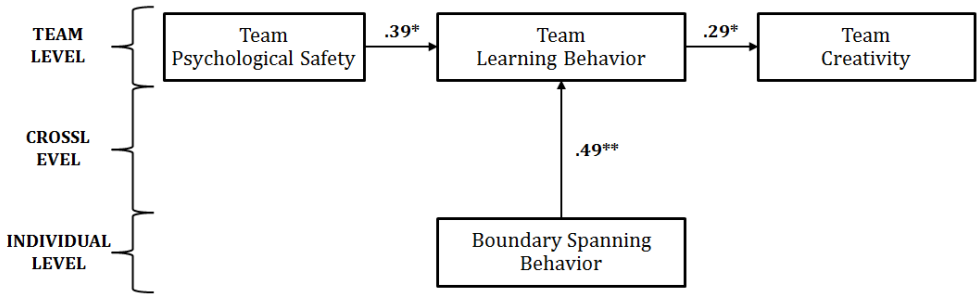
(Level 2) in the model using the Mplus multiple regression approaches (Kang, Matusik, Kim, & Philips, 2016; Kang et al., 2015). Thus, Path A (i.e., boundary spanning → team learning behavior) were entered and estimated in the MSEM model. As shown in Table 3, boundary-spanning behavior was positively and upwardly related to team learning behavior (β = .49, p < .01; 90% confidence interval (CI) .248, .749). Thus, Hypothesis 2 predicting the upward influence of boundary spanning was supported. The fit indices for the current MSEM model showed a satisfactory model fit (χ^2 =.00, p < .001, CFI = 1.00, RMSEA = .00, SRMR*B* = .00, where SRMR*B* was the standardized root mean square residuals for the between models).

Table 3
MSEM Result for the Relationship between Boundary-spanning and Team Learning Behavior

	Level	Coefficient	SE
Within Level			
Boundary Spanning (DV)	1		
Between Level			
Team Learning Behavior (DV)	2		
Boundary Spanning (IV)	1	.49**	.15

Note: Analyses are based on Mplus multiple regression approach; N = 195 at Level 1, N = 42 at Level 2.
All entries are standardized regression coefficients; IV = independent variable; DV = dependent variable; SE = standard error.
*p < .05, **p < .01.

Figure 2. Results of MSEM and Hierarchical Regression Analysis



Note. *p < .05, **p <. 01; Standardized coefficients are presented

Supplementary Study

The results showed that an upward influence of boundary spanning on team learning behavior was statistically significant. However, it was unable to draw a causal inference or to reflect temporal changes due to a cross-sectional design of the current study. To address these issues, supplementary semi-structured interviews (n = 5) were conducted with employees currently working in various industries such as mobile, entertainment, and steel industry. Four of them were male, and the average age was twenty-nine. Organizational tenure was approximately 2.3 years. Interviews varied in length from fourteen minutes to twenty minutes and averaged approximately sixteen minutes. Interviewees were first introduced to the concepts of boundary spanning and team learning behavior as defined in the current study.

Next, they were asked to answer three questions: 1) “How often do you and your team engage in boundary spanning and team learning behavior over the past week, respectively?”; 2) “What did you learn after engaging in boundary-spanning?”; 3) “Do you think your or others’ boundary spanning activities affected team learning behavior? If so, please explain how they contributed to team learning behavior (in what aspect?).” The first question was to ensure that interviewees and their teams engaged in boundary spanning and team learning behavior to a certain extent. They were indicated to reported in 5-Likert scale (1 = “none,” 2 = “once or twice a

week," 3 = "three or four times a week," 4 = "once or twice a day," 5 = "more than three times a day"). The results of the first question showed that they spanned boundaries several times a week (M = 3.6), and their teams engaged in team learning behavior more than twice a week (M = 2.6). This implied that the interviewees could be reliable sources for explaining boundary spanning and team learning behavior experiences. Below, I detailed a mechanism through which boundary spanning influences team learning behavior.

The benefit of boundary spanning is that it not only helps employees to complete their cross-functional tasks through networking but also enables them to obtain valuable sources of knowledge and know-how to learn (Ancona & Caldwell, 1992; Bresman, 2010). Minhee[②] is an employee of a plant and facility department in the steel industry, undertaking procurement process. She described what she learned while engaging in boundary-spanning with employees in another department):

> A big part of my work is purchasing the product, so I need a lot of knowledge about what we have to and will be buying. We mostly deal with products related to engineering, electronics, and constructing, but there is no expert to that area in my department. We have to know about products and employees in other department know much better. If I do not collaborate with them, I cannot purchase any product! Thus, the more I communicate with them, the more I come to know about the potential product.

② Names that are used in the present study are all fictitious names.

The description of Minhee confirms the current prediction that boundary spanning will enable individuals to learn work-related necessary knowledge. By joining her workflows with employees in another department, she was able to obtain and learn crucial knowledge that can be used in her work. Complementing Minhee's implication, Minsoo described how he was able to learn while coordinating and collaborating work with external actors (e.g., employees in other department, clients, and employees in other company). He is an affiliate partnership sales employee in ABC Network Group's commercial department:

> I learn from how he works. If he works in a wrong way, I think myself that I should not make those same mistakes. On the contrary, I try to model his work attitude and learn work-related knowledge if he is competent. […] My work is related to sales. I have much information than employees doing purchase part because I meet diverse people. What I mean is that employees in purchase part meet those who come to them, which make them in a passive position to get information. Thus, employees in purchase part try to work with me as much as they can to obtain information that they did not know. […] Unless we do a project together, there is not much chance to exchange knowledge itself. […] What we exchange is up-to-the-minute information. We cannot google all information, so it is important to get what is useful. For example, he or she can give me information that a rival company CCC is recently focusing on drama or something. But this is not knowledge. It is more like information.

Minsoo first described that through boundary spanning he was able to learn from how others' work. He also described how employees in other

department tried to overcome shortcomings of this work position by working with him. He implied importance of boundary spanning such that employees in purchase part even tried to work with him just to obtain valuable information. In contrast to Minhee's description, he described that the benefits of boundary spanning as resources derived not from knowledge, but mostly from the latest, as well as useful information. Of course, it is undeniable that Minsoo learned some knowledge from external actors. However, what makes boundary spanning so important seems that it replenish information pool potentially crucial for working. It seemed that boundary spanning contributes to individual learning about his or her work role and industries. For those positions where having critical work-related knowledge is more important for doing work (i.e., procurement in a steel industry), learning from boundary spanning is focused on getting useful knowledge. On the other hand, in work roles where getting trendy information is critical (i.e., sales in an entertainment industry), learning primarily pertains to keep abreast of the latest and useful information.

Next, the current study attempts to reveal the process through which boundary spanning affects team learning behavior. Regarding this mechanism, Chulsoo described how his knowledge and information from boundary spanning stimulated team learning behavior. Chulsoo, an assistant manager in DDD telecommunication's product development team, develops new contents and manages the quality of the extant products:

There were some meetings when our team shares each other's

> information and ongoing work processes. During those meetings, I share knowledge and information that I learned during other project meetings with people in another department. Sometimes, it can be a weekly report. Anyway, then team members benefit from what I learned. But it will not be one hundred percent. I could tell them everything, but it will be a waste of time. I only tell them seventy or eighty percent of information without the trivial. […] For example, there was a time when I learned from the client that our rival company had changed some systems. I did not remember exactly what it was. Anyway, so I commented my idea on the current systems of our team based on the information I got. I said "if the system changes, our work process will be more effective. If we do not change now, we will be lagging behind them." After that, we discussed how to improve the system. Should we change all of it or just some of it? Yes, it was something like that.

Chulsoo provided a vivid description of how his boundary spanning influenced team learning behavior sequentially. First, as described by other interviewees, learning took place in a boundary spanner so that he or she was able to obtain and internalize useful information. Second, As Chulsoo depicted, he brought the information to a team meeting. The important thing is that he shared the information and knowledge in the form of an opinion and idea. Since the information was not redundant but highly useful, team members actively engage in reflection and discussion to appropriately apply the information to the current work process. Through this process, the team was able to learn new systems to the current knowledge pool and successfully adapt its process to the changing environment. Chulsoo described that his team as a whole shared each other's opinions and decided whether to experiment the new things. In sum,

this example showed the process through which individuals' boundary spanning emerged into upper-level learning behavior.

Discussion

The current study examines multi-level antecedents of team learning behavior in an entrepreneurial context. The results showed that team learning behavior mediated the positive relationship between team psychological safety and team creativity. MSEM results also showed that individual-level boundary spanning exhibited cross-level, bottom-up effects to team learning behavior. A supplementary study based on semi-structured interviews supported a hypothesized process through which boundary spanning influences team learning behavior. I discuss these findings in more detail, together with their theoretical and practical implications.

Theoretical and Practical Implication

The current study makes several theoretical contributions to team learning and boundary spanning literature. The first is related to the findings showing that team learning behavior is a crucial link between psychological safety and team creativity in start-up teams. In today's volatile business environment, organizations must improve their products and services more creatively through new knowledge and insight (Fiol & Lyles, 1985). To achieve that goal, adaptability of an organizational team to changing environment plays a significant role as a building block (Senge, 1990). Our results of the team-level analysis indicated that psychologically safe climate is a key antecedent to learning behavior of a team. If team members shared a

belief that it is harmless to take risks for voicing up in their team, they can actively share ideas on teamwork process and experiment unconventional way of doing works. As a result, teams as a whole can generate more creative ideas.

The context of the current study is also timely and crucial for the literature. The role of start-up firms in facilitating economic growth and development is getting more important in the contemporary business environment (Carree & Thurik, 2003). However, despite their contribution and role in the business environment, start-up (or entrepreneurial) teams have received scant attention from organizational psychology, as well as organizational behavior scholars. A majority of study samples and contexts in existing team learning behavior and external learning literature are based on teams in well-established firms (e.g., Edmondson, 1999; Bresman, 2010). As a result, we are limited substantially in our knowledge and empirical evidence whether the findings using traditional forms of the subject can be applied to new types of organizations. For generalizability of existing findings, scholars should put more efforts to expand scope of the research context. In doing so, the current study verifies the previous findings on the role of team learning behavior about psychological safety and team creativity (Edmondson et al., 2007). This result provides extended evidence on how team members in highly volatile and uncertain team environment can increase their adaptability and creativity through psychological climate.

Moreover, the current findings showed that boundary-spanning

behavior has an upward influence on team learning behavior. Despite the maturity of literature on the team learning process, researchers have ignored the lower level antecedents, mainly focusing on team-level antecedents such as team climate, leadership, and shared goal perception (Edmondson et al., 2006). This lack of understanding of lower-level impact has led us to overlook the fact that team learning is innately a micro-to-macro phenomenon. Building on quantitative and supplementary qualitative study, the current study integrates the conceptualization of learning as an individual-level property (Kozlowski & Salas, 1997), and team learning behavior as a bottom-up and an emergent phenomenon (Kozlowski & Bell, 2008).

The current focus on external learning also highlights the role of external activities in team learning behavior. As workflows of contemporary teams are increasingly relying on external actors, work-based linkages and subsequent conduit of knowledge have become the primary means for the emergence of team learning (Kozlowski & Bell, 2008; Bresman 2010). Thus, it can be crucial to revealing a theoretical mechanism through which those activities facilitate higher-level learning behavior. Based on the multilevel dataset, as well as vivid descriptions of interviewees, this study explains that team members' boundary spanning enables external learnings and those learning product stimulate the mutual learning in teams.

The result of the present study regarding the relationship between internal and external activities can also be interpreted through a lens of

psychological needs. Social identity formation theory assumes that an individual has needs for assimilation (social inclusion) and differentiation (individuation; Brewer, 1991). In a similar vein, inward and outward activities can be posited as the two opposing process through which a group manages boundary needs (Choi, 2002). Team members will adjust the level of boundary-spanning behavior not to be isolated from others. At the same time, they will try to preserve their uniqueness through focusing on internal process. The sample of this study has a low average age of firms and team tenure (M = 4.2 years, M = 14.1 months). Hence, because of unestablished team internal and external environment, motivation to solidify own knowledge pool and to collaborate works with external actors can be both high. Since the current result showed that external activities facilitate team learning behavior, it can be implied that team members were able to satisfy both of their needs successfully. This study suggests that team members could integrate external activities into internal team process, which complements a previous understanding of competing for relationship of the two. Future study should further investigate the complex relationship between two identity needs in team process and individual activities.

The present study also has some implications for leaders who wish to enhance team learning. Especially, the results are relevant to an environment characterized by high uncertainty and constrained resources. First, in the same line with previous research, the current results suggest that managers and leaders should give priority to building a shared belief for

interpersonal risk-taking. The current finding shows that only after psychologically safe team climate lowers the huddle of involvement to reflection process, can team members actively participate in asking questions, discussing each other's errors, and seeking feedback.

Moreover, the present findings illuminate tangible approaches that leaders can adopt to enhance individuals' influence on team learning process. The results of this study indicated that individual team member's external activities exert an upward influence to the emergence of team learning behavior. Since team learning behavior requires "input" for team learning, unique learning product of boundary spanning can be critical when teams suffer from lack of resources. Leaders should encourage their team members to actively engage in boundary-spanning so that they can learn from new information and knowledge and bring those learning products to team meetings. Moreover, organizations and leaders can create new channels (e.g., daily reports of external information) to enable team members to understand the state of the current knowledge pool of their teams. By doing so, team members will not only understand what is new but also share and experiment it with others.

Limitations and Future Research Directions

Although the current study has theoretical and practical implications, some limitations should be addressed for future research agenda. First, concerning individual-level antecedents of team learning

behavior, the present study only takes external activities (i.e., boundary spanning) into account. Theoretically, internal activities and external activities are in competing, as well as a synergistic relationship (Choi, 2002). For example, team learning especially that is driven by external activities interferes with and sometimes highly depends on teams' internal learning (i.e., team learning based on internal activities; Bresman, 2010). If team members spend too much effort on internalizing materials gathered within teams, they are unable to allocate enough energy to external team learning. On the other hand, if teams do not go through internal team learning process after external learning, what they have learned from team environment could not be fully internalized. This intricate relationship between internal and external learning implies that individuals' internal and external behaviors can be both crucial in understanding the emergence of team learning behavior. Future study can consider both individuals' internal behavior, such as internal information sharing, and external behavior, such as boundary spanning, at the same time to capture their competing and synergistic effects to team learning behavior.

A limitation in research design should also be noted in understanding the present findings. This research involved cross-sectional data that precludes making causal inferences. Although the present study asserts that individual-level boundary spanning would has a bottom-up effect to team learning behavior, it is also possible that team learning behavior influences team members' boundary spanning. For instance, when

teams try to seek feedback and share information about their teamwork, team members can better understand what kinds of external information and knowledge is required. If this is so, team members would be more likely to span their boundaries. The present study conducted supplementary study drawing from some interviews to address this issue. The result of interviews showed how boundary spanning leads to external learning and subsequent team learning behavior. To solve the ambiguity in causality, future study can use the longitudinal study designs and real-time, process-oriented research that capture group dynamics over time. The process-focused research could examine the causality of the process under which boundary spanning leads to the emergence of team learning behavior.

Since the present study does not specify the cause of boundary spanning behavior, it can be worthwhile to investigate antecedents of boundary spanning that received less attention from scholars. Previous literature had reported various predictors of boundary spanning, including work experiences across functional domains (de Vries, Walter, Van der Vegt & Essens, 2014), boundary spanning role identity, and self-efficacy (Marrone, Tesluk, & Carson, 2007). As compared to this task or boundary-spanning related factors, however, an impact of affect and emotion has not been reported. Considering potential impacts of positive affect on individuals' behavior and group process (Barsade, Brief, Spataro, & Greenberg, 2003; Barsade & Knight, 2015), the role of positive affect about boundary spanning can be an interesting research agenda.

Specifically, there can be two reasons why the positive affective state is likely to increase boundary-spanning behavior; 1) broadened thought-action repertoires, and 2) the benefit of positive affect in resource building (broaden-and-build theory; Fredrickson, 1998). The positive affective state is the combination of pleasantness and high activation (e.g., excitement; Barrett & Russell, 1999) that coordinates changes in action and thought tendencies. Positive emotion enhances a variety of resources; physical resources (e.g., physical skills, health; Boulton & Smith, 1992), psychological resources (e.g., resilience; Fredrickson, Tugade, Waugh, & Larkin, 2003), social resources (e.g., friendships; Aron, Norman, Aron, McKenna, & Heyman, 2000), and intellectual resources (e.g., knowledge, intellectual complexity, creativity; Csikszentmihalyi & Rathunde, 1998; Isen, Daubman, & Nowicki, 1987). To *build* these personal resources, positive emotion *broadens* momentary thought-action repertoires and prompts them to engage in a wider range of thoughts and actions than usual (Frederickson, 1998). The empirical evidence has supported this claim that positive emotions induce unusual (Isen, Johnson, Mertz, & Robinson, 1985), flexible (Isen & Daubman, 1984), and integrative (Isen, Rosenzweig, & Young, 1991) thoughts. Translating this broadened thought and attentional tendencies into actions, positive affect fosters wider behavioral patterns such as playing and exploring than those of who are in neutral states (Frederickson, 2001). Researchers also found that although discrete positive emotions (e.g., excitement) are short-lived experiences, such emotional

states can transform into the general positive mood (e.g., pleasantness; Barsade & Gibson, 2007). In another word, temporary changes in thought-action repertoires can become broad tendencies in a given period.

These extended scopes of thought-action patterns may lead to increased level of boundary spanning behavior. Boundary spanning requires members to direct toward teams' environment to meet organizational goals. For instance, teams would give more strategic emphasis on expanding the scope of the task (i.e., collective valuing of boundary spanning activities; Marrone et al., 2007). With attentional focus and behavioral patterns, members could incorporate their workflows into team's external task operation. Indeed, cognitive approach to boundary spanning found that individuals who geared with cognitive complexity and broad cognitive scope are more likely to engage in external task-related activities (de Vries, Walter, Van der Vegt, & Essens, 2014).

Second, resources built from positive affect could also facilitate boundary spanning. Boundary spanning is inherently establishing the external relationships and linkages with others (Marrone, 2010). By implication, boundary-spanning individuals who are more congenial and cooperative can better affiliate with external actors and lubricate the process of task coordination and negotiation. In the way of building social resources (Aron et al., 2000), individuals with positive mood display signs of joyfulness and cooperativeness. These signs make external actors perceive the individuals as agreeable and trustworthy (Fischer & Manstead, 2008).

Consequently, bonding and creation of social relationships with task-related external actors can be enhanced.

Physical, intellectual, and psychological resources will also accentuate both active task-related involvement and environment scouting behavior. According to the resource-based perspective (Choi, 2002), conducting either internal or external activities requires resources (e.g., time, physical and mental effort) otherwise available for the other. This trade-off relationship forces a team to allot resources between internal and external activities. If teams emphasize internal focus and pay too much attention to the internal operation, they could fail to address environmental changes and critical external information (Janis, 1982; Boyd, Dess, & Rasheed, 1993). Considering this resource-related problem, individuals in the positive affective state can better engage in boundary-spanning because they can leverage on physical and psychological resources than those who are not. The more they could build extra resources from positive affect, the more they can put more efforts for activities beyond team boundary.

In sum, drawing from broaden-and-build theory and resource-based approach to boundary spanning, future research should empirically test whether individual positive affect has a positive impact on boundary spanning behavior.

Conclusion

Prior research has emphasized that team learning behavior is a multilevel phenomenon, driven by team-level antecedents, as well as interaction of individuals. This study using quantitative and qualitative data demonstrates that team psychological safety is a critical antecedent that enhances team learning behavior and subsequent team creativity. Moreover, the result showed that individual-level boundary spanning influences the process by which teams engage in learning behavior. These empirical findings indicated that team members who experienced external learning through unique information and knowledge from external actors would provide new insights that need to be learned via interactions involving reflection, experiment, and discussion. Drawing from previous findings and recent multilevel theory of emergence, this study advances our understanding of how group context and individual group members play a role in group learning, particularly in a dynamic organizational environment characterized by incessant change and limited resources.

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APPENDIX

Appendix A. Followings are the translated survey items used in the current study.

Team Psychological Safety (Edmondson, 1999)

다음은 귀하께서 <u>소속되신 부서/팀</u>에 대한 질문입니다. '전혀 그렇지 않다'에서부터 '매우 그렇다' 중에 체크해주시기 바랍니다.

1. 내가 속한 팀/부서에서는, 실수를 하면 당사자를 좋지 않게 본다.
2. 우리 팀/부서에서는 문제상황이나 꺼내기 쉽지 않은 이야기를 제기할 수 있다.
3. 우리 팀/부서에서는 남들과 다르다는 이유로 배척 당할 때가 있다.
4. 우리 팀/부서에서는 위험을 감수하는 행동들이 허용된다.
5. 우리 팀/부서에서는 다른 팀원에게 도움을 요청하는 것이 어렵다.
6. 우리 팀원 중에는 나의 노력을 깎아 내리는 행동을 할만한 사람이 없을 것이다.
7. 팀원들과 일할 때는 내가 갖고 있는 특별한 기술과 재능이 잘 발휘되고, 가치를 인정받는다.

Team Learning Behavior (Edmondson, 1999)

아래와 같은 <u>행동의 빈도</u>를 현재를 포함한 <u>지난 일주일 동안</u> 미루어 보았을 때 '전혀 없음'부터 '매우 자주' 중에 체크해 주시기 바랍니다.

1. 우리 팀/부서는 업무 프로세스를 개선하기 위한 방법을 찾기 위해 주기적으로 시간을 투자한다.
2. 팀/부서에서 의견 차이가 발생할 경우, 모두 공개적으로 논의하기 보다는, 따로 개별 조율하는 편이다.
3. 우리 팀/부서원들은 다른 사람들(고객 혹은 다른 부서)로부터 가능한 많은 정보를 얻어온다.
4. 우리 팀/부서에서는 중대한 변화를 만들어 낼 수 있는 새로운 정보를 자주 찾아본다.
5. 우리 팀/부서의 누군가는 항상 우리 업무 프로세스가 제대로

작동하는지에 대해 중간에 검토해 보곤 한다.

6. 우리 팀/부서원들 간에 토의 과정에서 쟁점이 있을 때는, 각자의 주장을 적극적으로 하는 편이다.
7. 우리 팀/부서에서는 정보 공유나 논의를 위해 부서 외부의 사람들을 초대하기도 한다.

Boundary Spanning Behavior (Ancona & Caldwell, 1992)

아래와 같은 <u>행동의 빈도</u>를 현재를 포함한 <u>지난 일주일 동안</u> 미루어 보았을 때 '전혀 없음'부터 '매우 자주' 중에 체크해 주시기 바랍니다.

Task Coordinating Activity

1. 나는 업무 관련 문제를 해결하기 위해 우리 팀/부서 외부의 사람들과 협업한다.
2. 나는 외부의 사람(우리 팀/부서 외부, 회사 밖)들과 여러 활동들을 조율한다.
3. 나는 우리 팀/부서에서 필요한 것을 구하기 위해, 회사 내 다른 부서를 활용한다.
4. 나는 업무 기한에 대해 우리 부서/팀 외 다른 사람들과 협상한다.
5. 나는 우리 팀/부서 외부 사람들과 내 업무 결과에 대해 함께 검토한다.

Scouting Activity

6. 나는 유사한 프로젝트를 할 때 경쟁사에서 무엇을 하는지 알아본다.
7. 업무 관련 아이디어/기술을 얻기 위해 회사 내부 또는 외부의 환경을 유심히 살펴본다.
8. 우리 팀/부서 외부의 사람들로부터 기술 관련 정보나 아이디어를 얻어온다.

Team Creativity (Zhou & George, 2001)

다음은 귀하께서 <u>소속되신 부서/팀</u>에 대한 질문입니다. <u>부서장으로써 최근 1주일을 되돌아 보았을 때</u>, '전혀 그렇지 않다'부터 '매우 그렇다' 중에 체크해 주시기 바랍니다.

1. 우리 부서/팀은 문제를 해결할 때, 새롭고 유용한 아이디어를 잘 만들어 낸다.
2. 우리 부서/팀은 업무 추진에 필요한 새로운 프로세스와

방법들을 잘 만들어 낸다.

3. 우리 부서/팀은 문제 상황에 당면해서도 창의적인 해결책을 만들어낸다.

국문 초록

오늘날의 조직 학습이 팀에 의존함에 따라, 학자들은 어떻게 팀이 새로운 정보와 지식을 학습하는지에 큰 관심을 가져왔다. 이들은 주로 팀 수준의 요인에 초점을 맞춰 팀 학습 행동의 몇 가지 주요 선행 변인(예. 심리적 안전감)을 발견하였다. 그러나 팀 수준에 한정된 이와 같은 관점으로 인해, 실제 팀 내에서 개인과 개인 간 상호작용이 어떻게 팀 수준의 학습 행동에 영향을 미치는지에 대해서는 알기 어려웠다.

본 연구는 팀 현상이 본질적으로 다 수준적이라는 사실에 착안하여, 개인의 행동이 어떻게 팀 학습 행동의 출현(emergence)에 기여하는지 밝히고자 한다. 세부적으로, 본 연구는 개인 수준의 경계관리행동이 팀 학습 행동에 대해 상향 영향(upward influence)을 가지리라 가정하였다. 즉, 개인 수준의 경계관리행동을 통해 학습된 유용한 외부 정보와 지식은 팀 내에서 사회적 대리 학습(vicarious learning)을 통해 확산된다. 이와 더불어 본 연구는 기존 연구에 기반하여 팀 심리적 안전감이 팀 학습 행동을 증진시키고, 나아가 팀 학습 행동이 심리적 안정감과 팀 창의성 간의 관계를 매개할 것이라고 가정하였다. 특히 본 연구는 스타트업 팀을 대상으로, 기존 연구에서 검증된 결과가 새로운 형태의 조직 내 팀에서도 확인되는지 알아보았다. 마지막으로 보충적인 질적 분석(인터뷰 자료)을 통해 횡단 연구의 한계를 보완하였다.

분석 결과, 팀 학습 행동에 대한 개인 수준 경계관리행동의 상향영향이 통계적으로 유의미하였다. 팀 수준의 분석에서도 팀 학습 행동이 팀 창의성에 대한 심리적 안전감의 효과를 유의미하게 매개하였다. 또한 보충적인 인터뷰 자료를 분석한 결과, 본 연구에서 가정된 경계관리행동이 팀 학습 행동에 영향을 미치는 기제(mechanism)가 지지되었다. 본 연구는 다수준적 관점과 출현 개념을 활용하여 팀 수준 분석에 제한되었던 팀 학습 행동 연구에 기여한다.

주요어: 팀 학습 행동, 경계관리행동, 팀 심리적 안정감, 팀 창의성, 다수준 분석, 스타트업

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