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**WHEN ARE STRONG OR WEAK TIES BEST FOR CREATIVITY AND  
INNOVATION?  
CONSIDERING THE ROLE OF CONTEXTUAL FACTORS**

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by

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## ABSTRACT

Creativity is becoming essential for organizational success in the 21st century. Yet navigating the creative process is difficult and arduous for employees. To generate and implement creative ideas, creators often get help from their social networks. However, the strength of one's network relationships and its influence on creative performance likely depend on task/contextual factors that also influence whether creative ideas are subsequently implemented. The purpose of the current study was to examine how social and contextual factors interact across two creative process stages: information gathering to creativity and creativity to idea implementation. Drawing on threat rigidity theory and a similar framework on constraints on creativity, I argue that the information gathering network strength-creativity and creativity-idea implementation relationships are moderated by experienced creative time pressure and organizational support for innovation. Specifically, I argued that time pressure was a hindrance for creativity, but that it depended on organizational support. Additionally, I argued that time pressure was beneficial for idea implementation. Using an employee field sample, results supported some of the hypotheses. During the early stage, information gathering network strength was positively related to creativity when experienced creative time pressure was low and organizational support was high and was negatively related when experienced creative time pressure was high and organizational support was high. I also found that experienced creative time pressure moderated the creativity-idea implementation relationship and that organizational support moderated the relationship between time pressure and idea implementation. Implications for threat rigidity theory and the benefits of network strength with regard to the creative process and task/contextual factors are discussed.

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When are strong or weak ties best for creativity and innovation?

Considering the role of contextual factors

## **Chapter 1: Introduction**

Creativity and innovation are becoming critical for organizational success in a competitive and constantly changing economic landscape. Indeed, the World Economic Forum (2016) asked top management and those in charge of hiring at 371 corporations across nine industries to report the abilities jobs required in 2015 and will require in 2020. In 2015, creativity was ranked as the 10th most required ability, but was ranked 3rd for 2020, a clear indication creativity is growing in importance for modern work. Further, the first and second ranked abilities for 2020 were complex problem solving and critical thinking, respectively, which are closely related to creativity. With these findings in mind, corporations must seek ways to harness workers' creative potential and support the implementation of creative ideas.

Individual creativity and innovation often occurs at the intersection of personal sources (e.g., job experience, personality), contextual sources (e.g., resources, autonomy), and social sources (e.g., information gathering; Perry-Smith & Shalley, 2003; Woodman et al., 1993). Concerning the latter, social capital—the idea that social relationships facilitate a person's actions (Nahapiet & Ghoshal, 1998)—has been shown to play a critical role for gathering information that is important for creativity and subsequent idea implementation (Baer, Evans, Oldham, & Boasso, 2015; Perry-Smith & Mannucci, 2015, 2017).

Although findings indicate that social networks and social relationships contribute to individual creativity and innovation, the *strength* of these social network relationships that are beneficial for creativity remains a controversial and debated topic (Perry-Smith & Mannucci, 2015; Rost, 2011). Weak network ties are distant contacts that someone communicates with

infrequently, often works in another department, and approaches problem solving with a different perspective (Coleman, 1990; Granovetter, 1973; Hansen, 1999; Nahapiet & Ghoshal, 1998; Perry-Smith & Mannucci, 2015). Strong network ties are close contacts built on trust and social norms that someone communicates with regularly, often works in the same department, and approaches problem solving with a similar perspective. Although theory has argued that weak ties, rather than strong ties, are important for creativity (Granovetter, 1973), empirical research has produced mixed results. *Both* weak and strong ties are sometimes positively related to creativity and other times unrelated to creativity (Baer et al., 2015; Perry-Smith, 2006; Perry-Smith & Mannucci, 2015; Rost, 2011).

Recent theory and meta-analytic evidence specifies two important directions for future research. First, it is important to study moderating factors that influence the relationship between network strength and creativity/innovation. Baer et al. (2015), in a recent meta-analysis, found a weak, but statistically significant positive relationship between creativity with network strength and number of strong ties, but a nonsignificant relationship between creativity and number of weak ties. The 80 percent credibility intervals indicated variability exists among effect sizes, indicating moderators influence these relationships. Second, researchers should take a creative process-oriented approach when studying social network strength and creativity/innovation. Indeed, Perry-Smith and Mannucci (2017) argued that conflicting relationships might be due to researchers examining different creative process stages. Taken together, future research should examine how moderating factors influence the relationship between network strength and creativity and consider the creative process stages to provide further clarification on the mixed empirical results.

To clarify these conflicting results, I adopted a highly recommended interactionist

approach, focusing on how social and contextual sources interact to influence creativity and innovation (Woodman et al., 1993; Zhou & Hoever, 2014). I utilized threat rigidity theory (Staw, Sandelands, & Dutton, 1981) and an updated framework on creativity under constraints (Gutnick, Walter, Nijstad, & De Dreu, 2012) to examine how experienced creative time pressure differentially impacts two phases of the creative process: the information gathering to creativity phase and the creativity to idea implementation phase. Using these frameworks, I argue that while time pressure, a threat, might be harmful to creativity (Amabile, Mueller, et al., 2002; Amabile, Conti, Coon, Lazenby, & Herron, 1996; Amabile, Hadley, & Kramer, 2002; Runco, 1999, 2004), it may be beneficial for idea implementation. I then examine the role that organizational support for innovation plays in these relationships.

This study makes a number of contributions. First, I argue that while threats are often perceived as negative, they have potentially positive effects under certain conditions and for certain outcomes. Extending threat-rigidity theory, which focuses more on the harmful effects of threat on performance (Staw et al., 1981), I argue that threats can be beneficial for creativity and innovation.

Second, I propose competing hypotheses for whether strong or weak ties are beneficial for creativity. Because of the inconsistent results in empirical research, I argue that contextual factors moderate the relationship between information gathering network strength and creativity. Specifically, I examine whether weak or strong ties are beneficial for creativity when time pressure is low and examine how organizational support for innovation jointly moderates the information gathering network strength and creativity relationship. This has important implications for addressing the conflicting research on network strength and creativity (Baer, 2010; Baer et al., 2015; Perry-Smith, 2006; Zhou, Shin, Brass, Choi, & Zhang, 2009).

## Theoretical Background

### Creativity and Innovation

Although the terms creativity and innovation are used interchangeably, the two terms reflect two different stages of an idea's journey. According to Anderson et al. (2014):

*Creativity and innovation at work are the process, outcomes, and products of attempts to develop and introduce new and improved ways of doing things. The creative stage of this process refers to the idea generation, and innovation refers to the subsequent stage of implementing ideas towards better procedures, practices, or products (p. 1298).*

Anderson and colleagues' definition highlights how the two concepts are inherently linked.

Creativity precedes innovation: creative ideas must be generated before they can be implemented. Whereas creativity can occur without innovation, innovation cannot occur without creativity.

Creativity and innovation are difficult for various reasons. First, most ideas fail (Mumford & Hunter, 2005). Because creative ideas/products are novel and often untested, they have a greater likelihood of failure, costing an organization time and money. Second, creativity requires time to obtain relevant information and integrate it into the ideas generated (Cropley, 2006; Redmond, Mumford, & Teach, 1993; Sawyer, 2012). Obtaining information helps people refine ideas, discard impractical ideas, and then move the remaining ideas towards implementation. Third, biases towards creativity influence how organizations and leaders view creativity (Blair & Mumford, 2007; Mueller, Melwani, Loewenstein, & Deal, 2017; Mueller, Melwani, & Goncalo, 2012). Specifically, creativity is often viewed as risky, causing organizations and leaders to abandon and not implement creative ideas. Thus, it is often difficult for creative ideas, especially those high in creativity, to be implemented (Baer, 2012).

The above obstacles for generating and implementing ideas imply that people will benefit from using their social networks to obtain information, handle the inherent complexity of creativity, and provide support to avoid criticism/rejection when developing creative ideas. Although a person working alone can overcome these difficulties, it is impractical. Such efforts would be tedious and other creators would likely develop a similar idea quicker. To increase the efficiency of creativity and likelihood of implementation, creators often receive information and support from others (Baer, 2012; Nahapiet & Ghoshal, 1998; Rodan & Galunic, 2004). In other words, creators turn to those within their social network, harnessing their social capital.

### **Social Capital, Network Strength, and Creativity**

Social capital is the notion that social relationships serve as a resource for action (e.g., creativity; Nahapiet & Ghoshal, 1998). Social capital can serve multiple functions including gathering information and social support. In short, people who are better connected to others often do better (Burt, 2001).

The strength of a person's social network influences whether social capital is beneficial for certain outcomes. Social network strength is conceptualized by three factors (Granovetter, 1973): (a) closeness, (b) duration, and (c) frequency. Closeness refers to the extent to which a person is emotionally close (i.e., an acquaintance vs. a very close colleague/friend). Duration is how long a relationship has existed (i.e., two people have known each other for a few months vs. many years). Last, frequency reflects how often people communicate with each other (i.e., infrequently/once a year or less vs. frequently/daily). Social networks with contacts low in all three dimensions are considered weak network strength ("weak ties") and networks with contacts high in all three dimensions are considered strong network strength ("strong ties"). Strong ties are often those within the same social circle or work department, whereas weak ties are those

outside of a person's primary social circle or work department (Hansen, 1999).

Granovetter's (1973) seminal strength-of-weak-ties theory argues that weak ties are those outside of their immediate social circle that provide them with novel information and fresh perspectives for solving problems. As relational strength increases, a person's information and problem solving perspectives are expected to more strongly overlap with their social network contacts, but there is also greater trust with network contacts (Coleman, 1988; Nahapiet & Ghoshal, 1998). Thus, theoretical arguments have stated that weak network strength is beneficial for creativity because people can obtain diverse and nonredundant information for creativity. However, strong network strength can be beneficial for other outcomes because of trust and support from strong ties.

Previous research on network strength and creativity has produced mixed results: *both* weak and strong ties are sometimes positively related to creativity and other times unrelated (Baer et al., 2015; Perry-Smith, 2006; Perry-Smith & Mannucci, 2015; Rost, 2011). One potential reason for these mixed results is that empirical studies examining network strength often confound network size and strength. That is, they identify the number of weak and strong ties in a person's network and then examine the relationship between these measures with creativity (Marsden & Campbell, 1984; Nelson, 1989; Perry-Smith, 2006; Seibert, Kraimer, & Liden, 2001). This approach confounds network size and strength and it is unclear which, or both, are related to creativity/innovation (Baer, 2010). Notably, both network size and strength were positively related to creativity/innovation, with meta-analytic work indicating network size has a stronger direct relationship with creativity/innovation than does strength (Baer et al., 2015). However, the positive relationship between network strength and creativity was weak and indicated moderators likely influence this relationship. Thus, confounding size and strength

impedes researchers from determining if effects are due to network size or strength. Thus, it is important to treat network size and strength as two distinct factors.

A second reason for mixed results is that studies examining the relationship between network strength and creativity have not considered whether contextual factors influence the relationship between information gathering network strength and creativity. Indeed, Adler and Kwan (2002) stated, “Task contingencies help explain whether strong or weak ties are more valuable” (p. 32). Contextual factors help shape whether people have access to and can utilize information obtained from weak or strong ties. Notably, a recent meta-analysis found a weak effect size between network strength and creativity (Baer et al., 2015). However, they found large credibility and confidence intervals indicating that moderators likely explain these relationships. It is important to consider other factors that also account for and moderate the relationship between network strength and creativity. I draw on threat rigidity theory (Staw et al., 1981) and apply an interactionist perspective (Woodman et al., 1993) to argue that task/work characteristics influence whether weak or strong networks are beneficial for creativity.

### **Hypothesis Development**

In the current study, I draw on threat rigidity theory (Staw et al., 1981) and a more recently updated framework focusing on constraints on creativity (Gutnick et al., 2012) to examine how experienced creative time pressure, a threat, differentially impacts two creative process stages. I also examine how organizational support for innovation impacts whether time pressure is a threat for creativity. I argue that experienced creative time pressure negatively impacts the information gathering to creativity relationship, but positively influences the creativity to idea implementation stage. Experienced creative time pressure is “the extent to which employees feel they have insufficient time to develop creative ideas at work” (Baer &



Oldham, 2006, p. 963). Empirical evidence indicates that time and support are necessary for creativity (Amabile, 1998; Amabile, Hadley, & Kramer, 2002; Scott & Bruce, 1994). Time pressure is typically a constraint on creative ideation (Amabile, Mueller, et al., 2002). Yet, case examples challenge this notion. Some industries, organizations, and workers must engage in creative activities at a faster pace to remain competitive and they meet these demands and expectations. I argue that whether network strength relates to creativity depends on whether the organization is supportive of creativity. That is, organizations might be mindful of the constraints placed on employees and help them overcome these constraints by providing necessary resources and support (Baer & Oldham, 2006; Klein & Knight, 2005; Klein & Sorra, 1996; Scott & Bruce, 1994). I proposed competing hypotheses for the relationship between information sharing network strength and creativity for the moderating factors.

Threat rigidity theory (Staw et al., 1981) argues that perceived threats can impair a person's ability to process and utilize information. Because people are focused on the threat rather than the task at hand, they are unable to attend to information they might receive from their social network contacts. People then utilize already existing routines and algorithmic problem solving approaches rather than utilize useful knowledge they receive from their weak or strong ties (Amabile, 1998; Amabile, Mueller, et al., 2002; Amabile, Hadley, et al., 2002). Thus, potentially useful novel information, from either strong or weak ties, is ignored or cannot be integrated with already existing knowledge to generate creative ideas.

Because time pressure is often a threat to creativity, people will be unable to utilize knowledge received from people under such conditions. Their attentional focus will narrow causing them to be unable to use information received from their social networks or generate novel and useful ideas based on information a person gathers from their social networks

(Amabile, Mueller, et al., 2002; Staw et al., 1981). Thus, time pressure serves as a constraint on whether information gathered from their social network will be useful for creativity.

When people are free from constraints (i.e., low time pressure), a person's strong or weak ties might be beneficial for creativity. I propose competing hypotheses for whether weak or strong ties are beneficial for creativity when time pressure is low. Strong ties have the potential to be beneficial for creativity. First, strong ties are a reliable, quick, and trustworthy source of information. Because people interact with their strong ties frequently, people have more opportunities to reach out to and receive help from their strong ties. This allows people to discuss ideas they are working on to quickly gather new knowledge that can be useful to creative tasks. Indeed, Granovetter (1983) stated "Strong ties have greater motivation to be of assistance and are typically more easily available" (p. 209).

Second, increased levels of trust with strong ties allow a person to discuss their ideas more openly. Strong ties are more likely to help because trust and social norms dictate information exchange and future reciprocation (Coleman, 1988, 1990). People are able to share and discuss their ideas more openly with strong ties without fear of rejection, ridicule, or idea theft (Levin & Cross, 2004). Thus, trust plays an important role in interactions among people and their strong ties.

Third, people share a common "language" or shared narrative with their strong ties (Nahapiet & Ghoshal, 1998). A common language and shared narrative involves the use of similar problem-solving approaches. A person's strong ties often problem solve in similar ways, whereas weak ties problem solve in different ways and subsequently influences whether complex, technical information versus simple, nontechnical information is effectively transferred (Hansen, 1999). Hansen (1999) found that weak ties were more effective for transferring simple,

nontechnical knowledge, whereas strong ties were more effective at transferring complex, technical knowledge. Taken together, these reasons indicate that network strength will be positively related to creativity when time pressure is low.

However, there is competing rationale for why weak ties will be beneficial for creativity. Specifically, Granovetter's (1973) seminal strength-of-weak-ties theory argues that weak ties will be beneficial for creativity because they connect people with diverse information that can be useful for creativity. Over time, people might develop strong overlapping knowledge structures with their strong ties, leading to only transferring redundant information that is not helpful for creativity (McFadyen & Cannella, 2004). This strong overlap in knowledge might also lead to strong ties only providing advice and knowledge on well-established practices for completing tasks, which in turn inhibits creativity (Krackhardt, 1999).

Thus, I propose competing hypotheses for time pressure:

*Hypothesis 1a:* Experienced creative time pressure will moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure is low there will be a positive relationship between network strength and creativity and no relationship when experienced creative time pressure is high.

*Hypothesis 1b:* Experienced creative time pressure will moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure is low there will be a negative relationship between network strength and creativity and no relationship when experienced creative time pressure is high.

Although I predict that time pressure will hinder one's ability to utilize knowledge

received from a person's social network contacts for creativity, there are potential factors that might mitigate this relationship. More recently, Gutnick et al. (2012) argued that although constraints might be a hindrance for creativity, certain resources might help overcome these constraints. Overall, threat rigidity theory would argue that time pressure would be perceived as a threat to creativity, constricting a person's ability to utilize knowledge received from their social network contacts (Staw et al., 1981). However, high organizational support for innovation might lead people to interpret time pressure as a challenge for tasks requiring creativity rather than a threat (Gutnick et al., 2012). Thus, organizational support is an important factor for overcoming the detrimental effects of time pressure on the network strength-creativity relationship.

Rather than viewing time pressure as a threat, people might interpret it as a challenge. This approach is analogous to Amabile, Hadley, et al.'s (2002) argument of people being "on a mission" when still producing creative outputs despite high time pressure. Thus, when time pressure is high, supportive organizations might help people ensure people can focus on the task at hand rather than on the threat. This will reduce a person's narrowed frame of thinking and engage in creative ideation. However, it is unclear whether strong or weak ties will be beneficial for creativity when time pressure is high and organizational support is high. Under such conditions, network strength could be either positively or negatively related to creativity (Gutnick et al., 2012). Thus, I propose competing hypotheses for the joint effects of time pressure and organizational support for innovation:

*Hypothesis 2a:* Experienced creative time pressure and organizational support for innovation will jointly moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure is high and

organizational support is high, there will be a positive relationship between network strength and creativity and no when relationship when experienced creative time pressure is high and organizational support is low.

*Hypothesis 2b:* Experienced creative time pressure and organizational support for innovation will jointly moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure is high and organizational support is high, there will be a negative relationship between network strength and creativity and no when relationship when experienced creative time pressure is high and organizational support is low.

Notably, these three-way interaction effects are dependent on strong or weak ties being differentially beneficial when time pressure is low versus high when organizational support for innovation is high. Specifically, if strong (weak) ties are beneficial when time pressure is high and low when organizational support is high, this three-way interaction will not emerge.

After obtaining information for creativity, people then must push their creative ideas towards implementation. Examining the role of time pressure in later creative process stages is important because time pressure likely increases as projects progress. Thus, it is possible that time pressure has differential effects during later process phases. Specifically, although time pressure constrains a person's ability to use information gathered from their social network for creative tasks, it might enhance people's ability to push their already generated creative ideas towards implementation. Threat rigidity theory argues that time pressure constrains heuristic thinking and information processing because of narrowed attention (Staw et al., 1981). Thus, threats constrain the ability to engage in divergent thinking processes. However, the narrow processing approach does not necessarily divert people's attention from the task at hand. Instead,

threats prioritize attention (Notebaert, Crombez, Van Damme, De Houwer, & Theeuwes, 2011). Because of this prioritized attention, threats like time pressure might help during convergent thinking phases of the creative process. Under such situations, time pressure will help people push their creative ideas forward towards implementation because they would be more focused and persist to complete the task at hand (Gutnick et al., 2012). Thus, when creative ideas are already generated, time pressure might help motivate people to push those ideas towards successful implementation (Amabile, Mueller, et al., 2002). When time pressure is low, this narrowing of attention is less likely to occur. Rather, there will be minimal impact on whether creative ideas are subsequently implemented. Thus, I predicted that:

*Hypothesis 3:* Experienced creative time pressure will moderate the relationship between creativity and idea implementation such that the relationship between creativity and idea implementation will be positive when experienced creative time pressure is high and nonsignificant when experienced creative time pressure was low.

Although I predict that experienced creative time pressure will be beneficial for pushing creative ideas towards implementation, this effect will be dependent on how supportive the organization is of innovation. When organizational support for innovation is low, time pressure will likely have little effect on the relationship between creativity and idea implementation. Under such conditions, the constraints of time pressure will be largely perceived as a threat that will impede one's ability to plan and subsequently implement creative ideas. However, when organizational support for innovation is high, people will be more likely to implement their creative ideas because the organization will remove road blocks that might occur with the implementation of creative ideas. This will help a person persist on the task and ensure the creator's attention is focused on the task at hand (Gutnick et al., 2012; Staw et al., 1981).

Therefore, I hypothesized:

*Hypothesis 4:* Experienced creative time pressure and organizational support for innovation will jointly moderate the relationship between creativity and idea implementation such that the relationship between creativity and idea implementation will be positive when experienced creative time pressure is high and organizational support for innovation is high rather than when organizational support for innovation is low.

## Chapter 2: Method

### Participants

Employees ( $N = 147$ ) were recruited from two sources: 49 were recruited from a survey panel company and 98 using a snowball-sampling methodology by the researcher. Participants were from a variety of different occupations and industries such as service, technology, and banking/finance. Thus, an ego-centric network methodology was used (Borgatti, Everett, & Johnson, 2013). Egocentric network designs involve collecting and analyzing personal network data. Thus, employees (egos) list their connections (alters) to different name generator and interpreter questions (described below). Analyses are then conducted using the personal networks. Across the two sources, there were 60 men and 87 women. The mean age was 38.62 ( $SD = 14.78$ ) and mean job tenure was 4.77 ( $SD = 5.15$ ) years. The majority of employees had a Bachelor's degree or higher ( $n = 97$ ).

### Measures

#### **Independent Variables.**

*Information gathering network size and strength.* To examine the size and strength of participants' information gathering networks, I utilized measures from prior research (Baer, 2010; Perry-Smith, 2006; Rodan & Galunic, 2004). Following Baer (2010) and Rodan and Galunic (2004), employees were given the following name generator prompt:

People may discuss work-related matters with others inside their organization, such as colleagues and supervisors, and with others outside of their organization, such as family members, customers, suppliers, and competitors. These discussions may result in people getting, intended or unintended, new information or insights about work-related problems or issues you face. Thinking back over the past year, please write down the names,



nicknames, or initials of all people inside or outside your organization who have provided you with new information or insights about work-related problems or issues.

Employees were provided with 31 text boxes to enter contacts' names. One text box was for a careless responding check (discussed below) and 30 for reporting actual contacts. The number of text boxes for entering contacts' names is in line with prior research, which includes 24 or 25 text boxes for entering contacts' names (Baer, 2010; Zou, Ingram, & Higgins, 2015). The number of contacts listed was used to determine a person's information gathering network size, which is the same as degree centrality (Borgatti et al., 2013).

After listing their contacts, employees completed name interpreter questions for each contact listed to establish network strength. Network strength was measured using three theoretical (Granovetter, 1973) and empirical criteria (Baer, 2010; Perry-Smith, 2006): (a) closeness ("How close are you with each person?" [1 = *acquaintance*, 2 = *distant colleague*, 3 = *friendly colleague*, 4 = *close colleague*, 5 = *very close colleague*]); (b) duration ("How many years has each relationship been in existence?" [1 = *less than one year*, 2 = *1 to 3 years*, 3 = *4 to 6 years*, 4 = *7 to 9 years*, 5 = *10 or more years*]); and (c) frequency ("On average, how frequently do you communicate with each person?" [1 = *once a year or less*, 2 = *several times a year*, 3 = *once a month*, 4 = *several times a month*, 5 = *several times a week*, 6 = *daily*]). Each item was averaged across all contacts listed and then the average scores were standardized and then averaged across items to create the network strength measure (Baer, 2010). The correlations among the three items were: closeness and duration ( $r = .51, p < .001$ ), closeness and frequency ( $r = .36, p < .001$ ), and duration and frequency ( $r = .15, p = .086$ ), which are similar to those reported in prior research (*cf.* Baer, 2010). Because the three items are formative indicators of network strength, the lower alpha reliability ( $\alpha = .59$ ) was not problematic (see Diamantopoulos

& Winklhofer, 2001).

Embedded within the prompt asking employees to report the information gathering network size and strength measures was an instructional manipulation check to identify careless responders (Oppenheimer, Meyvis, & Davidenko, 2009). Specifically, one sentence in the first prompt asked for participants to type the name “Joe Smith” in the first text box provided. When participants provided information on network strength, they were asked to report that “Joe Smith” is a “very close colleague,” someone they have known for “10 or more years,” and someone they communicate with “daily.” Participants who did not provide correct responses to these prompts were classified as careless responders. That is, failing to accurately follow the prompt indicated a participant was not reading the prompts, which would negatively affect the quality of the data (Huang, Liu, & Bowling, 2015; Meade & Craig, 2012). The final sample reflects participants who passed this careless responding check. The prompts and endpoints for each facet of network strength are included in Appendix C.

***Experienced creative time pressure.*** Employees completed Baer and Oldham's (2006) five-item experienced creative time pressure measure. The scale was rated on a seven-point scale (*strongly disagree-strongly agree*). A sample item is “thinking of new ideas takes time I don’t have.” Cronbach’s  $\alpha$  was .87. The full scale is included in Appendix D.

***Organizational support for innovation.*** Employees completed Scott and Bruce's (1994) 16-item organizational support for innovation measure. The scale was rated on a seven-point scale (*strongly disagree-strongly agree*). A sample item is “this organization can be described as flexible and continually adapting to change.” Cronbach’s  $\alpha$  was .92. The full scale is included in Appendix D.

***Self-reported creativity.*** Employees’ self-reported creativity was measured with a three-

item measure developed by Subramaniam and Youndt (2005) and adapted by Baer (2012). I used this measure to test Hypotheses 3 and 4 to avoid issues with common method bias associated with leader's reporting both creative and innovative job performance. The scale was rated on a seven-point scale (*not at all characteristic-extremely characteristic*). Participants were asked to indicate whether the three items were characteristics of their work over the past year. A sample item is "developed ideas that make existing knowledge about current products/services obsolete." Cronbach's  $\alpha$  was .87. The full scale is included in Appendix D.

**Control Variables.** Across all analyses, I controlled for six variables: (a) data source (0 = Snowball Sample, 1 = Survey Panel), (b) job tenure (years), (c) education, (d) extraversion, (e) frequency of communication with other people for one's job, and (f) the office size an employee works in. Education and job tenure reflect one's existing knowledge and are important predictors of creativity (Hammond, Neff, Farr, Schwall, & Zhao, 2011; Tierney & Farmer, 2002) and job tenure also influences how long an employee has to develop their network. I also controlled for the Big Five factor extraversion because of the positive relationship between extraversion and network size (Fang et al., 2015), which might facilitate obtaining more information for creativity. Extraversion was measured using five items from the mini-IPIP (Donnellan, Oswald, Baird, & Lucas, 2006) on a five-point scale (*strongly disagree-strongly agree*;  $\alpha = .76$ ). Additionally, frequency of communication with other people for one's job and office size were also controlled for because the two variables reflect the number of people one can have in their networks within their workplace and how often they are able to obtain information that might be beneficial for creativity and idea implementation. Frequency of communication with other people for one's job was measured using a seven-point scale (*multiple times per day-less than once per month*). Office size was measured using an eight-point ordinal scale (*1-19 to 200 or more*).

For the analyses focusing on the information gathering to creativity phase, I controlled for information gathering network size. For the analyses focusing on the creativity to idea implementation phase, I controlled for the frequency of employee's generated ideas, also referred to as fluency (Baer, 2012). It is possible that an employee is more successful getting their ideas implemented simply because they generate more ideas. Participants completed one item to measure fluency ("How often, on average, do you come up with new ideas at work?") using a five-point scale (*once a year or less-every week*).

### **Dependent Variables.**

***Leader-reported creativity.*** Each employee's direct supervisor rated their employees' creativity over the past year using three-items developed by Oldham and Cummings (1996). Supervisor ratings of employee creativity are commonly used in creativity research (Amabile, Barsade, Mueller, & Staw, 2005; Mueller & Kamdar, 2011; Tierney & Farmer, 2011) and are correlated with objective measures of creative performance (Oldham & Cummings, 1996; Scott & Bruce, 1994; Tierney, Farmer, & Graen, 1999). Items were rated using a seven-point scale (*not at all characteristic of the employee-extremely characteristic of the employee*). Cronbach's  $\alpha$  was .91. The full scale is included in Appendix D.

***Leader-reported idea implementation.*** Each employee's direct supervisor also rated how frequently employees' ideas were successfully implemented. Supervisors rated idea implementation using a three-item measure (Baer, 2012). Items were rated using a seven-point scale (*never-always*). A sample item is "have been successfully brought to market or have been successfully implemented." Cronbach's  $\alpha$  was .96. The full scale is included in Appendix D.

### **Procedure**

After volunteering to complete the survey online, employees first reported their

information gathering network ties (i.e., network size) and completed the network strength measures. Participants then completed the remaining measures: experienced creative time pressure, organizational support for innovation, self-reported creativity, fluency, and extraversion. Last, they provided demographic information. Each participant's direct supervisor completed a separate survey where they assessed their employees' creative performance and the frequency their employees' ideas are implemented.

### **Analytic Plan**

For the study, supervisors provided ratings for multiple employees (*Med.* = 2), which created a nested data structure for the employee sample (i.e., employees nested within supervisors). To determine if there could be statistical issues related to violating the independence of measurement assumption, I calculated ICC(1) values for leader-reported creative performance and idea implementation (McGraw & Wong, 1996). The ICC(1) was .213 ( $p = .034$ ) for creative performance and .412 ( $p < .001$ ) for idea implementation. In other words, 21.3 percent of the variability in creative performance scores and 41.2 percent of the variability in idea implementation scores was due to an employee's supervisor. The ICC(1)s were also statistically significant, indicating the independence of measurement assumption was violated. Thus, multilevel modeling was used to account for the nested structure.

Multilevel modeling analyses were conducted using MPlus 7.0 to account for the supervisor nesting (Muthén & Muthén, 2010). Level 1 variables were the employee scores (both predictors and outcomes) and Level 2 was the supervisor employees were nested under. Because all variables and the interaction term were at Level 1, it was important to ensure that there was no Level 2 confounding. Thus, main effects were group-mean centered prior to creating the interaction terms (Enders & Tofighi, 2007; Hofmann & Gavin, 1998). Group-mean centering

removes the confounding between-groups effects (Level 2) from the scores while retaining the within-groups effects (Level 1).

The first multilevel analysis tested Hypotheses 1 and 2 examining the moderating effect of experience creative time pressure and organizational support for innovation on the relationship between information gathering network strength and creativity. All variables were regressed on the leader-reported creativity variable. In the first step, the control variables were entered. In the second step, the main effects (information gathering network strength, experienced creative time pressure, and organizational support for innovation) were entered. In the third step, the three two-way interactions were entered. In the fourth step, the three-way interaction was entered.

The second multilevel analysis tested Hypotheses 3 and 4 examining the moderating effect of experienced creative time pressure and organizational support for innovation on the relationship between creativity and idea implementation. All variables were regressed on the leader-reported idea implementation variable. In the first step, the control variables were entered. In the second step, the main effects (self-reported creativity, experienced creative time pressure, and organizational support for innovation) were entered. In the third step, the three two-way interaction terms were entered. In the fourth step, the three-way interaction was entered.

### Chapter 3: Results

Descriptive statistics and correlations among all variables are in Table 1. Notably, the relationship between leader-reported creativity and leader-reported idea implementation was high ( $r = .75, p < .001$ ). Although high, this correlation is similar to the individual-level effect size reported in a recent meta-analysis examining the relationship between creativity and innovation (Sarooghi, Libaers, & Burkemper, 2015). However, it was still necessary to determine whether the two factors should be treated as two separate factors or a single unitary factor by conducting a confirmatory factor analysis. The chi-square, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) were examined for model fit. Overall, the CFI and TLI should be high and close to one; RMSEA and SRMR should be low and close to zero. A chi-square difference test was used to compare the one- and two-factor models.

The two-factor model with factors correlated was a better fit than a one-factor model,  $\chi^2_{\text{diff}}(1) = 116.58, p < .001$  (one-factor model:  $\chi^2(9) = 154.44, p < .001, \text{CFI} = .846, \text{TLI} = .744, \text{RMSEA} = .332, \text{SRMR} = .082$ ; two-factor model:  $\chi^2(8) = 37.85, p < .001, \text{CFI} = .968, \text{TLI} = .941, \text{RMSEA} = .159, \text{SRMR} = .045$ ). For the two-factor model, the CFI and TLI were at or above often used cutoffs for adequate and good fit (.90 and .95, respectively) and below often used cutoffs for SRMR (.05; Kline, 2011). However, the RMSEA was higher than cutoffs used for adequate or good fitting models (.08 and .05, respectively; Browne & Cudeck, 1992). When sample sizes are smaller (below 200) and degrees of freedom are low (below 10), the RMSEA often exceeds these cutoffs, even when the model is a good fit (Kenny, Kaniskan, & McCoach, 2015). Indeed, Kenny and colleagues argued that “it advisable for researchers to completely avoid computing the RMSEA when model *df* are small” (p. 503). Because all other fit indices

indicated a good fitting model and the two-factor model was a better fit than the one-factor model, the high RMSEA is negligible. Based on the CFA results, leader-reported creativity and idea implementation were treated as two, distinct factors rather than a single, unitary factor.

### **Hypotheses 1 and 2: Information Gathering to Creativity**

For Hypothesis 1, I proposed competing hypotheses. For Hypothesis 1a, I predicted that experienced creative time pressure would moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure was low there would be a positive relationship between network strength and creativity and no relationship when experienced creative time pressure was high. For Hypothesis 1b, I predicted that experienced creative time pressure would moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure was low there would be a negative relationship between network strength and creativity and no relationship when experienced creative time pressure was high.

As shown in Table 2, there was a significant interaction effect between information gathering network strength and experienced creative time pressure,  $b = -0.60$ ,  $p = .012$  (Model 3). The interaction effect is plotted in Figure 1 and includes simple slope results. In line with Hypothesis 1a, the simple slope analyses indicated that when experienced creative time pressure was high, there was no relationship between information gathering network strength and creative performance,  $b = -0.62$ ,  $p = .183$ . When experienced creative time pressure was low, there was a significant positive relationship between information gathering network strength and creativity,  $b = 0.99$ ,  $p = .032$ . Hypothesis 1a was supported and Hypothesis 1b was unsupported.

For Hypothesis 2, I also proposed competing hypotheses. For Hypothesis 2a, I predicted that experienced creative time pressure and organizational support for innovation would jointly



moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure and organizational support were high, there would be a positive relationship between network strength and creativity and no when relationship when experienced creative time pressure is high and organizational support was low. For Hypothesis 2b, I predicted that experienced creative time pressure and organizational support for innovation would jointly moderate the relationship between information gathering network strength and creativity such that when experienced creative time pressure was low and organizational support was high, there would be a negative relationship between network strength and creativity and no when relationship when experienced creative time pressure was high and organizational support was low.

As shown in Table 2, there was a significant three-way interaction effect between information gathering network strength and experienced creative time pressure,  $b = -0.47, p = .016$  (Model 4). The interaction effect is plotted in Figure 2 and includes simple slope results in the table key. Partially in line with Hypothesis 2b, the simple slope analyses indicated that when experienced creative time pressure was high and organizational support for innovation was high, there was a marginally significant negative relationship between information gathering network strength and creative performance,  $b = -1.27, p = .083$ . When experienced creative time pressure was high and organizational support was low, there was no relationship between information gathering network strength and creativity,  $b = -0.29, p = .335$ . Additionally, the simple slopes indicated that when experienced creative time pressure was low and organizational support for innovation was low, there was a nonsignificant relationship between information gathering network strength and creative performance,  $b = -0.02, p = .975$ . When experienced creative time pressure was low and organizational support was high, there was a positive relationship between

information gathering network strength and creativity,  $b = 1.73$ ,  $p = .013$ . These results partially supported Hypothesis 2b and provided further support for Hypothesis 1a with the additional contingency that organizational support is high for the positive relationship between information gathering network strength and creativity.

### **Hypotheses 3 and 4: Creativity to Idea Implementation**

For Hypothesis 3, I predicted that experienced creative time pressure would moderate the relationship between creativity and idea implementation such that the relationship between creativity and idea implementation would be positive when experienced creative time pressure was high and nonsignificant when experienced creative time pressure was low. As shown in Table 3, there was a significant interaction effect between creativity and experienced creative time pressure,  $b = 0.31$ ,  $p < .001$  (Model 3). The interaction effect is plotted in Figure 3 and includes simple slope results. The simple slope analyses indicated that when experienced creative time pressure was high, there was a positive relationship between creativity and idea implementation,  $b = 0.50$ ,  $p = .001$ . When experienced creative time pressure was low, there was a significant negative relationship between creativity and idea implementation,  $b = -0.33$ ,  $p = .023$ . Based on these results, Hypothesis 3 was partially supported.

For Hypothesis 4, I predicted that experienced creative time pressure and organizational support for innovation would jointly moderate the relationship between creativity and idea implementation such that the relationship between creativity and idea implementation would be positive when experienced creative time pressure and organizational support for innovation were high rather than when experienced creative time pressure was high and organizational support for innovation was low. As shown in Table 3, the three-way interaction effect was nonsignificant,  $b = -0.17$ ,  $p = .305$  (Model 4). However, there was a significant interaction effect

between experienced creative time pressure and organizational support for innovation,  $b = 0.79$ ,  $p < .001$  (Model 3). The interaction effect is plotted in Figure 4 and includes simple slope results. The simple slope analyses indicated that when organizational support for innovation was high, there was a positive relationship between experienced creative time pressure and idea implementation,  $b = 0.71$ ,  $p = .001$ . When organizational support for innovation was low, there was a significant negative relationship between experienced creative time pressure and idea implementation,  $b = -1.00$ ,  $p < .001$ . Although Hypothesis 4 was not supported, the two-way interaction between experienced creative time pressure and organizational support for innovation indicated the results were in the expected direction.

## Chapter 4: Discussion

The current study utilized an interactionist and creative process framework (Perry-Smith & Mannucci, 2017; Woodman et al., 1993; Zhou & Hoever, 2014) to examine how social and contextual factors interact during two creative process stages: information gathering to creativity and creativity to idea implementation. Drawing on threat rigidity theory, I found that experienced creative time pressure, a threat to creativity, had differential effects across the creative process. Specifically, time pressure was detrimental to utilizing information gathered from a person's social network during creativity, but beneficial for idea implementation. I also found that organizational support for innovation played an important role in these relationships. The results suggest that time pressure had differential effects at each stage of the creative process and that organizational support was an important moderator.

For the information gathering to creativity phase, results indicated that network strength was positively related to creativity when experienced creative time pressure was low and had no relationship when experienced creative time pressure was high. I also found that organizational support for innovation and experienced creative time pressure jointly moderated the relationship between information gathering network strength and creativity such that there was a marginally significant negative relationship between information gathering network strength and creativity when time pressure and organizational support were high.

Overall, the results align with threat rigidity theory, which argues that people are unable to attend to or utilize novel information a person gathers (Staw et al., 1981). When people reported high time pressure, there was no relationship between network strength and creativity. However, when they reported low time pressure, network strength was positively related to creativity. This relationship aligned with recent meta-analytic findings showing a positive

relationship between network strength and creativity (Baer et al., 2015). An important contingency of this relationship was when organizational support for innovation was high. Under these conditions, strong network ties are likely more useful for creativity because of the trust a person has with their strong ties and the ability to transfer complex knowledge across frequent interactions (Coleman, 1988, 1990; Hansen, 1999). Organizations providing support and assistance under such conditions allows for discussing ideas useful for creative performance.

Weak network ties might also be beneficial under other conditions. Specifically, when people perceive time pressure and organizational support for innovation to be high, network strength was negatively related to creativity. This result aligns with a more recent framework on the role of constraints for creativity arguing that resources play an important role for the negative effects of constraints on creativity (Gutnick et al., 2012). Organizational support might provide people with the means and support to overcome the constraints of time pressure and utilize the novel information people might receive from their weak network ties (Granovetter, 1973, 1983).

For the creativity to idea implementation stage, which focused on the interactive effects of experienced creative time pressure and organizational support for innovation on the creativity-idea implementation relationship, I found partial support for hypotheses. Specifically, results indicated that when time pressure was high, creativity was positively related to idea implementation. Unexpectedly, I also found that creativity was negatively related to idea implementation when time pressure was low. As mentioned, threat rigidity theory argues that time pressure constrains heuristic thinking and information processing because of narrowed attention (Staw et al., 1981), hindering a person's ability to think divergently. However, narrow cognitive processes that occur due to time pressure appears to prioritize attention that is beneficial for convergent thinking (Notebaert et al., 2011). Thus, time pressure likely focuses a

person to implementing their creative ideas. The negative relationship between creativity and idea implementation when time pressure is low was also surprising. A previous study found that, although time pressure was negatively related to creativity, it was positively related to intrinsic motivation (Amabile, Mueller, et al., 2002). The time pressure people experience might help prioritize attention and motivate people to push their creative ideas towards implementation, but lacking time pressure might lead people to do the opposite (Gutnick et al., 2012). People will lack the motivation and attentional focus when they report not experiencing an external constraint like time pressure.

For Hypothesis 4, I found indirect and partial support. Specifically, organizational support moderated the relationship between experienced creative time pressure and idea implementation such that time pressure was positively related to idea implementation when organizational support was high and negatively related when organizational support was low. Creativity, however, did not have an effect as evidenced by a non-significant three-way interaction. The results align with Gutnick et al.'s (2012) more recent framework. Time pressure is motivating for idea implementation only when organizational support is high. Without organizational support, people lack the means to implement their ideas under time pressure. Indeed, when organizational support is low, time pressure was negatively related to idea implementation, indicating that time pressure has detrimental effects.

### **Theoretical Implications**

The results of the current study offer a number of theoretical implications. First, extending threat rigidity theory (Staw et al., 1981), which focuses on the negative effects of threats on performance, results indicated that perceived threats can have positive effects. However, threats were shown to have differential effects for different outcomes across the

creative process in the current study. Threats like time pressure hinder one's creative performance and the ability to utilize information from one's social network. However, it has positive effects on creativity when organizational support is high and for downline creative process outcomes like idea implementation (Gutnick et al., 2012; Staw et al., 1981). Future research should further explore when threats have a negative or positive effect on creative performance.

Second, the results for the information gathering to creativity process stage indicate that weak and strong ties can be beneficial for creativity. However, their utility depends on contextual contingencies (Adler & Kwan, 2002). The results simultaneously provide support for theory arguing for the benefits of weak ties (Granovetter, 1973) and for strong ties (Baer et al., 2015; Coleman, 1990; Rost, 2011). Thus, time pressure and organizational support play an important role in whether network strength is either positively or negatively related to creativity. Rather than focusing on whether one or the other is beneficial, it might be more useful to build theory that discusses under what conditions weak or strong ties are beneficial (*cf.* Perry-Smith & Mannucci, 2017).

### **Practical Implications**

The current study offers a number of practical implications for organizations, leaders, and employees. First, organizations and leaders should focus on ways to build a climate that is supportive of creativity (Scott & Bruce, 1994). By building a climate for creativity and innovation, they can ensure that employees can safely generate and implement creative ideas that can improve organizational outcomes.

Second, organizations should be mindful of how time pressure can harm creativity (Andrews & Farris, 1972; Baer & Oldham, 2006).. Indeed, Amabile (1998) argued,

“Organizations routinely kill creativity with fake deadlines or impossibly tight ones” (p. 82). Organizations and leaders should focus on ways to reduce time pressure during the information gathering to creativity phase, but also seek to harness the potential benefits of time pressure during the idea implementation stage.

If organizations are unable to reduce time pressure and they have a supportive climate, they should promote employees discussing their ideas and gathering information from their weak network ties. This will provide them with new information and ideas that might be useful for creative performance. If time pressure is low, leaders and organizations should promote employees’ working closely with strong network contacts on their ideas. These tradeoffs indicate how people might utilize different social network contacts based on the task at hand.

### **Limitations and Future Research**

Although this study has a number of implications, it is not without its limitations. First, the study used a cross-sectional design. Theoretically, creative process models have established the temporal order of the stages and what needs are important at different stages (Montag, Maertz, & Baer, 2012; Perry-Smith & Mannucci, 2017; Sawyer, 2012). Thus, the challenge for future empirical research is to utilize longitudinal designs to further establish the causal order of the variables examined in the current study.

Second, employees were from a variety of organizations and industries. Individual differences and aspects of the work environments included in the sample may have influenced the results. In order to account for this limitation, I controlled for extraversion, office size, and the frequency of communication for one’s job. Including these control variables accounted for some alternative interpretations of the results. However, jobs and industries have different creative job requirements (Shalley, Gilson, & Blum, 2000). For example, someone working in



research and development would be expected to have different perceptions about organizational support for creativity compared to someone working on an assembly line. Future research should explore differences across industries, organizations, and job duties.

Third, only two contextual moderators were examined for the relationship between social network strength and creativity and innovation. It is likely that other task/contextual factors also moderate these relationships across the creative process. For example, information gathering network strength might be more important when task/job complexity is high. Effectively transferring and utilizing information from others when tasks are more complex might require high network strength (Hansen, 1999). However, it is possible that personal characteristics like creative self-efficacy will jointly moderate this effect, indicating that a more complex interactionist approach is warranted. Future research should consider and study other contextual factors like task/job complexity and job requirements for creativity along with personal characteristics.

## **Conclusion**

Overall, the current study provides a better understanding of how social network strength influences creativity and innovation. By taking an interactionist perspective, I found that social and contextual factors jointly influenced the generation of creative ideas and whether creative ideas were subsequently implemented. With a better understanding of how contextual and social factors influence creative and innovative performance, employees, leaders, and organizations can design the social work environment to stimulate creativity and innovation.

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<https://doi.org/10.1007/s11031-015-9490-1>

## Appendix A: Tables

Table 1

*Means, Standard Deviations, and Correlations of Variables*

Variables	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Data Source	0.33	-													
2. Job Tenure (years)	4.77	5.15	.32***												
3. Education	5.01	1.70	-.16 <sup>†</sup>	-.04											
4. Extraversion	3.00	0.84	.17*	.04	-.04										
5. Freq. of Comm. for Job	1.53	1.10	.07	.11	.07	-.09									
6. Office Size	3.07	2.45	.21**	.02	.16 <sup>†</sup>	.01	-.002								
7. I.G. Network Size	8.25	6.55	-.42***	-.16 <sup>†</sup>	.18*	-.07	.07	.04							
8. I.G. Network Strength	-0.02	0.77	.27**	.43***	-.001	-.01	.09	.07	-.08						
9. ECTP	3.21	1.35	-.10	-.06	.13	-.24**	-.03	.12	.23**	-.07					
10. Org. Support	4.81	1.08	.24**	.08	-.11	.10	.11	.03	-.18*	-.01	-.48***				
11. Fluency	2.94	1.15	.04	-.12	.19*	.09	.11	.20*	.06	.02	-.13	.05			
12. S.R. Creativity	3.24	1.56	.40***	.11	.03	.28***	.10	.11	-.09	.18*	-.20*	.09	.37***		
13. L.R. Creativity	4.62	1.46	.23**	-.04	.29***	.10	.21*	.07	.06	.13	-.23**	.19*	.31***	.34***	
14. L.R. Idea Implementation	4.16	1.55	.18*	-.02	.27***	.13	.18*	.06	.06	.12	-.10	.09	.25**	.21*	.75***

*Note.* Freq. = Frequency, Comm. = Communication, I.G. = Information Gathering, ECTP = Experienced Creative Time Pressure, Org. = Organizational, S.R. = Self-Reported, L.R. = Leader-Reported. Data Source: 0 = Snowball Sample, 1 = Panel Sample.

<sup>†</sup> $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 2

*Moderating Effect of Experienced Creativity Time Pressure and Organizational Support on the Information Gathering Network Strength-Creativity Relationship*

Independent Variables	DV: Leader-Reported Creativity			
	Control Variables	Main Effects	Two-Way Interactions	Three-Way Interaction
	<i>b</i> ( <i>SE</i> )	<i>b</i> ( <i>SE</i> )	<i>b</i> ( <i>SE</i> )	<i>b</i> ( <i>SE</i> )
Constant	0.93 (0.72)	1.17 (0.72) <sup>†</sup>	1.27 (0.67) <sup>†</sup>	1.37 (0.68)*
<i>Control Variables</i>				
Data Source	1.18 (0.31)***	1.31 (0.33)***	1.11 (0.30)***	1.06 (0.30)***
Job Tenure (years)	-0.04 (0.02)*	-0.05 (0.02)*	-0.05 (0.02)*	-0.05 (0.02)*
Education	0.29 (0.06)***	0.30 (0.07)***	0.27 (0.07)***	0.26 (0.07)***
Extraversion	0.13 (0.12)	0.10 (0.13)	0.14 (0.12)	0.15 (0.13)
Freq. of Comm. for Job	0.23 (0.09)*	0.18 (0.10) <sup>†</sup>	0.21 (0.10)*	0.20 (0.09)*
Office Size	-0.04 (-0.04)	-0.03 (0.05)	-0.01 (0.83)	-0.02 (0.05)
I.G. Network Size	0.03 (0.02) <sup>†</sup>	0.04 (0.02)*	0.02 (0.02)	0.02 (0.02)
<i>Main Effects</i>				
I.G. Network Strength		0.22 (0.26)	0.19 (0.33)	0.04 (0.33)
ECTP		-0.30 (0.11)**	-0.31 (0.11)**	-0.34 (0.11)**
Org. Support		0.13 (0.16)	0.28 (0.16) <sup>†</sup>	0.25 (0.15) <sup>†</sup>
<i>Two-Way Interactions</i>				
I.G. Network Strength × ECTP			-0.60 (0.24)*	-0.60 (0.26)*
I.G. Network Strength × Org. Support			0.16 (0.24)	0.18 (0.22)
ECTP × Org. Support			0.62 (0.19)***	0.58 (0.016)***
<i>Three-Way Interaction</i>				
I.G. Network Strength × ECTP × Org. Support				-0.47 (0.20)*
<i>R</i> <sup>2</sup>	.241	.280	.365	.378
$\Delta R^2$		.039	.085	.013

*Note.* *N* = 135 with listwise deletion. Freq. = Frequency, Comm. = Communication, I.G. = Information Gathering, ECTP = Experienced Creative Time Pressure, Org. = Organizational. Data Source: 0 = Snowball Sample, 1 = Panel Sample. All coefficients are unstandardized.

<sup>†</sup>*p* < .10, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

Table 3

*Moderating Effect of Experienced Creative Time Pressure and Organizational Support on the Creativity-Idea Implementation**Relationship*

Independent Variables	Criterion Variable: Leader-Reported Idea Implementation			
	Control Variables	Main Effects	Two-Way Interactions	Three-Way Interaction
	<i>b</i> ( <i>SE</i> )	<i>b</i> ( <i>SE</i> )	<i>b</i> ( <i>SE</i> )	<i>b</i> ( <i>SE</i> )
Constant	0.32 (0.75)	0.73 (0.68)	0.99 (0.58) <sup>†</sup>	0.97 (0.57) <sup>†</sup>
<i>Control Variables</i>				
Data Source	0.78 (0.27)**	0.78 (0.27)**	0.66 (0.24)**	0.67 (0.24)**
Job Tenure (years)	-0.03 (0.03)	-0.03 (0.03)	-0.03 (0.03)	-0.02 (0.03)
Education	0.26 (0.08)***	0.28 (0.08)***	0.22 (0.08)**	0.23 (0.08)**
Extraversion	0.18 (0.13)	0.15 (0.13)	0.22 (0.12) <sup>†</sup>	0.21 (0.12) <sup>†</sup>
Freq. of Comm. for Job	0.21 (0.09)*	0.14 (0.08) <sup>†</sup>	0.14 (0.08) <sup>†</sup>	0.13 (0.08)
Office Size	-0.04 (0.05)	-0.01 (0.05)	-0.002 (0.04)	-0.01 (0.04)
Fluency	0.22 (0.11) <sup>†</sup>	0.20 (0.11) <sup>†</sup>	0.20 (0.10) <sup>†</sup>	0.21 (0.11) <sup>†</sup>
<i>Main Effects</i>				
S.R. Creative Performance		0.16 (0.11)	0.08 (0.10)	0.06 (0.10)
Experienced Creative Time Pressure		-0.11 (0.14)	-0.14 (0.13)	-0.16 (0.13)
Org. Support		0.03 (0.16)	0.002 (0.17)	-0.04 (0.19)
<i>Two-Way Interactions</i>				
S.R. Creative Performance × ECTP			0.31 (0.08)***	0.31 (0.08)***
S.R. Creative Performance × Org. Support			-0.03 (0.25)	0.04 (0.27)
ECTP × Org. Support			0.79 (0.18)***	0.81 (0.20)***
<i>Three-Way Interaction</i>				
S.R. Creative Performance × ECTP × Org. Support				-0.17 (0.16)
<i>R</i> <sup>2</sup>	.195	.230	.344	.346
$\Delta R^2$		.035	.114	.002

*Note.* *N* = 144 with listwise deletion. Freq. = Frequency, Comm. = Communication, S.R. = Self-Reported, ECTP = Experienced Creative Time Pressure, Org. = Organizational. Data Source: 0 = Snowball Sample, 1 = Panel Sample. All coefficients are unstandardized.

<sup>†</sup>*p* < .10, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

Appendix B: Figures

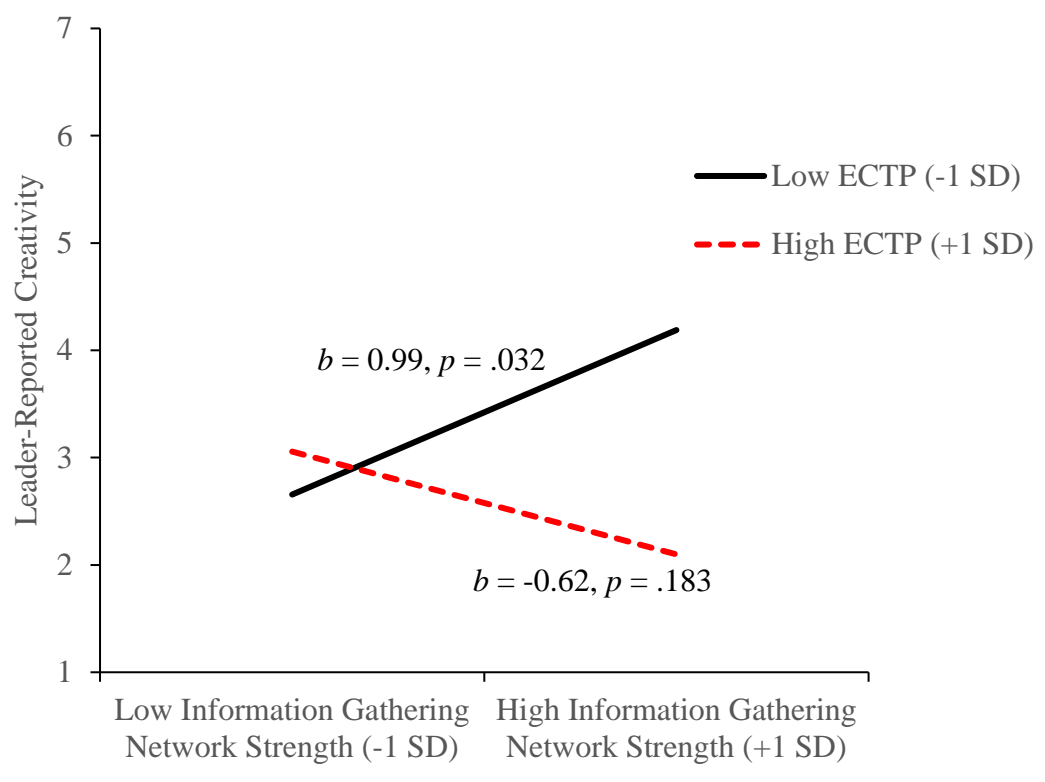


Figure 1. Moderating effect of experienced creative time pressure (ECTP) on the information gathering network strength-creativity relationship.

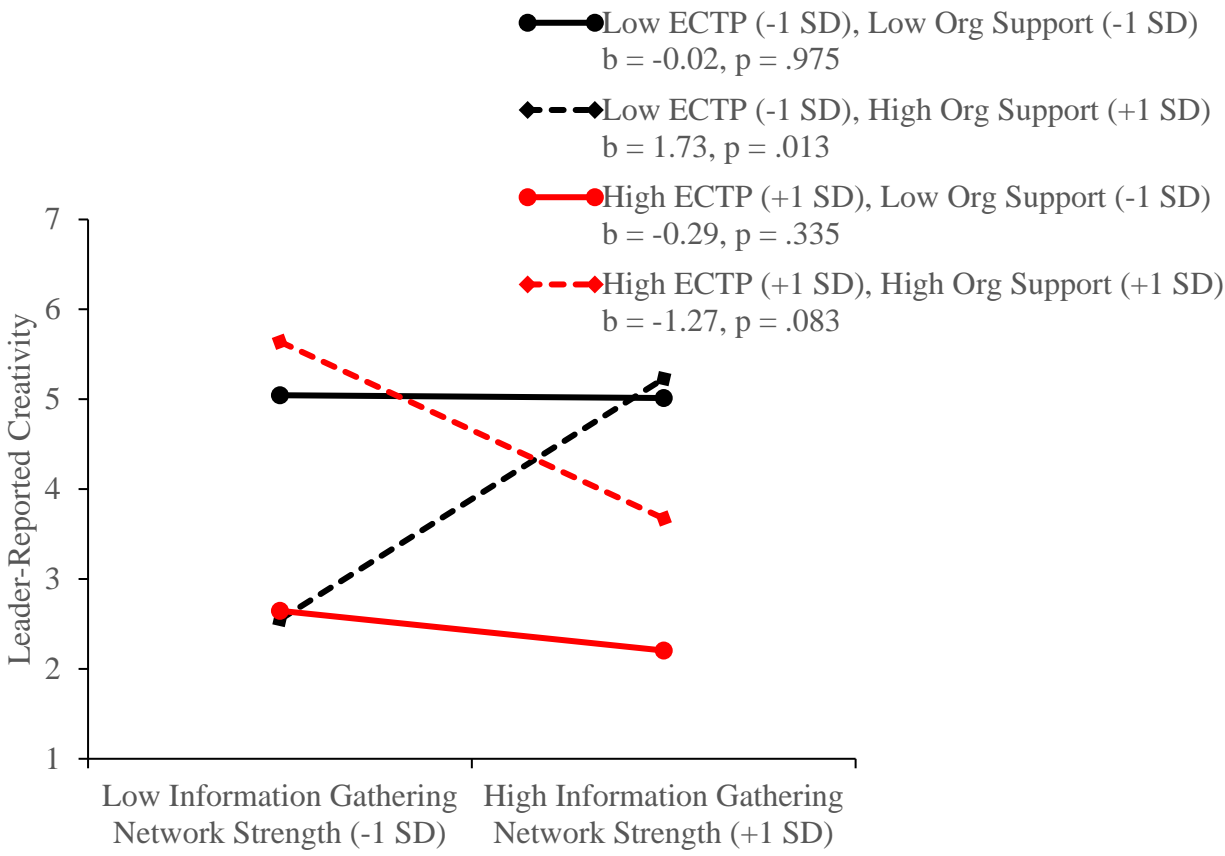
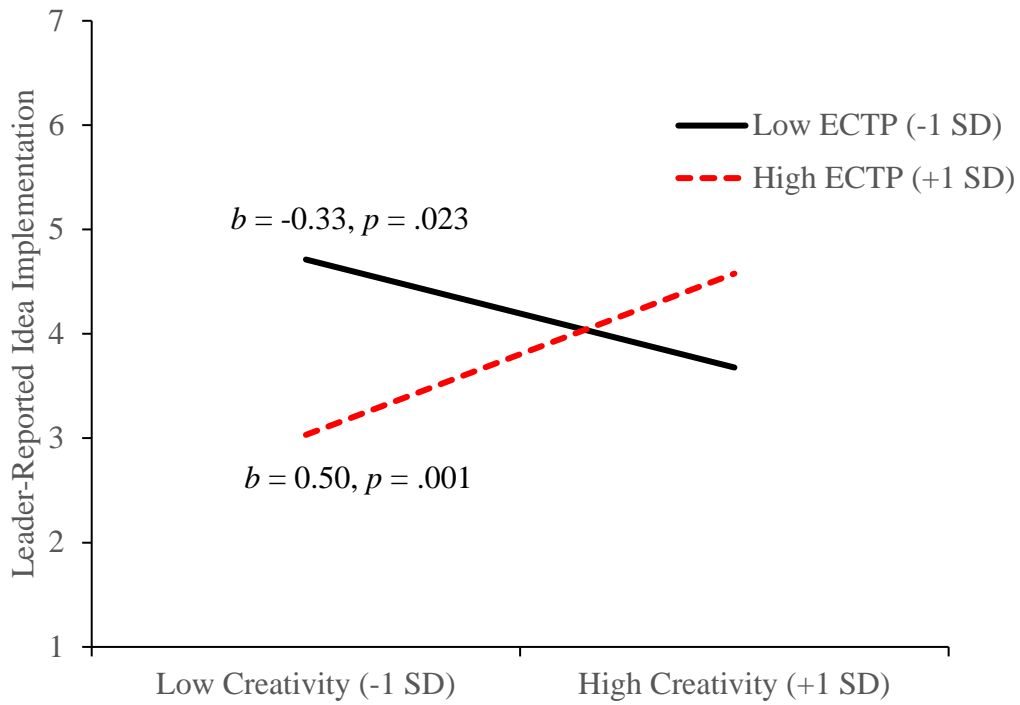


Figure 2. Moderating effect of experienced creative time pressure (ECTP) and organizational support for innovation on the information gathering network strength-creativity relationship.



*Figure 3.* Moderating effect of experienced creative time pressure (ECTP) on the creativity-idea implementation relationship.



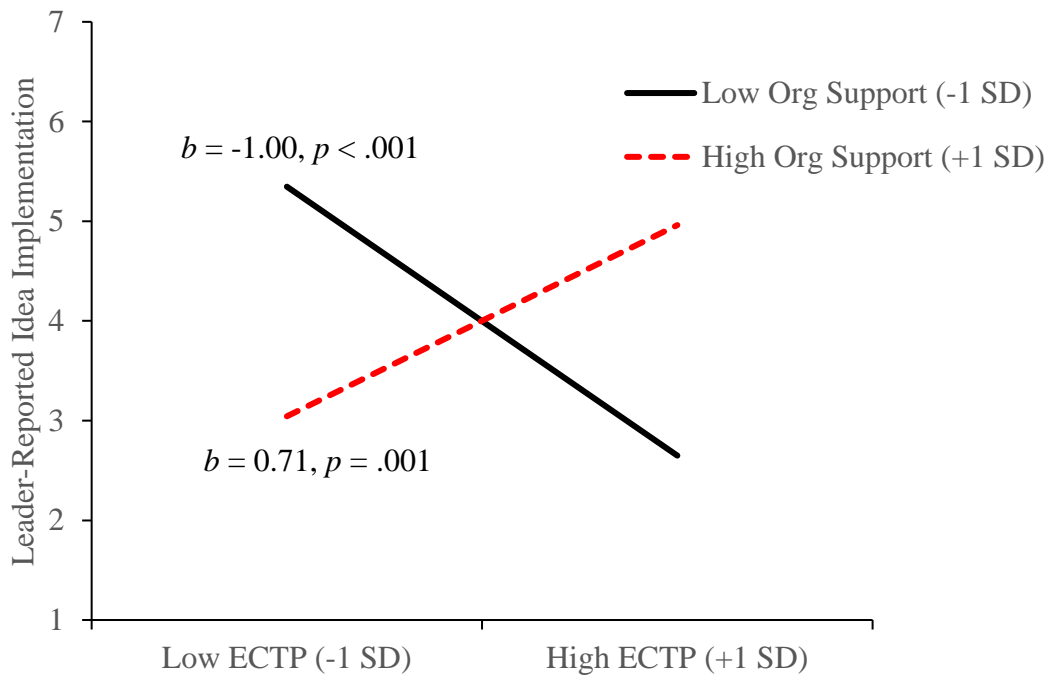


Figure 4. Moderating effect of organizational support for innovation on the experienced creative time pressure (ECTP)-idea implementation relationship.

## Appendix C: Social Network Measures

### References:

Baer, M. (2010). The strength-of-weak-ties perspective on creativity: A comprehensive examination and extension. *Journal of Applied Psychology*, 95, 592–601.  
<http://doi.org/10.1037/a0018761>

### Information gathering network measure:

- “People may discuss work-related matters with others inside their organization, such as colleagues and supervisors, and with others outside of their organization, such as family members, customers, suppliers, and competitors. These discussions may result in people getting, intended or unintended, new information or insights about work-related problems or issues you face. Thinking back over the past year, please write down the names, nicknames, or initials of all people inside or outside your organization who have provided you with new information or insights about work-related problems or issues. In order to determine that you have read the instructions, type the name ‘Joe Smith’ in the first box provided.”

### Network strength and scale points:

- “Please provide additional information for each of the contacts you listed on the previous page by indicating how close you are with each contact, how long you have known this person, and how frequently you communicate with them. For contact Joe Smith, please report that ‘Joe Smith’ is a ‘very close colleague,’ someone you have known for ‘10 or more years,’ and some you communicate with ‘daily.’”
1. Closeness: “How close are you with each person?”
    - a. 1 = *acquaintance*
    - b. 2 = *distant colleague*
    - c. 3 = *friendly colleague*
    - d. 4 = *close colleague*
    - e. 5 = *very close colleague*
  2. Duration: “How many years has each relationship been in existence?”
    - a. 1 = *less than one year*
    - b. 2 = *1 to 3 years*
    - c. 3 = *4 to 6 years*
    - d. 4 = *7 to 9 years*
    - e. 5 = *10 or more years*
  3. Frequency: “On average, how frequently do you communicate with each person?”
    - a. 1 = *once a year or less*
    - b. 2 = *several times a year*
    - c. 3 = *once a month*
    - d. 4 = *several times a month*
    - e. 5 = *several times a week*
    - f. 6 = *daily*

## Appendix D: Scales

### **Employee Survey Measures:**

#### **Experienced Creative Time Pressure**

##### ***Reference:***

Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. *Journal of Applied Psychology, 91*, 963–970.  
<http://doi.org/10.1037/0021-9010.91.4.963>

##### ***Scale and endpoints:***

1. Thinking of new ideas takes time I don't have.
2. I don't have much time for thinking up wild ideas; I'm too busy just getting my job done.
3. Employees in your department do not have the time to think about how to improve work processes.
4. The pace of the work around here is too hurried for new ideas to be tried out.
5. Employees in your department have the time to develop and consider new ideas about their work. (Reverse scored)

1 = *Strongly disagree*

7 = *Strongly agree*

#### **Organizational Support for Innovation**

##### ***Reference:***

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal, 37*, 580–607.  
<http://doi.org/10.2307/256701>

##### ***Scale and Endpoints:***

1. Creativity is encouraged here.
2. Our ability to function creatively is respected by the leadership.
3. Around here, people are allowed to try to solve the same problems in different ways.
4. The main function of members in this organization is to follow orders, which come down through channels.
5. Around here, a person can get in a lot of trouble by being different.
6. This organization can be described as flexible and continually adapting to change.
7. A person can't do things that are too different around here without provoking anger.
8. The best way to get along in this organization is to think the way the rest of the group does.
9. People around here are expected to deal with problems in the same way.
10. This organization is open and responsive to change.
11. The people in charge around here usually get credit for others' ideas.
12. In this organization, we tend to stick to tried and true ways.
13. This place seems to be more concerned with the status quo than with change.
14. The reward system here encourages innovation.
15. This organization publicly recognizes those who are innovative.
16. The reward system here benefits mainly those who don't rock the boat.

1 = *Strongly disagree*

7 = *Strongly agree*

### **Self-Reported Creativity**

#### **Reference:**

Baer, M. (2012). Putting creativity to work: The implementation of creative ideas in organizations. *Academy of Management Journal*, 55, 1102–1119.  
<http://doi.org/10.5465/amj.2009.0470>

Subramaniam, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal*, 48, 450–463.  
<http://doi.org/10.5465/AMJ.2005.17407911>

#### **Scale and endpoints:**

1. Developed ideas that imply substantial departures from existing product and service lines.
2. Developed ideas that make existing knowledge about current products/services obsolete.
3. Developed breakthrough ideas—not minor changes to existing products/services.

1 = *Not at all characteristic*

7 = *Extremely characteristic*

### **Fluency/Number of Ideas**

#### **Reference:**

Baer, M. (2012). Putting creativity to work: The implementation of creative ideas in organizations. *Academy of Management Journal*, 55, 1102–1119.  
<http://doi.org/10.5465/amj.2009.0470>

#### **Scale and endpoints:**

1. How often, on average, do you come up with new ideas at work?

1 = *Once a year or less*

5 = *Every week*

### **Mini-IPIP (Big Five Personality)**

#### **Reference:**

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The mini-IPIP scales: Tiny-yet-effective measures of the Big Five factors of personality. *Psychological Assessment*, 18, 192–203. <http://doi.org/10.1037/1040-3590.18.2.192>

#### **Scale and endpoints:**

1. Am the life of the party.
2. Sympathize with others' feelings.
3. Get chores done right away.
4. Have frequent mood swings.
5. Have a vivid imagination.
6. Don't talk a lot.
7. Am not interested in other people's problems.
8. Often forget to put things back in their proper place.
9. Am relaxed most of the time.
10. Am not interested in abstract ideas.
11. Talk to a lot of different people at parties.
12. Feel others' emotions.
13. Like order.
14. Get upset easily.

15. Have difficulty understanding abstract ideas.
16. Keep in the background.
17. Am not really interested in others.
18. Make a mess of things.
19. Seldom feel blue.
20. Do not have a good imagination.

1 = *Strongly disagree*

5 = *Strongly agree*

### **Leader-Reported Measures:**

#### **Leader-Reported Creativity**

##### ***Reference:***

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, 39, 607–634. <http://doi.org/10.2307/256657>

##### ***Scale and endpoints:***

1. How ORIGINAL and PRACTICAL is this person's work? Original and practical work refers to developing ideas, methods, or products that are both totally unique and especially useful to the organization
2. How ADAPTIVE and PRACTICAL is this person's work? Adaptive and practical work refers to using existing information or materials to develop ideas, methods, or products that are useful to the organization
3. How CREATIVE is this person's work? Creativity refers to the extent to which the employee develops ideas, methods, or products that are both original and useful to the organization.

1 = *Not at all characteristic of the employee*

7 = *Extremely characteristic of the employee*

#### **Leader-Reported Idea Implementation**

##### ***Reference:***

Baer, M. (2012). Putting creativity to work: The implementation of creative ideas in organizations. *Academy of Management Journal*, 55, 1102–1119. <http://doi.org/10.5465/amj.2009.0470>

##### ***Scale and endpoints:***

1. Have been approved for further development
2. Have been transformed into usable products, processes, or procedures
3. Have been successfully brought to market or have been successfully implemented.

1 = *Never*

7 = *Always*

## Alexander S. McKay – Curriculum Vitae

### **EDUCATION:**

- 2014-2018 Ph.D., The Pennsylvania State University, Psychology  
2012-2014 M.A., California State University, San Bernardino, Experimental Psychology  
2010-2012 B.A., California State University, San Bernardino, Psychology (Honors)  
2007-2010 A.A., College of the Desert, Psychology

### **SELECTED PUBLICATIONS:**

- McKay, A. S.,** Garcia, D. M., Clapper, J. P., & Shultz, K. S. (2018). The attentive and the careless: Examining the relationship between benevolent and malevolent personality traits with careless responding in online surveys. *Computers in Human Behavior*, 85, 295-303.
- McKay, A. S.** (in press). An introduction to social network analysis for creativity research. In V. P. Glaveanu and I. Lebuda (Eds.), *The Palgrave Handbook of Social Creativity Research*. London, UK: Palgrave Macmillan.
- McKay, A. S.,** Lovelace, J. B., & Howard, M. C. (in press). The heart of innovation: Antecedents and consequences of creative self-efficacy in organizations. In R. Reiter-Palmon & J. C. Kaufman (Eds.), *Individual creativity in organizations*. San Diego, CA: Academic Press.
- McKay, A. S.,** Grygiel, P., & Karwowski, M. (2017). Connected to create: A social network analysis of creativity and friendship ties. *Psychology of Aesthetics, Creativity, and the Arts*, 11, 284-294. (Special Issue: *Aesthetics, Creativity, and the Arts in Everyday Environments*)
- McKay, A. S.,** Karwowski, M., & Kaufman, J. C. (2017). Measuring the muses: Validating the Kaufman Domains of Creativity Scale (K-DOCS). *Psychology of Aesthetics, Creativity, and the Arts*, 11, 216-230.

### **SELECTED RECENT RESEARCH PRESENTATIONS:**

- McKay, A. S.** (2018, April). *Social network strength, contextual factors, and the creative process*. Paper presented at Annual Meeting of the Society for Industrial and Organizational Psychology, Chicago, IL.
- Sayre, G. M., Hoffman, M. E., Grimaldi, E. M., **McKay, A. S.,** Reimer, R. D., & Mohammed, S. (2018, April). *Pay fair! Testing the contradictory predictions of distributive and deontic justice*. Poster presented at the Annual Meeting of the Society for Industrial and Organizational Psychology, Chicago, IL.
- McKay, A. S.,** Grimaldi, E. M., Hoffman, M. E., Reimer, R. D., Sayre, G. M., & Mohammed, S. (2017, April). *Who participates in unions? Applying latent class analysis*. Poster presented at the Society for Industrial and Organizational Psychology, Orlando, FL.

### **TEACHING EXPERIENCE:**

#### ***Teaching Assistant, Pennsylvania State University***

Courses (all undergrad): Work Attitudes and Motivation; Psychology and a Sustainable World; Introduction to Abnormal Psychology; Self and Social Judgment; Introductory Psychology; Selection and Assessment in Organizations; Research Methods

#### ***Teaching Assistant & Instructor, California State University, San Bernardino***

Instructor: Intro to Experimental Psychology-Lab, 3 sections

Teaching Assistant: Regression (graduate); Advanced Methods in Psychology Research (graduate); Advanced Experimental Psychology: Social Psychology (undergrad); Advanced Seminar: Social Psychology (undergrad); Psychology and the Movies (undergrad); Race & Racism (undergrad, 5 sections)