

**EPISTEMOLOGICAL BELIEFS IN THE WORKPLACE:  
THE IMPACT OF PERSONAL BELIEFS ON KNOWLEDGE SHARING OUTCOMES**

by

Frankie J. Weinberg

(Under the Direction of Melenie J. Lankau)

**ABSTRACT**

This study proposes and tests two social-constructivist, knowledge-based models through which organization members' personal epistemological beliefs about knowledge and learning promote organizational knowledge sharing behaviors in teams and mentoring relationships. First, beliefs held by team members are argued to influence these individuals' knowledge sharing behaviors in their respective group, ultimately impacting group-level knowledge sharing outcomes in the forms of transactive memory systems and group learning. Second, beliefs held by mentors are expected to impact the degrees of vocational and psychosocial mentoring they provide to their protégés. The member's perception of psychological safety is expected to moderate the relationships in both of these models. Results reveal that the epistemological beliefs of full-time working adults do not appear to converge on the expected five dimensions, and rather a construct of individuals' beliefs regarding the effort associated with knowledge and learning processes emerged. Subsequent analysis reveals that organization members' effort-oriented beliefs impact the amount of psychosocial support they provide as mentors and that the mentor's perception of psychological safety acts to moderate this relationship in the direction predicted. However, members' levels of vocational mentoring and the degree of knowledge

sharing in which they engage in their work groups do not appear to reflect their effort-oriented beliefs. Constraints upon the study are discussed, and implications for future research and for practice are suggested.

INDEX WORDS: Epistemological Beliefs, Teams, Groups, Workgroups, Mentoring, Mentor, Mentor-Centric, Psychological Safety, Transactive Memory, Group Learning, Effort, Structural Equation Modeling, Multilevel

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A Dissertation Submitted to the Graduate Faculty of the University of Georgia in Partial  
Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2010

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August 2010

## **DEDICATION**

To my muse, my love, my best friend, and the best fiancée a man could ever ask for, O'Shea.

You have been so incredibly patient as I worked to complete my degree.

Now, as this journey reaches its conclusion, I can't wait to embark on a new journey with you  
as we start our new life together in New Orleans!

And to my parents, for everything that you have done for longer than I can remember  
that has made it possible for me to embark on all of my journeys.

## ACKNOWLEDGEMENTS

*“Sometimes the light’s all shinin’ on me;*

*Other times I can barely see.*

*Lately it occurs to me what a long, strange trip it’s been.”*

*~Garcia, Weir, Lesh, and Hunter (1970)*

Throughout my long, often strange, and certainly humbling journey to complete this dissertation, I have been fortunate to receive a great amount of support, inspiration, and motivation from so many different people. It is a pleasure to take this opportunity to thank all of those who made this project possible.

First and foremost, I extend my heartfelt gratitude to my supervisor, Melenie J. Lankau, for all of her encouragement, guidance, support, and especially her patience throughout my doctoral training. It is not often that a protégé is able to find such a willing, compassionate, and capable mentor. Melenie, the insight and wisdom that you have shared with me are unparalleled; I cannot thank you enough.

I further owe a great deal of thanks to both past and present members of my Advisory and Dissertation Committees including Robert J. Vandenberg, Laura M. Little, Jodi P. Holschuh, and Andrew J. Ward, each of whom provided valuable comments on previous drafts of this dissertation that helped to improve the content and presentation of the final manuscript. My dissertation would have suffered immeasurably without each of your unique contributions; I could not have asked for a better team.

Further, it goes without saying that I have benefited greatly from the support, guidance, and encouragement of all of my academic colleagues, particularly those at the University of

Georgia, the State University of New York at Buffalo, the State University of New York at Binghamton, and my undergraduate professors at Villa Julie College and Loyola University in Maryland. Of these colleagues, I would like to make a special reference to Prasad Balkundi at SUNY Buffalo, whose support, encouragement, and friendship throughout the entirety of my doctoral studies have been essential toward my growth as an academic.

In addition, this manuscript would not have been possible without the dedication, time, and support from the members of the organization at which this dissertation study was conducted. My deepest thanks to everyone who participated in the study and who took the time to share their thoughts and concerns with me. In particular, I would like to thank the members of the Human Resources department who welcomed me and worked alongside me to make this project a success, the members of the organization's Operations Committee whose communicated support provided me access to members at all levels of the organization, and the organization's warehouse manager who encouraged me to initially approach the organization with my research proposal. Of further note, I would like to thank my friends at the Jittery Joe's Coffee Roasting Co., who kept me company and kept me fueled as I penned the majority of this manuscript. Lastly, I would like to thank my new colleagues at Loyola University New Orleans, whose continuous encouragement during the final phases of my dissertation defense helped me to keep my eye on the light at the end of the long and winding tunnel.

Finally, these acknowledgements would not be complete without remarking on the love and support I have received from my close family and friends throughout my entire academic career. Mom, Dad, Marc, Melissa, O'Shea, Pam, Aadra, Jeremiah and everyone else ... you know who you are. I offer my most sincere regards and deepest gratitude to everyone who supported me in any respect during the completion of this dissertation.

*F. J. Weinberg*



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## CHAPTER 1

### INTRODUCTION

***"Archivists estimate that the collective sum of all printed knowledge is doubling every four years. More information has been produced in the last thirty years than in the previous five thousand."***

*~Oppenheimer (1996), quoting Barry Diller*

In its 2007 annual report, a Fortune 500 company's CEO expressed in his letter to shareholders that the organization is "blessed with a community of outstanding individuals who [each] ... brings a unique set of assets to the job, collectively resulting in greater knowledge, better decisions and premium quality and value" (*Fluor Corporation 2007 Annual Report*, p. 3). Later, this same annual report elaborates on the benefits associated with the organization's investment in a strong culture of knowledge sharing. This example serves as evidence that organizational decision-makers, including chief organizational strategists, are beginning to consider how they can make the most of the knowledge contained in their organizations. This question becomes increasingly important in today's knowledge era, as business organizations' capacities for effective performance have been shown to directly relate to the knowledge they contain and employ (Alavi & Leidner, 2001; Nonaka, 1994).

Given this powerful, positive relationship between knowledge and performance, it may not be surprising that over half of the total gross domestic product (GDP) of developed nations is knowledge-based (Husted & Michailova, 2002, citing a 1996 report released by the Organization for Economic Cooperation and Development). This focus on knowledge-based work demonstrates that organizational decision-makers have begun to recognize knowledge as a vital organizational resource (Alavi & Leidner, 2001), the management of which is essential. One

consequence that has resulted from an emphasis on knowledge management in organizations has been the emergence of a knowledge-based theory of the firm, in which organizations are conceptualized as institutions for assimilating knowledge (e.g. Grant, 1996). This theory recognizes that knowledge resides within individuals, and that the role of the organization is to integrate this individually held knowledge so that it can be applied toward positive results.

Positive results of knowledge integration within organizations are plentiful. For example, knowledge-based resources positively relate to firm performance (e.g. Wiklund & Shepherd, 2003), and “knowledge transfer among organizational units provides opportunities for mutual learning and interunit cooperation that stimulate the creation of new knowledge and, at the same time, contribute to organizational units’ ability to innovate” (e.g. Kogut & Zander, 1992; Tsai, 2001, p. 996; Tsai & Ghoshal, 1998). Accordingly, knowledge sharing has become the foundation of many organizations’ contemporary knowledge management strategies, such as creating a knowledge-sharing culture or developing a systematic, strategic approach to applying knowledge (Riege, 2005).

According to the theory of social-constructivism, learning takes place in a social context (Baxter Magolda, 2002). Therefore, to enable knowledge sharing in organizations, members must have access to an arena in which they may enter into interpersonal dialogues to share their experiences and knowledge with one another. Two workplace contexts in which knowledge sharing behaviors are pertinent to organizations, and in which individuals may share such experiences, include team work situations and mentoring relationships (Engström, 2003). Team knowledge sharing is a broad construct (Mohammed & Dumville, 2001), and accordingly, a number of inter-disciplinary research areas have considered knowledge sharing in organizational groups. A sample of these disciplines includes literature on team mental models (e.g. Cannon-

Bowers, Salas, & Converse, 1993; Mohammed & Dumville, 2001), transactive memory (e.g. Lewis, 2003; Moreland, 1999), group learning (e.g. Argote, Gruenfeld, & Naquin, 1999; Edmondson, 1999), and cognitive consensus (e.g. Bettenhausen, 1991). Further, organizational mentoring relationships have been explicitly viewed in recent literature as effective ways in which knowledge is created and shared (e.g. Bryant, 2005; Crocitto, Sullivan, & Carraher, 2005; Swap, Leonard, Shields, & Abrams, 2001). Both formal and informal organizational mentoring relationships establish a caring and trusting context in which face-to-face conversations and interactions take place between the two members, thus enabling knowledge sharing to take place (Engström, 2003). In both team and mentoring research, knowledge-sharing behaviors among members have been shown to positively impact consequences deemed important to organizational decision makers.

Although the literature on knowledge sharing clearly identifies the benefits of sharing knowledge in both group and mentoring contexts, it remains less clear which antecedents drive these knowledge-sharing behaviors in organizations. The aforementioned segregated literatures on knowledge sharing stand as partial testimony to this dearth of understanding. Accordingly, it appears appropriate to consider the process through which individuals choose to share knowledge in these contexts. As such, this study intends to identify the processes through which individuals' cognitions, which are rooted in their personal beliefs about knowledge and learning, promote knowledge sharing behaviors in interpersonal organizational situations. The theory of personal epistemologies, or one's beliefs about knowledge and learning, is a concept that is grounded in education literature, but which has the potential to impact learning and knowledge sharing behaviors in the workplace. Epistemological beliefs are one's personal theory of knowledge (Hofer, 2002). Each person has a personal theory of knowledge, which has an impact

on the ways in which they construct knowledge. Personal epistemological beliefs guide an individual's learning strategies, which, in turn, affect the cognitive processes underlying his or her learning experience, and ultimately impact the outcomes of the individual's learning process (Schommer, 1990), including the ways in which he or she works to build and share knowledge in his or her workplace setting.

Thus, the purpose of the present study is to examine how organization members' personal epistemological beliefs about knowledge can help to further our understanding of how knowledge sharing behaviors come about in workplace contexts. Accordingly, the present study presents a model through which organizational group members' knowledge sharing behaviors, and organizational mentors' output of mentoring support are both expected to stem from the personal epistemological beliefs that the group members and mentors respectively hold regarding the nature of knowledge.

In sum, today's knowledge era has paved the way for organizational decision-makers to consider the management of knowledge within their organizations. The challenge of managing knowledge has been met, in part, by managers taking a more knowledge-based, learning perspective to their firms; and this perspective has brought about a focus on collaborative, social workplace learning and knowledge sharing. It follows, then, that for these social workplace contexts to translate into positive consequences, we must understand the processes through which knowledge sharing behaviors come about. Studying personal epistemological beliefs about knowledge may allow us to gain insight into these underlying processes.



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **Knowledge-Based Social Constructivism in the Workplace**

Recent strategic management research has begun to discuss a knowledge-based perspective of the firm (e.g. Cole, 1998; Nonaka & Takeuchi, 1995; Spender, 1996a, 1996b). The knowledge-based perspective views knowledge as an important organizational resource, and as such, it acts as an extension to the resource-based perspective of the firm (e.g. Penrose, 1959). According to the knowledge-based perspective of the firm, an organization's knowledge is carried through multiple organizational entities, including individual employees, and the combination and application of this knowledge produces results that ultimately bring about long-term sustainable competitive advantage (Alavi & Leidner, 2001). Some researchers have even argued that a firm's competitive advantage is largely dependent upon the knowledge that it holds (e.g. Goh, 2002), and its ability to exploit that knowledge (e.g. W. M. Cohen & Levinthal, 1990). Thus, it appears as though the method by which this knowledge is transmitted and interpreted among organizational members may have an important impact on a firm's ability to compete.

Knowledge-based learning organizations represent an attempt to reap the benefits associated with organizational knowledge, and thus often stress the usefulness of collaborative learning (Tillema, 2006). Collaborative learning accounts for knowledge as a process of employing expertise among organization members (Alavi & Leidner, 2001). Hence, in keeping with this process perspective of knowledge, the present study focuses on knowledge flows and the processes associated with creating, sharing, and distributing knowledge. This process of knowledge dissemination is consistent with Cohen and Levinthal's (1990) discussion of how learning capabilities require the capacity to assimilate prior, related existing knowledge in order

to develop and use new knowledge. However, as Goh (2002) acknowledges, managing knowledge assets can be one of the most challenging aspects facing contemporary organizations. The management of knowledge sharing processes have been discussed extensively by researchers in a variety of fields, including information technology (e.g. Nonaka, 1994), education (e.g. Tillema, 2006), and strategic business management (e.g. Husted & Michailova, 2002). Although Alavi & Leidner (2001) concede that the knowledge management process of creating, storing/retrieving, transferring, and applying knowledge are not new to research, they add that organizational managers have only recently become much more knowledge focused. This new knowledge focus has, in fact, become such a way of life in many successful organizations that it has become integrated into both individual and corporate objectives (Husted & Michailova, 2002).

Knowledge-based learning organizations, with their focus on collaborative learning, inherently acknowledge the social nature of knowledge construction (Tillema, 2006). This stress on social knowledge construction emphasizes individual members' contributions to shared, collective understanding (Tillema, 2006), while acknowledging that these individuals' social workplace contexts are inseparable from their learning and developmental opportunities (Palonen, Hakkarainen, Talvitie, & Lehtinen, 2004). Thus, as elaborated by Cohen and Levinthal (1990), "firms are in fact sensitive to the characteristics of the learning environment in which they operate" (p. 149). Accordingly, an organizational focus on collaborative, social learning and knowledge sharing corresponds with social-constructivist theories of knowledge building. Social constructivism holds that individuals' beliefs and perspectives are constructed through their unique interpretations of their social experiences (Baxter Magolda, 2002). These individual, socially constructed beliefs act as the foundation upon which their subsequent

learning and knowledge-related behaviors rest. Similar to the work of Baxter Magolda (2002) and Kegan (1982), the present study is grounded in socially constructed assumptions of developmental processing. Whereas social constructivism signifies the belief that people's perspectives are constructed through their own interpretations of their experiences, developmentalism "refers to the belief that these constructions evolve through eras marked by principles of stability and change" (Baxter Magolda, 2002, p. 90; Kegan, 1982). With regard to epistemological development, this assumption infers that epistemologies are socially constructed such that the events which cause changes in individuals' beliefs represent an interaction between the individual and the social context (Kegan, 1982). As such, similar to Kasworm's (2003) social-constructivist view of adult learning, the present study views organization members' learning and knowledge construction as a process through which individuals construct "new representations and models of reality ... with culturally developed tools and symbols, and further negotiating such meaning through cooperative social activity, discourse, and debate" (Twomey Fosnet, 1996, p. ix). Consequently, organizational knowledge-sharing contexts such as group interactions and mentoring relationships provide the social frameworks through which individuals draw on their beliefs about knowledge and learning to participate in knowledge-related behaviors. It stands to reason, then, that social contexts may have a considerable impact on knowledge sharing and other knowledge-related behaviors.

Some research has explicitly examined the ways in which social contexts can promote knowledge-productive behaviors among organizational members (e.g. Tillemma, 2006; Tsai, 2001). However, this research has focused largely on the ways in which learning environments are physically arranged and how these arrangements foster or discourage organizational members to develop, exchange, and communicate their knowledge with one another (Tillemma,

2006), rather than focusing on the individual contributions of the team members. Some teamwork researchers such as Goodman, Ravlin, and Schminke, (1987), for example, have argued that most variance in team effectiveness comes from team structural features (i.e. availability of information and resources, or expected rewards) rather than from interpersonal factors. However, organizational learning researchers (e.g. Argyris, 1993; Edmondson, 1999) argue the importance of cognitive and interpersonal factors as explanations for team effectiveness. Studies on professional knowledge construction (e.g. Engeström, 1994) and community of practice (e.g. E. Wegner, McDermott, & Snyder, 2002) further appear to support the concept that individual factors interact with social situations to impact behaviors conducive to team effectiveness outcomes. Organizational learning research emphasizes how these individual variables (e.g. cognitive and interpersonal factors toward knowledge construction) are contributors to the practice of learning in the organization.

The present study will examine the influence that one of these individual variables – individuals' epistemological beliefs – have on knowledge sharing processes in the contexts of group work and mentoring relationships. Accordingly, the following section defines personal epistemological beliefs in detail; this section will be followed by a description of the theoretical mechanisms through which I propose that beliefs will influence knowledge sharing actions in teams and mentoring relationships. Finally, a model is developed and presented wherein epistemological beliefs act as an antecedent to knowledge sharing behaviors in the two organizational contexts of group collaboration and mentoring relationships.

### **Epistemological Beliefs about Knowledge and Learning**

One's epistemological beliefs relate to the individual's notions regarding such items as the origin and nature of knowledge and the ways in which knowledge is acquired. The theory of

social constructivism considers how knowledge is acquired within a certain context. As epistemological beliefs are grounded in situated cognition theory (Marlene Schommer-Aikins & Hutter, 2002) in such a way that they represent such a sociological, constructivist approach to knowledge (Bereiter, 1994; Hofer & Pintrich, 1997), the literature suggests that learning takes place in a specific context. In the case of epistemological beliefs, the context gives rise to a learner's assumptions that he or she has about the nature of knowledge and learning. Thus, epistemological beliefs are socially embedded: One's assumptions are shaped by his or her previous learning experiences; as beliefs, they represent an individual's strong convictions, but they remain a dynamic construct. One's epistemological beliefs about knowledge may be modified if the individual is exposed to new learning experiences that cause him or her to question his or her existing assumptions. These dynamic, socially constructed assumptions guide one's strategies for learning, the cognitive processes underlying one's learning experience, and, finally, the outcomes of one's learning process.

An employee's epistemological beliefs about knowledge and learning will influence the way in which he or she approaches the learning process (Hofer, 2002). For example, as discussed by Hofer and Pintrich (1997), individuals' theories about knowledge influence their motivation and cognition such that they influence how the individuals approach tasks. Further, one's epistemological beliefs may drive the cognitive processes underlying his or her learning (Nist & Holschuh, 2005). As such, learning tasks may be accomplished through a process that begins with one's epistemological beliefs: One's beliefs influence thoughts about learning and motives in learning situations which then shape behavior. For example, as Hofer (2002) points out, a student who views knowledge as a set of accumulated facts or views him/herself as a passive receptor of knowledge may approach learning much differently than someone who

believes that knowledge is a set of integrated constructs or who considers him/herself an active participant in the construction of knowledge, respectively. Finally, individuals' beliefs about knowledge and learning have been shown to impact their approaches to and strategies for learning (Cano, 2005; Holschuh, 1998; Schreiber & Shinn, 2003). As one's beliefs impact his or her approaches to learning, learners' personal epistemological beliefs are related to their performance in multiple contexts (Schommer, 1990).

### **The Five Dimensions of Epistemological Beliefs**

Most research on epistemological beliefs of learning compartmentalizes individuals' beliefs into five relatively independent dimensions (Bauer, Festner, Gruber, Harteis, & Heid, 2004; Nist & Holschuh, 2005; Schommer, 1990, 1994). These dimensions, stemming from Schommer's (1990) discussion about the beliefs of knowledge on comprehension, include one's beliefs about (1) the simplicity of knowledge; (2) one's own innate ability to learn; (3) the omniscience of authority; (4) the certainty of knowledge; and (5) the speed at which learning occurs. Next, I will elaborate on each of these five belief dimensions:

**Simplicity of knowledge.** According to Schommer (1990), an individual who views knowledge as simple would probably seek single answers for problems, and would likely avoid integration of constructs as he or she encounters them. Such learners may oversimplify complex information in two ways: First, they may maintain a focus on only one aspect of the overall information presented to them; or second, they might compartmentalize the information into independent categories (Schommer, 1990). Whereas either of these approaches may allow a task to appear more manageable through their respective focuses on smaller pieces of information, such simplification might not be appropriate for every task; for example, if a task requires an

organization member to make a strategic decision, it may be important for this employee to see a broader, more integrated picture than his or her simplification strategies may allow.

**Innate ability to learn.** Additionally, some individuals believe that abilities are innate, rather than acquired (Schommer, 1990). As a person with the belief that abilities are innate is likely to disbelieve in his or her own ability to become more skilled at learning, he or she may be unlikely to work hard toward success, believing instead that hard work is not necessary and that ‘smart’ individuals do not really have to work hard, as their abilities are intrinsic.

**Omniscience of authority.** A person who believes in omniscient authority would not question his or her confidence in the knowledge source and may, rather, become dependent upon that source of authoritative knowledge. This dependence may occur because an organization member who holds a stronger belief in omniscient authority is less likely to consider the rationale behind the information presented to him or her (Schommer, 1990), thereby bestowing power unto the person who provides the information. Further, a belief in omniscient authority may also cause oversimplification of complex ideas that may contain more than one solution, as an individual with this belief is likely less driven to seek new answers or solutions to given situations.

**Certainty of knowledge.** This dimension describes an individual’s belief that knowledge is either certain or tentative (Schommer, 1990). An individual who views knowledge as certain or fixed may choose to avoid ambiguity, preferring instead situations in which a predictable outcome is likely to ensue. A potential strength associated with the belief that knowledge is certain may be that a person with this belief may be more likely to derive a feasible conclusion to a problem, rather than describing it as unresolvable, as would a person holding a belief in uncertainty of knowledge (Schommer, 1990). However, such absolute conclusions,

which are likely to be made by an individual who believes that knowledge is certain, may impair his or her openness to information-seeking. Thus, a consequence associated with holding a belief that knowledge is certain is that an individual with this belief may not take into account broader contextual factors that could have a potentially huge impact on the effectiveness of the conclusions drawn. This individual may be more likely to jump to conclusions based on what he or she ‘knows’ to be certain, rather than seek an open exchange of ideas. Moreover, an individual who holds a belief in the certainty of knowledge may become too involved in fitting his or her perceptions of a situation to harmonize with his or her version of the ‘truth’ that this person may be incapable of considering alternatives that could allow him or her to examine the situation as a whole.

**Speed at which learning occurs.** This final dimension pertains to an individual’s belief that learning either occurs ‘quickly or not at all’ versus recognizing that it may progress over time (Schommer, 1990). Individuals who believe that learning occurs rapidly may be prone to maintaining an attitude that spending much time on a project would likely only lead to oversimplification or confusion over the subject matter, whereas individuals who recognizes that learning may progress over time may be more likely to integrate different lessons or theories to arrive at a more complete understanding of the subject matter and derive a more comprehensive conclusion (Schommer, 1990).

Keeping with the organization of the five epistemological belief dimensions discussed above, mature (or sophisticated) epistemological beliefs about knowledge could be characterized as an individual (1) understanding the complexity of knowledge; (2) acknowledging that knowledge can be gained through learning processes; (3) internalizing the responsibility for knowledge and questioning the authority on which the knowledge has been presented; (4)



recognizing that knowledge is uncertain or tentative; and (5) realizing that knowledge creation is a continual process that in many cases takes a great deal of time to master; whereas naïve beliefs epitomize the diametrically opposite convictions. According to Schommer-Aikins (2002), “the rationale used in designating epistemological sophistication is that the beliefs support quality study strategies, quality comprehension, quality interpretation, and quality problem solving” (p. 113). Therefore, one may conclude that, in many learning situations, positive outcomes are expected to arise from organizational members who hold mature or sophisticated beliefs, as opposed to those who hold naïve or less advanced beliefs.

### **Epistemological Beliefs Impact Knowledge-Sharing Outcomes**

Examining epistemological beliefs as they relate to an organizational context heeds the call of previous epistemology researchers who have asked for investigations into the ways in which epistemological beliefs affect the nature and development of knowledge proficiency in a variety of learning contexts (Moore, 2002). All knowledge depends on, and is thus embedded in, its context (Von Krogh, Ichijo, & Nonaka, 2000). Thus, studying the relationship between personal epistemological beliefs and the contexts responsible for knowledge sharing behaviors is warranted. In a recent study, Tickle and her colleagues (Tickle, Brownlee, & Nailon, 2005) assert the worthiness of investigating epistemological beliefs and learning in organizational research because of the insight that such a study might provide into the decision-making processes and behaviors of organization members. The present study aims to further this area of inquiry by outlining the relationship between epistemological beliefs of organization members and how, in social-developmental contexts, they motivate individuals to contribute to group knowledge sharing behaviors. However, to do so, it is necessary to first discuss why we should expect one’s personal beliefs to impact his or her subsequent behaviors. This relationship may

be expected through social-contextual consideration of Dulaney's (1967) theory of propositional control, whereby social situations trigger one's attitudes or beliefs, which subsequently drive his or her behaviors.

Cognition theories recognize the social sources that drive an individual's motives and goals (Pintrich, Marx, & Boyle, 1993; Strike & Posner, 1992). One's needs often drive his or her motivations, and these needs may be triggered by exposure to certain social situations. According to Murray's (1938) manifest needs theory, people experience a wide variety of needs, and these needs may motivate an individual to behave in such a way as to satisfy those needs. Consistent with this theory, Horner (1997) describes how environmental conditions may activate certain needs within an individual. That these contexts may activate one's needs and motivate him or her to action is consistent with distributed cognition theory, which extends the organization of cognitive systems beyond the individual to encompass interactions between individuals (Hollan, Hutchins, & Kirsh, 2000). Thus, an individual's drive to satisfy his or her needs may be triggered by organizational contexts, including a group setting or mentoring relationship in which the individual is involved. This rationale may explain how an individual's attitudes or beliefs may be derived from his or her contextually stimulated drive to satisfy certain needs. Fishbein's (1967) expansion on Dulaney's (1967) theory of propositional control suggests that these attitudes or beliefs ultimately direct an individual's behavior. Ajzen and Fishbein (1970) found empirical support for the theory of propositional control, suggesting that a person's attitude toward an act directs his or her behavioral intention toward that act, which then directly brings about the person's subsequent behavior. Drawing on this theory, an organization member's epistemological beliefs about knowledge and learning may impact his or her thoughts

regarding the learning process which may then subsequently impact his or her knowledge-related behaviors.

The following sections discuss the relationships anticipated between group member and mentor epistemological beliefs and subsequent group knowledge sharing and the degree of mentoring support provided, respectively. First, I will discuss groups as generators of knowledge and elaborate on how the different components of group members' epistemological beliefs are expected to relate to individual member's knowledge sharing behaviors; each of these subsections will end with the presentation of a formal hypothesis. Following this discussion is a section describing anticipated relationships between those individual behaviors and group-level knowledge sharing outcomes, and presenting related hypotheses. The second section will elaborate on mentoring relationships as generators of knowledge and will describe the expected relationships between epistemological beliefs and mentoring support. Each mentoring subsection will, likewise, end in the statement of a formal hypothesis. These two sections will be followed by a final discussion of how the concept of psychological safety is expected to act as a moderator between one's personal epistemological beliefs and his or her individual knowledge sharing behaviors.

## **CHAPTER 3**

### **THEORETICAL DEVELOPMENT OF A SOCIAL-CONSTRUCTIVIST MODEL OF EPISTEMOLOGICAL BELIEFS IMPACTING KNOWLEDGE SHARING BEHAVIORS**

#### **Epistemological Beliefs and Groups**

##### **Groups as Generators of Knowledge**

Group and team interaction provide one context in which knowledge sharing behaviors take place in the workplace<sup>1</sup>. Teams have become commonplace in contemporary organizations, and thus have become a popular topic for organizational research. As Edmondson (1999) points out, the uncertainty and rapid changes characteristic of today's organizational environment have led to greater organizational reliance on teams to battle these challenges and to accomplish tasks. The present study follows Guzzo and Dickson's (1996) definition of work group, which these authors used interchangeably to mean team:

Individuals who see themselves and who are seen by others as a social entity, who are interdependent because of the tasks they perform as members of a group, who are embedded in one or more larger social systems (e.g. community, organization), and who perform tasks that affect others (such as customers or coworkers) (1996, pp. 308-309).

This definition is important, as it highlights the social interdependence of team members as they perform their task functions. By emphasizing interdependence as an integral part of being a team member, this definition of team appreciates the social nature of collective knowledge construction, and highlights the individual members' contributions toward a shared understanding (Tillema, 2006). As such, the social context in which the team members exchange

knowledge is inseparable from the knowledge sharing itself (Palonen et al., 2004; Tillema, 2006).

Knowledge has come to be considered an important organizational resource (Alavi & Leidner, 2001), and thus managers have become more knowledge-focused and interested in methods to improve knowledge management and team learning. The knowledge management process involves a number of activities, including coding, storing, retrieving, transferring, and applying the knowledge (Alavi & Leidner, 2001). With respect to knowledge sharing, the knowledge management process is transacted between the individuals involved, with the purpose of developing greater “knowledge productivity” (Tillema, 2006). Thus, it stands to reason that a theory of knowledge sharing in a group context requires discussion of both individual contributions, in terms of their knowledge sharing behaviors, and the processes that result in intra-group knowledge sharing. I will begin by discussing individual team member contributions to knowledge sharing.

Knowledge sharing is an activity through which knowledge is exchanged among people. In the context of a group, then, individual member knowledge sharing behaviors are those behaviors in which a person engages which should enhance knowledge exchange among team members. These activities may include such directly relevant behaviors as listening to ideas expressed by others, sharing one’s own specialized knowledge with fellow teammates, and seeking out information that may lead to important changes. Further, individuals who work toward effectively coordinating team interactions so that the team’s work processes are more effective could be equally described as engaging in knowledge-sharing behaviors, as this activity contributes to greater knowledge productivity (Tillema, 2006) within their work group unit. According to Tillema (2006), the study of knowledge productivity in teams allows us to

understand team learning results, as they promote collaborative knowledge construction. However, before I discuss group-level results, I will examine some potential indicators of the individual-level knowledge sharing behaviors associated with those results.

### **Epistemological Beliefs and Individual Knowledge Sharing Behaviors**

Mature, or sophisticated, epistemological beliefs are expected to positively drive individuals' knowledge-sharing behaviors. Figure 3.1 represents the individual-level portion of my group model, as it illustrates how team members' epistemological beliefs drive their individual knowledge-sharing behaviors. Figure 3.1 describes the thoughts and behaviors associated with mature or sophisticated epistemological beliefs, and the relationship that these mature beliefs are expected to have with individual knowledge sharing behaviors. The first relationship presented in Figure 3.1 describes the expected relationship between a belief that knowledge is complex and knowledge-sharing behaviors. Group members who believe that knowledge is complex (as opposed to simple) are interested in the big picture, rather than focusing on less complicated individual pieces of information. An individual who believes in the complexity of knowledge, then, would consider complex, integrated knowledge as a valuable resource (Hobfoll, 1988), and would thus shape his or her work behaviors and goals toward conservation of this, taking such actions as sharing his or her own knowledge, seeking out new information from others, and incorporating those others' ideas into a collaborative framework. As goals reflect items that an individual considers important (Locke & Latham, 1994), one's goal of integrating knowledge is, according to Festinger's (1957) theory of cognitive dissonance, likely to encourage associated, harmonious behaviors. As such, these individuals are likely to behave in ways that pull ideas together through aggregation of knowledge. Further, these individuals would likely think creatively, unconstrained by orthodox or conventional limitations,

and ultimately see patterns in the distributed knowledge that others may not see. In a group setting, this belief could manifest itself by motivating the team member to communicate with other members in order to arrive at a more complete comprehension. Rationale for such behavior in groups may stem from Blau's (1964) social exchange theory, which would argue that a member might share his or her knowledge with the group because he or she expects reciprocity from fellow members. Bock and Kim (2002) build on Blau's (1964) theory to argue that a series of social interactions in which a member receives knowledge and reciprocates properly will lead to trust, and ultimately establishment of positive exchange relations. Thus, an individual who believes that knowledge is complex is likely to not only consider both his or her own influence on knowledge sharing outcomes, but also acknowledge the importance of other members' contributions, as well. This acknowledgement of complex knowledge arising from the proactive sharing of information among members is likely to encourage information-seeking and feedback-seeking behaviors by this member. Accordingly, I propose the following hypothesis:

*H1. Group members' personal epistemological belief that knowledge is complex (rather than simple) is expected to positively relate to their individual knowledge-sharing behaviors.*

The belief that knowledge can be gained through learning (as opposed to believing that knowledge is innate) deals with one's conviction in his or her own capacity to improve upon or gain knowledge, as well as his or her belief in others' abilities to do so. Consistent with self-determination theory, an individual who holds the belief that knowledge can be gained through learning experiences believes not in innate human abilities, but rather in human potentials (Ryan & Deci, 2000). Thus, this individual would be interested in exploring the ways in which group

interactions can bring out the potential within each member. This member, then, may be likely to act as a knowledge broker, assisting fellow members to get the information they need.

Additionally, previous knowledge-sharing researchers (e.g. Cabrera & Cabrera, 2002; Foss, Minbaeva, Pedersen, & Reinholt, unpublished manuscript) have examined the role that motivation, in the forms of expectancy theory and expected utility theory, plays in one's decision to engage in knowledge sharing behaviors. Consistent with Vroom's (1964) expectancy theory, an individual who believes that knowledge is gained through learning experiences will behave in ways that he or she believes will consequently bring about positive outcomes from those efforts. Expectancy theory holds that individuals decide their behaviors according to their expectations of consequences that are likely to arise from those behaviors. Building on this concept, Cabrera and Cabrera (2002) discuss the process of determining whether to engage in knowledge sharing in terms of a cost-benefit analysis. An individual who holds this belief that knowledge can be gained through learning, then, is likely to decide among alternative behaviors, and choose collaborating and sharing as behaviors associated with his or her goal to gain knowledge through learning experiences. These behaviors may manifest as action associated with improving the team's work processes and working toward effectively coordinating and the interactions of the team.

Further, the concept of learning goal orientation may explain why an individual who believes that knowledge can be gained through learning may view the effort he or she associates with knowledge attainment as in-role behaviors (e.g. Katz, 1964; O'Reilly & Chatman, 1986); that is, as behavior that is a required part of his or her job as a team member. An individual with a learning goal orientation would believe that successful task accomplishment comes from effort (VandeWalle, Brown, Cron, & Slocum, 1999), and that it is therefore his or her duty to put in the



effort associated with such outcomes. Bock and colleagues (Bock, Zmud, Kim, & Lee, 2005) found that one's perception of social pressure (such as believing that the behavior is in-role) positively associate with one's intention to engage in knowledge sharing behaviors. Another knowledge-sharing behavior, feedback seeking, is also strongly associated with having a learning goal orientation (VandeWalle & Cummings, 1997). Therefore, a group member who believes that knowledge can be gained through learning is likely to approach team interactions as an opportunity to learn something, as he or she will likely recognize the useful learning nature of teamwork and collaboration exercises. Ultimately, this individual is likely to claim to have learned something from having undertaken such collaborative interactions, as he or she is likely to recognize the influence that his or her social action in the form of participation has on learning outcomes (Lewin, 1939). Further, as this individual is likely to understand the mutually beneficial nature of social exchanges (Emerson, 1976), he or she may be willing to take the time to detail his or her own knowledge to less knowledgeable teammates, in addition to seeking feedback from other members, as discussed earlier. For these reasons, I put forth the following hypothesis:

*H2. Group members' personal epistemological belief that knowledge can be gained through learning (that it is not innate) is expected to positively relate to their individual knowledge-sharing behaviors.*

The third epistemological belief dimension is that of omniscient authority. An individual with a mature or sophisticated belief on this dimension is one who internalizes the responsibility for knowledge, believing that learning happens internally. That is, this individual would consider knowledge creation as something that happens from within him/herself, and not something that is passively done to him/her. As Schommer has shown mixed results in previous

factor analyses of this particular dimension, I deviate slightly from her original (1990) theory to expand this concept to include the internalization of knowledge itself as a compliment to one's internalizing the responsibility for knowledge. As internally focused people feel as though they are the ones primarily responsible for their fate, they tend to have the confidence and direction to attempt to control their external environments (Ng, Sorensen, & Eby, 2006). Thus, this belief that knowledge is generated from within should encourage an individual to examine his or her own influence on group learning outcomes, as he or she will likely recognize that such outcomes are to some extent dependent upon his or her own behavior. In a team setting, this behavior is likely to manifest itself as the individual taking it upon him- or herself to assert, and thus share, his or her internally acquired knowledge with teammates so as to work to improve team work processes and achieve group tasks. This individual's internal focus may encourage him or her to take a more positive outlook on a situation, and thus feel a great deal of satisfaction from taking on this job of sharing information (Ng et al., 2006), further motivating such knowledge-sharing behaviors.

Further, an individual with this belief would believe in other members' needs to internalize responsibility for knowledge, as well, and thus he or she is likely to engage in information-seeking and feedback-seeking discourse to encourage fellow members to take ownership of the group's knowledge generation. Sharing information with fellow teammates in this way might help to satisfy an internally focused individual's strong intrinsic motivation toward achievement (Yukl & Latham, 1978). Encouraging feedback-seeking behaviors may further help to enhance the individual's intrinsic motivation, as it could enforce his or her image accuracy and thus bring about self-enhancement (Scott & Lane, 2000).

Lastly, according to Deci and Ryan's (1985) self-determination theory, these behaviors could come about, in part, due to the individual's competence orientation. That is, an individual who believes in the internalized responsibility for knowledge may boost his or her own confidence in his or her competency by retaining the large degree of control that may be associated with taking on the role of information provider or broker. However, as Ryan and Deci (2000) elaborate, this individual's internalized motivation may at the same time allow him or her to better assimilate him or herself within the group. To the degree that an internally focused team member takes on the role of information provider or broker to assimilate him or herself into the group, this view is consistent with Owens & Sutton's (2001) discussion of meetings as forums where status is played and displayed. In conclusion, an individual who believes in internal responsibility for knowledge has a number of reasons to engage in knowledge sharing behaviors. Consequently, I offer the following hypothesis:

*H3. Group members' personal epistemological belief to internalize (rather than externalize) knowledge is expected to positively relate to their individual knowledge-sharing behaviors.*

Further, an individual who believes that knowledge is uncertain or tentative (as opposed to certain or fixed) is likely more open to explore alternatives and question the basis of any knowledge he or she acquires. This implies such knowledge-sharing behaviors as seeking out and listening to others ideas and working to integrate them into a tentative understanding of the situation. They will also look for multiple solutions to problems and are likely to challenge conventional wisdom, unlike their absolute-minded counterparts (Nist & Holschuh, 2005). Although an individual who believes that knowledge is uncertain or tentative may be more likely to understand a situation as potentially unresolvable (e.g. wondering whether, since knowledge is

uncertain, they are taking the right course of action), this perspective may actually benefit decision-making, as it may represent a low need for closure within the individual. De Dreu, Nijstad, and van Knippenberg (2008) have argued that

individuals with low rather than high need for closure have a relatively weak desire for firm and ready-made knowledge, and thus they rely less on what other group members think to acquire (social) validation of one's views, beliefs, and perspectives (p. 28).

Further, an individual's low need for closure, or low desire to reach a conclusive answer to a given topic, may allow him or her to react more positively to fellow members who disrupt closure by, for example, discussing alternative solutions or calling for a deeper consideration of the issue (Webster & Kruglanski, 1994). This reasoning is consistent with De Grada and colleagues' finding that groups composed of members with low need for closure tend to report less pressures for conformity and higher levels of open, unrestricted communication (De Grada, Kruglanski, Mannetti, & Pierro, 1999).

In addition, individuals who believe that knowledge is uncertain tend to approach knowledge from a situationist perspective (e.g. Davis-Blake & Pfeffer, 1989; Locke, 1976), recognizing that there are situationally-based, contextual differences which contribute to knowledge. As such, a team member with this belief would be more open to exploring alternative explanations as necessary, and may be interested in learning how other members acquired their knowledge, particularly when the other member's knowledge differs from his or her own. This behavior would be consistent with social exchange theory (Blau, 1964), which recognizes the reciprocal nature of social interactions. Specifically, as an individual with this belief engages in an open discussion with teammates and shares his or her own perspective, the

expected reciprocity of knowledge sharing behaviors in the group may allow the individual to validate his or her belief in the tentative nature of knowledge, as he or she would expect fellow members to bring to light alternative explanations and differing opinions.

Additionally, situational or contextual inconsistencies brought to light through group discussion may trigger this individual to consider changing his or her outlook on a topic, as his or her belief in uncertain knowledge is likely to allow this person to account for contextual factors as they arise. Thus, the mature belief that knowledge is uncertain or tentative may allow a team member to openly consider team-discussed alternatives to the knowledge that he or she has acquired through his or her own explorations. Further, a member who believes that knowledge is uncertain or tentative will perceive ambiguous situations or stimuli as challenging, interesting, and even desirable (Furnham & Ribchester, 1995) and is more likely to engage in conversation in which he or she openly considers alternatives brought to the table by fellow members. These behaviors are consistent with knowledge sharing. Accordingly, I propose the following hypothesis:

*H4. Group members' personal epistemological belief that knowledge is uncertain or tentative (rather than certain or fixed) is expected to positively relate to their individual knowledge-sharing behaviors.*

Lastly, a team member's belief that knowledge acquisition is a continual process (rather than a now-or-never endeavor) is expected to impact the ways in which he or she behaves in a group setting. Specifically, an individual with this belief will acknowledge that learning is a work in progress, and that there is more that can be learned. Consistent with Vroom's (1964) expectancy theory and Cabrera and Cabrera's (2002) contention that the decision to share knowledge entails a cost-benefit analysis, this individual would view continued time spent

collaborating as leading to a desired outcome – that is, acquiring more knowledge. Thus, he or she would be motivated to share and collaborate, as he or she would likely consider time spent interactively on a project as time well spent toward doing the best job possible toward the group's knowledge sharing, learning, and task outcomes. This member may consider continuous group interactions toward a task as a useful and pertinent step toward ultimately accomplishing the group's task, and by proxy his or her own goal of acquiring knowledge. To this individual, the journey of learning from one another and from trial-and-error allow for important information gains, which the members translate into task-related knowledge. These behaviors are consistent with individuals who have a higher learning goal orientation (see Dweck, 1986; VandeWalle et al., 1999), in that these individuals view the continual process of learning as an opportunity to further develop their competence. Further, the networking aspect of continually working toward a task may appeal to these members, as they will perceive more opportunities to be informed by others, thereby further developing their own knowledge, skills, and abilities. These collaborative exercises will provide more opportunity to explore alternatives and engage in a system of task-related transactions with fellow teammates, furthering individual competence by allowing them to acquire additional knowledge and skills. Thus, team members who believe that knowledge creation is a continual process are likely to be motivated to engage in knowledge sharing behaviors. Hence, I propose the following hypothesis:

*H5. Group members' personal epistemological belief that knowledge creation is a continual process (rather than now-or-never) is expected to positively relate to their individual knowledge-sharing behaviors.*

## **Knowledge Sharing Behaviors and Groups**

Figure 3.2 displays the positive relationship expected between individual knowledge sharing behaviors (aggregated) and group knowledge sharing outcomes in the forms of transactive memory and group learning. Knowledge sharing behaviors enacted by individual team members are meaningless if they occur in a vacuum. By definition, knowledge sharing is a relational action based on mutual exchanges in which individuals either transmit their own knowledge to others, receive knowledge from those others, or both (Foss et al., unpublished manuscript). The theory of social-constructivism argues this point, stating that learning takes place in a social context (Baxter Magolda, 2002). Thus, without an arena in which individuals may to share tacit knowledge via interpersonal dialogues, knowledge sharing cannot take place. Business strategy research further supports this concept that knowledge sharing inherently involves individual members' contributions to group process outcomes. For example, Cohen and Levinthal's (1990) argue that a business unit's capacity to recognize the value of new information, assimilate that information, and apply it depends on the absorptive capacity of its individual members. As a construct, knowledge sharing represents actions by individuals that, in the aggregate, increase knowledge in a larger context, such as the work group or organization in which the individual functions. As such, knowledge sharing can be operationalized at multiple levels of analysis, as the more micro construct of individual knowledge sharing behaviors is embedded or nested within the more macro construct – in this case, group knowledge sharing (see Avolio & Bass, 1995 for a discussion of this concept).

It is my contention that to fully model knowledge sharing, it is essential to examine it in terms of how it evolves from individual motivations to share knowledge to their knowledge sharing behaviors, and the subsequent behaviors observed at the group level. The previous

section discussed how individual epistemological beliefs drive an individual to participate in different forms of interpersonal communication, including those behaviors that may lead a team to engage in group learning and develop a transactive memory system. In this sense, a communication system emerges within a team as more individual members engage in knowledge sharing behaviors, acting as a conduit for knowledge sharing to occur within the group. Thus, as Peltokorpi and Manka (2008) found that communication works through transactive memory to impact group outcomes, it is likely that the individual members' knowledge sharing behaviors, driven by their personal beliefs, may have a decisive ultimate impact on group outcomes via their impact on team transactive memory and group learning.

In groups, the social transactions involved in the knowledge management process result in such knowledge-productive outcomes as the construction of a transactive memory system and group learning, which both promote collaborative knowledge construction (Tillema, 2006), and have each been found to ultimately impact group performance outcomes. These two knowledge processes both have a track record of relating to team performance outcomes (e.g. Argote, Insko, Yovetich, & Romero, 1995; Austin, 2003; Lewis, 2004; Wong, 2004).

**Transactive memory systems.** First, transactive memory systems describe memory as a social phenomenon, where individuals in ongoing relationships often rely on each other as “external memory aids to supplement their own limited and unreliable memories” (Mohammed & Dumville, 2001, p. 93). Originally discussed by Wegner (1986) to explain some behavioral aspects of intimate couples, transactive memory systems have more recently been applied at the group level of analysis (e.g. Moreland, 1999). Team transactive memory systems come about as members combine their own knowledge with a shared consciousness of “who knows what” in the group (Mohammed & Dumville, 2001; D. M. Wegner, 1986). As such, teams develop an



interdependent cognitive system through which they encode, store, and retrieve information (Mohammed & Dumville, 2001; D. M. Wegner, 1986). This system, in turn, ensures that important details are made readily available, and thus minimizes the extent to which important artifacts are forgotten. A transactive memory system involves proactive behavior from members to keep current on ‘who knows what’ in the group, and maintaining a strategy for accessing information when needed (Mohammed & Dumville, 2001). Further, an intact transactive memory system ensures that incoming information to a group is stored with the member whose domain of expertise most closely matches the information (Mohammed & Dumville, 2001). Thus, individual members become more specialized in their respective domain areas, ultimately reducing redundancy of effort among team members (Hollingshead, 1998) who can focus on their areas of expertise and have access to an “expanded pool of expertise” when they require additional information.

Although a number of recent studies have considered transactive memory in teams, most of these transactive memory studies have been conducted with students, and thus relatively little is known about how they manifest in organizational work settings (Peltokorpi & Manka, 2008). Given the importance of transactive memory toward team functioning, it appears important that we focus on methods by which to develop transactive memory in work teams (Prichard & Ashleigh, 2007). The present study extends existing research on the processes by which transactive memory is developed (e.g. Rulke & Rau, 2000; D. M. Wegner, 1986).

**Group learning.** Although group learning has been defined as both a process and an outcome of group interaction, the present study joins the tradition of conceptualizing collective learning as the outcome of a process (e.g. Devadas & Argote, 1995; Levitt & March, 1988) whereby “relatively permanent changes in the knowledge and performance of an interdependent

set of individuals” ultimately come about as a result of individual member behaviors contributing to a process that drives these changes (Mohammed & Dumville, 2001, p. 96). The team learning literature focuses on groups as information-processing systems (Edmondson, 1999). Hence, by processing information as a group entity, teams are able to examine the consequences of their previous decisions, improve their collective understanding, and thus react to environmental changes (Edmondson, 1999). This group learning process allows the team to recognize and respond to unexpected consequences of their actions, thus improving their ability to changing situations (Edmondson, 1999; Mohammed & Dumville, 2001). Thus, like the group transactions that bring about team transactive memory and consequently their ability to utilize knowledge within the group, the interaction involved in group learning allow for more efficient knowledge usage within the team context via group knowledge sharing behaviors.

According to Mohammed and Dumville (2001), research on group learning has been conducted concurrently with that on transactive memory, but there have been few cross-references between the two fields of inquiry. Whereas transactive memory research grew out of the study of dyads (e.g. D. M. Wegner, Giuliano, & Hertel, 1985) and was later aggregated to the group level (e.g. Moreland, 1999), group learning represents a direct aggregation of a traditionally individual-level construct (knowledge) to the group level (e.g. Argote et al., 1999). Group learning outcomes have been found to relate to team performance in such areas as productivity (e.g. Argote et al., 1995), group efficiency (e.g. Wong, 2004), and group innovativeness (e.g. Wong, 2004). However, few studies have examined the antecedents to learning behavior (Edmondson, 1999). Those studies which have examined the group learning process tend to focus on overall group processes such as communication and influence, but have not delved into the antecedents which bring about those group processes (e.g. Argote et al.,

1999). Further, much of the empirical work on group learning and the factors that influence learning behavior have been conducted in laboratory settings (Mohammed & Dumville, 2001); thus, we need further investigations into the learning processes involved in real, ongoing work teams (Edmondson, 1999).

Hence, as transactive memory and group learning constructs are traditionally discussed at the group level of analysis (using the team as a referent), and with the understanding that individual knowledge sharing behaviors are embedded in the larger context of the work group, it makes sense to aggregate individual team member knowledge sharing behaviors to understand the impact that these behaviors have on these two group-level outcomes. As the individual knowledge sharing behaviors discussed above (e.g. sharing one's own knowledge, listening to others' ideas, attempting to improve team work processes, and seeking and collecting new information from multiple sources) are inherently characteristic of the group behaviors associated with team transactive memory and group learning, a team whose members aggregately engage in such knowledge sharing behaviors is expected to have high levels of transactive memory and group learning. For these reasons, I propose the following two hypotheses:

*H6. Group members' aggregate knowledge-sharing behaviors are expected to positively relate to group transactive memory systems.*

*H7. Group members' aggregate knowledge-sharing behaviors are expected to positively relate to group learning.*

Thus, Figure 3.3 is offered to represent the full multilevel groups model, as it illustrates how team members' individual epistemological beliefs drive their associated thoughts and behaviors (as elaborated in hypotheses 1-5), which subsequently impact team knowledge sharing

in the form of a transactive memory system and group learning outcomes (as elaborated in hypotheses 6 and 7).

### **Group Member Behavior Similarity and Group Knowledge-Sharing Outcomes**

Whereas hypotheses 6 and 7 explicate that we should expect group member knowledge-sharing behaviors to collectively impact group knowledge sharing outcomes, I now consider whether this relationship is more salient when group members' individual behaviors are similar with other members. A situation where the group members' aggregate behaviors are considerably high or considerably low would be indicative of similar behaviors across team members. However, in the event that, on average, a group has mediocre aggregate knowledge sharing behaviors among members, this could be indicative of a team where all members engage in only average knowledge-sharing (Team A) *or* a team where, for example, half of the teammates have a very high output of knowledge sharing behaviors, and half of the teammates are quite low on these behaviors (Team B). Using an aggregate measure, Team A would appear similar to Team B in analyses of the teams. I have no a-priori reason to believe that Team A would exhibit greater or poorer knowledge sharing in the forms of transactive memory systems or group learning than Team B. In contrast, I might argue that, as transactive memory and group learning involve such components as sharing, trust, and coordination, a team in which half its members exhibit a great deal of knowledge sharing behaviors and half are considerably worse in such activities would have no overall knowledge sharing advantage over a team in which all members are about average in this behavior. However, it is possible that the difference in team member similarity between Team A (very similar member behaviors) and Team B (differentiated member behaviors) may have a foreseeable impact on the way in which the team works together, and even if there is no impact on the group knowledge-sharing outcomes, variance in member

behavior may affect other group outcomes such as its levels of affective and cognitive conflict. Although it is outside the scope of this study to examine team-level processes that may impact the degree to which similarity or dissimilarity among members translates into positive outcomes, it appears worthwhile to examine whether any compositional effects are present. Thus, I am interested in exploring whether differences in the similarity of group members in their knowledge-sharing behaviors interacts with the aggregate knowledge-sharing behaviors of a group's members to impact group knowledge sharing in the forms of transactive memory and group learning. Hence, I will examine the two-way interaction between aggregated member knowledge-sharing behaviors and similarity in those behaviors among group members. The following research question is proposed:

*Research Question: Does the similarity among group members' individual knowledge sharing behaviors interact with those reported behaviors to impact group knowledge sharing outcomes in the forms of transactive memory systems and group learning?*

## **Epistemological Beliefs and Mentoring**

### **Mentoring Relationships as Generators of Knowledge**

Another context in which knowledge sharing may be examined in organizations is that of mentoring relationships. Mentoring in an organization may be viewed as a learning context in which a more experienced member brings about desired, sustainable change in a less experienced member (Boyatzis, 2007). Boyatzis (2007) elaborates on the social nature of learning, as he explains how a person cannot engage in intentional change alone, and how it is through mentors that protégés come to realize the discoveries that support change outcomes, such as learning.

Previous research (e.g. Noe, 1988) has shown the existence of two distinct mentoring functions: vocational support and psychosocial support. Vocational support relates to the degree to which the mentor promotes his or her protégé's career-related performance, including such items as carrying out day-to-day operations and preparing for career advancement (Kram, 1988). Psychosocial support comes in the form of allowing a protégé to feel self-confident in building his or her sense of identity within the organization (Kram, 1985, 1988; Noe, 1988). In part, psychosocial support also entails role modeling, whereby the mentor acts as an exemplar – a prototypical archetype – who sets an example worthy of following (Kram, 1985).

Mentorship is considered a mechanism for the transfer of tacit knowledge (Edmondson, Winslow, Bohmer, & Pisano, 2003), and the benefits of mentoring in business organizations are widespread. Further, a mentoring relationship is a learning relationship. Although few studies on mentoring have focused on mentoring as a teaching and learning environment (Allen & Eby, 2003; Hale, 2000), a couple of studies have explicitly established this connection (e.g. Hale, 2000; Hezlett, 2005). As mentors serve as unofficial teachers (Swap et al., 2001), the act of mentoring is one in which learning takes place. Indeed, it has been argued that both formal and informal mentors are a critical source of learning from which organizational members learn about organizational issues (Chao, Walz, & Gardner, 1992; Ostroff & Kozlowski, 1993), and that mentoring serves as an effective way to not only transfer knowledge, but to encourage organizational learners (Bryant, 2005). Thus, as outlined by Lankau and Scandura (2007), mentoring relationships offer a developmental context in which personal learning takes place.

Moreover, mentoring is not only a learning environment, but also a knowledge-sharing activity. Qualitative and quantitative studies alike have demonstrated that new hires gain both technical knowledge and organizational knowledge from their mentors (Hezlett, 2005); and these

knowledge outcomes of mentoring are not limited only to new workers (e.g. Chao, 1997). These studies view mentoring relationships as a means by which organizations may share knowledge and build intellectual capital (Bryant, 2005), and, by proxy, implicitly argue that information and knowledge sharing functions are outcomes of the mentoring relationship. By definition, mentoring involves, to some extent, a more experienced person providing new knowledge to a less experienced person (Eby, 1997; Hale, 2000). Mentors in organizations impart their knowledge to protégés in multiple ways – for example, transferring skills, conveying knowledge about organizational routines and systems, teaching norms of behavior, and sharing knowledge about the values held by the organization (Swap et al., 2001). Further, with the rapid rate of change evident in today's business environment, companies often rely on their more experienced employees to pass on these types of knowledge to their less experienced workers (Bryant, 2005). In this way, mentoring can be viewed as a knowledge-sharing mechanism by which organizations may leverage their tacit knowledge to build their core capabilities (Swap et al., 2001).

The importance of educator beliefs as a focus of inquiry has been established (Pajares, 1992). Thus, a theory of mentor personal epistemological beliefs about knowledge and learning may provide a useful advancement of the mentoring literature. Unlike trait characteristics, beliefs about learning are trainable (Nist & Holschuh, 2005); further, they have been found to influence learning outcomes (Schommer, 1990). The teacher's (mentor's) perceptions about what knowledge is and where it comes from may impact his or her understanding of how protégés will learn. Thus, the purpose of this section of the study is to present a conceptual model where mentor epistemological beliefs are posited to influence the mentoring process. It is possible that an exploration of mentor beliefs may allow us to examine the role that these beliefs

play in promoting positive mentoring experiences. Figure 3.4 graphically represents the mentoring model, as it illustrates the process through which mentors are expected to provide increased levels of mentoring to protégés based on their personal epistemological beliefs about knowledge.

### **Mentor Beliefs and Vocational Mentoring Support**

Mentoring involves, in part, assisting a less experienced member of the workforce to perform his or her job well, a mentoring function known as vocational support. A mentor's capacity to provide vocational support to his or her protégé may be compared to any other educator providing curriculum-specific instruction. In this sense, similar to the way in which the personal belief systems regarding teaching and learning held by classroom teachers have been shown to impact the way in which they deliver their classroom curricula to pupils (Powell, 1996), the same may be expected of mentors providing vocational support to their protégés. Organizational mentoring appears to build on teacher-pupil models to foster critical and abstract thinking (McDade, 2005). Epistemological beliefs relate to one's general viewpoint about how learning occurs, and will therefore impact not only his or her own learning behaviors, but also the way in which he or she thinks others should approach the learning process. With regard to a mentoring relationship, the mentor will, therefore, behave in a way consistent with his or her beliefs and will approach his or her mentoring responsibilities accordingly. The mentor's beliefs will therefore impact his or her expectations of how the protégé should behave throughout the learning process, as well. In-line with this argument is Hashweh's (1996) finding that teachers who hold constructivist beliefs are more likely to recognize the alternative ways in which their pupils comprehend or conceptualize knowledge. By detecting the students' alternate conceptions in this way, a mentor may be able to provide more appropriate task-related support to their



protégés. Specifically, it is expected that mentors who recognize that knowledge can be learned, internalize the responsibility for knowledge, and understand knowledge as a continual process are likely to provide greater levels of vocational support to their protégés than mentors who do not share these mature beliefs.

First, the mature or sophisticated belief associated with the epistemological dimension *innate ability to learn* would be to acknowledge that knowledge can be gained through learning processes. One with this conviction would believe that everyone has the potential to gain knowledge through some type of learning process. As mentoring represents a learning process for the protégé, a mentor who believes that anyone can succeed when given sufficient training, resources, and time, is more likely to believe in the potential of his or her protégé and the ability of the protégé to take away lessons from the relationship. A mentor who believes that knowledge can be gained through a learning process believes that one's effort drives his or her successes. This view is consistent with Vroom's (1964) expectancy theory, in that this mentor may believe that the effort he or she makes toward his or her mentoring role will have the ability to impact protégé learning. Thus, as a mentor with this belief expects positive outcomes from his or her efforts (his or her efforts lead to a desired reward), he or she will be motivated to behave in a way congruent with protégé learning. Further insight may come from the literature on self efficacy, or the belief in one's own ability to perform, which has been shown to have a significant effect on one's performance of his or her tasks (Stajkovic & Luthans, 1998). Self-efficacy research would suggest that a mentor could vary in his or her conviction regarding his or her own ability to perform the mentoring task of providing career support to his or her protégé. In the case where a mentor believes that he or she can provide meaningful instruction to his or her protégé that the protégé is then able to translate into task-related learning, it is possible that

the mentor's self-efficacy regarding this task may positively impact the vocational support provided. That is, a mentor may provide greater levels of vocational support purely because he or she expects him/herself to do so. However, the belief that knowledge can be gained through some type of learning process is distinct from that of self-efficacy in that it uniquely involves the epistemological concept of one's belief regarding the innate ability to learn. For these reasons, it is expected that a mentor who holds the mature epistemological belief that knowledge can be gained through a learning process may be more willing to provide vocational lessons to the less experienced member, as suggested by the following hypothesis:

*H8a. A mentor's mature epistemological belief that knowledge can be gained through a learning process (that it is not innate) is expected to positively relate to the level of vocational support provided to his or her protégé.*

In addition, a mentor who holds mature or sophisticated beliefs regarding *omniscience of authority* would internalize the responsibility for knowledge. A mentor holding this belief would have confidence that knowledge is generated from within, and may be more likely to question the authority on which any externally derived knowledge is based. Such a mentor would be likely to actively examine whether knowledge received makes sense by questioning the assumptions and rationale upon which the knowledge is based. As a person who believes that responsibility resides internally, this mentor would likely feel responsible for outcomes, as he or she would perceive a strong link between his or her own behaviors and the resulting consequences (Ng et al., 2006). One responsibility that this mentor is likely to internalize is that of guiding knowledge-sharing behavior in the mentoring relationship. Thus, a mentor who believes that knowledge is an internally driven process may take it upon him or herself to

provide conclusive mentoring support to his or her protégé. Likewise, a mentor who internalizes the responsibility for knowledge will believe that his or her protégé should internalize this responsibility, too.

By insisting that a less knowledgeable worker further develop his or her individual abilities, a mentor acts as a coach. Feldman (2001) has discussed how coaching can facilitate learning. When a mentor recognizes that each of his or her protégés should internalize the responsibility for gaining knowledge from a learning experience, that mentor would be *less* likely to act as an omniscient authority of knowledge; and would rather be *more* likely to act as a coach, presenting information in the form of advice and direction which would provide opportunities for the protégé to engage in learning activities. Further, as a mentor with this belief is less likely to act as an omniscient knowledge authority, his or her protégé may be less tied to the mentor, thus providing less opportunity for negative relationship outcomes (Tepper, 2000). By taking the initiative to guide knowledge sharing behaviors in the relationship, expecting the protégé to internalize the responsibility for his or her own acquisition of knowledge and by consequently behaving as a coach, a mentor who internalizes the responsibility for knowledge is likely to guide his or her protégé in a way that allows the less experienced person to make decisions that could improve his or her ability to perform the job. Thus, the following hypothesis is proposed:

*H8b. A mentor's mature epistemological belief to internalize (rather than externalize) knowledge is expected to positively relate to the level of vocational support provided to his or her protégé.*

Lastly, mentoring relationships develop over time (Kram, 1985). Regarding the epistemological belief dimension *speed of learning*, a mentor who recognizes that knowledge

creation is a continual process, rather than a ‘now-or-never’ occurrence, may be likely to spend additional time with his or her protégé and integrate different lessons or theories so that the protégé may be able to arrive at a more complete understanding and more comprehensive conclusions regarding job tasks, as one’s conceptions about teaching have been shown to be beliefs-driven (e.g. Chan & Elliott, 2004b). Therefore, consistent with expectancy theory (Vroom, 1964), a mentor who believes that knowledge is a continual process is likely to understand how efforts made in the present will contribute to desired outcomes down the road (in this case, protégé learning). Further, a mentor who understands that learning is a continual process may be more likely to offer vocational support over time that builds upon not only the previous knowledge that the protégé held prior to entering into the relationship, but also builds upon previous interactions that the mentor has with his or her protégé, ultimately resulting in a more complete vocationally supportive offering. Lastly, part of the continual process of knowledge is one’s ability to share his or her acquired knowledge with others. In this sense, a mentor who believes that knowledge is a continual process is likely to desire opportunities to share his or her knowledge with younger generations. This is consistent with Erickson’s (1963) theory of generativity which states that rejuvenation benefits associated with sharing one’s knowledge are likely to motivate a mentor to assist in the continuation of knowledge, and thus result in greater levels of vocational support to the protégé, as suggested by Ragins (1997). From this reasoning, I offer the following hypothesis:

*H8c. A mentor’s mature epistemological belief that knowledge creation is a continual process (rather than now-or-never) is expected to positively relate to the level of vocational support provided to his or her protégé.*

## **Mentor Beliefs and Psychosocial Mentoring Support**

Psychosocial support involves a mentor behaving in a way that facilitates an environment in which the protégé may develop his or her own sense of identity. As such, psychosocial support holds an important function in mentoring relationships, as the mentor takes on more of a counseling role by allowing the protégé to understand and resolve his or her own issues with a sense of self-confidence and work-role effectiveness (Kram, 1985, 1988; Noe, 1988). With regard to the epistemological beliefs held by mentors, it is expected that mentors who recognize the complexity and uncertainty of knowledge, believe that knowledge can be learned, and recognize learning as a continual process will be more likely to provide greater levels of psychosocial support to their protégés than mentors who do not share these mature beliefs.

First, a mentor who believes that knowledge is complex (rather than simple) will understand that mentoring is not a simple process and that support and encouragement are needed as people may question their self-efficacy, beliefs or assumptions as they are challenged with new ideas and information. Thus, a mentor with this belief may be more likely to integrate constructs and less likely to oversimplify complex information by examining each bit of information separately. The belief that knowledge is complex may be associated with a low need for closure, such that a mentor with this belief is not motivated to find a simple answer or solution (see Webster & Kruglanski, 1994). As with the other epistemological beliefs, one's belief that knowledge is complex extends outside of the self and one's own processes and generalizes to a broader context. As such, a mentor who recognizes that knowledge is complex will likely appreciate the complexity of knowledge shared by his or her protégé without a bias toward closure, and thus support the protégé's self-reflective exploration and provide acceptance and confirmation of such behaviors. Hence, I propose the following hypothesis:

*H9a. A mentor's mature epistemological belief that knowledge is complex (rather than simple) is expected to positively relate to the level of psychosocial support provided to his or her protégé.*

Further, a mentor who acknowledges that knowledge can be learned (denying that knowledge is an innate ability) will be more likely to believe in the potential of his or her protégé (Schommer, 1990) and thus offer encouragement and social support while the protégé engages in the learning process. According to Boyatzis (2007), the process by which a mentor impacts change in his or her protégé's actions, habits or competences may be explained through the literatures on relational theories (e.g. Hall & Associates, 1996; Kram & Cherniss, 2001), leader-member exchange (e.g. Graen & Uhl-Bien, 1995), and attachment theory (e.g. Popper, Mayseless, & Castelnovo, 2000). Boyatzis' (2007) intentional change theory builds on these literatures to suggest that mentors play a crucial role in allowing a protégé to make discoveries that ultimately encourage change and growth. By acknowledging that the protégé can take away beneficial knowledge from interactions, a mentor is likely to approach the relationship in a positive manner that encourages trust in the relationship. These trusting relationships allow for protégé self-discoveries to take place (Boyatzis, 2007). Further, education literature suggests that the mentor, by believing in his or her own ability and that of the protégé to become more skilled at learning, is likely to encourage exploratory learning throughout the mentoring relationship and may be more likely to provide an environment in which the protégé will feel confident to use the mentoring relationship as a scaffold onto which both task-based and non-task-based learning may be accomplished. As a mentor with such a belief is likely to believe in the protégé's potential as a learner, the mentor may be further expected to engage in socially-

centered activities with his or her protégé, hoping that the protégé will be able to learn something meaningful from the experience. Therefore, I propose the following hypothesis:

*H9b. A mentor's mature epistemological belief that knowledge can be gained through learning (that it is not innate) is expected to positively relate to the level of psychosocial support provided to his or her protégé.*

Further, a mentor who recognizes that knowledge is uncertain or tentative (as opposed to certain or fixed) is likely to foster self-confidence and creativity because he or she would seek multiple solutions and would likely demand the same from the protégé. By viewing ambiguous situations as interesting and potentially desirable challenges (Furnham & Ribchester, 1995), this person may behave in such a way that he or she would tackle these situations head-on, questioning the basis of knowledge received rather than passively accepting what he or she is told at face value. As such, this mentor would teach his or her protégé to question conventional wisdom. A mentor who recognizes the uncertainty of knowledge acknowledges that there is no stable 'truth' regarding any piece of knowledge, and would therefore pursue potential alternative explanations. As discussed earlier, a mentor's low desire to reach a conclusive answer to any given topic is consistent with an individual with a low need for closure (De Dreu et al., 2008), and the affiliated high levels of open, unrestricted communication with his or her protégé (De Grada et al., 1999). This behavior by a mentor represents his or her appreciation for unique perspectives and viewpoints, and is likely to manifest itself by fostering a relationship where the protégé feels self-confident to build his or her identity. Additional benefits of this belief lie in the ability of the mentor to account for contextual factors and undertake steps toward unraveling ambiguous situations, and such behaviors may be considered admirable by a protégé seeking a role model to emulate. As a mentor who recognizes the tentative nature of knowledge will likely

encourage self-confidence via the open sharing of unique viewpoints, and will model exemplary attempts to ascertain the reality of a particular situation, I offer the following hypothesis:

*H9c. A mentor's mature epistemological belief that knowledge is uncertain or tentative (rather than certain or fixed) is expected to positively relate to the level of psychosocial support provided to his or her protégé.*

Lastly, a mentor who understands that knowledge is a continual process (rather than a now-or-never endeavor) is likely to spend additional time with his or her protégé to allow the knowledge to cumulate. Time spent together has been shown to bring about higher levels of psychosocial support in a formal mentoring program (Weinberg & Lankau, in press). This may be due, in part, to social learning theory's idea that learning occurs through observation of other people and modeling their behavior (Bandura, 1977). Given time, a mentor has more opportunity to act as a model to his or her protégé. Further, consistent with Vroom's (1964) expectancy theory, such a mentor may recognize his or her present efforts as contributing toward desired outcomes (e.g. protégé modeling behaviors), and thus may be more motivated to act as a role model to the learner. Further, a mentor who believes that knowledge is a continual process may be more likely to recognize the protégé's ability to carry on learning above and beyond what the mentor teaches, even after the relationship dissolves. Additionally, a mentor who understands that knowledge progresses over time is likely to recognize the value of spending a greater deal of time instructing his or her protégé, and may behave accordingly by spending more time with the protégé. This additional time spent together, and the interaction and dialogue that are likely to ensue from it, will provide additional opportunities for the mentor to positively influence his or her protégé. For these reasons, I posit the following hypothesis:



*H9d. A mentor's mature epistemological belief that knowledge creation is a continual process (rather than now-or-never) is expected to positively relate to the level of psychosocial support provided to his or her protégé.*

### **Psychological Safety as a Moderator**

An individual is said to experience psychological safety if he or she feels safe to proactively display behaviors in a social context without the fear of negative consequences to his or her self-image, status, or career (Baer & Frese, 2003; Brown & Leigh, 1996; Kahn, 1990). The level of psychological safety perceived by members is expected to moderate the relationships between one's epistemological beliefs about knowledge and the individual-level outcomes of interest (individual knowledge sharing behaviors and mentoring support). Collaboration, as it applies to knowledge sharing, requires members to proactively display knowledge sharing behaviors with one another. As Baer and Frese (2003) explain, successful collaboration requires a context in which members feel safe to employ themselves proactively. Thus, the collaboration implicit to knowledge sharing behaviors is more likely to transpire when members perceive that they are working together in a psychologically safe climate.

Further, as elaborated by Edmondson (1999, p. 352), when individuals face potential threat or embarrassment from speaking out, they tend to act in ways that hamper learning, but when they face environments in which they perceive career and interpersonal threat as adequately low, that is, a situation which they feel is safe for interpersonal risk-taking, they do tend to "ask for help, admit errors, and discuss problems" openly. Empirical studies have supported this notion that employees' perceived psychological safety has a substantial impact on their proactive behaviors and engagement at work. For example, Kahn (1990) found that psychological safety impacts the degree to which people were engaged in work situations, while

Detert and Burris (2007) found that perceived psychological safety mediated the relationship between managerial openness and employee voice behavior, an out-role prosocial activity. Whereas knowledge sharing in the forms of mentoring and sharing knowledge in a team may also be considered engaging, proactive, and prosocial activities, it is likely that they, too, may be impacted by the sharer's perception of a psychologically safe environment.

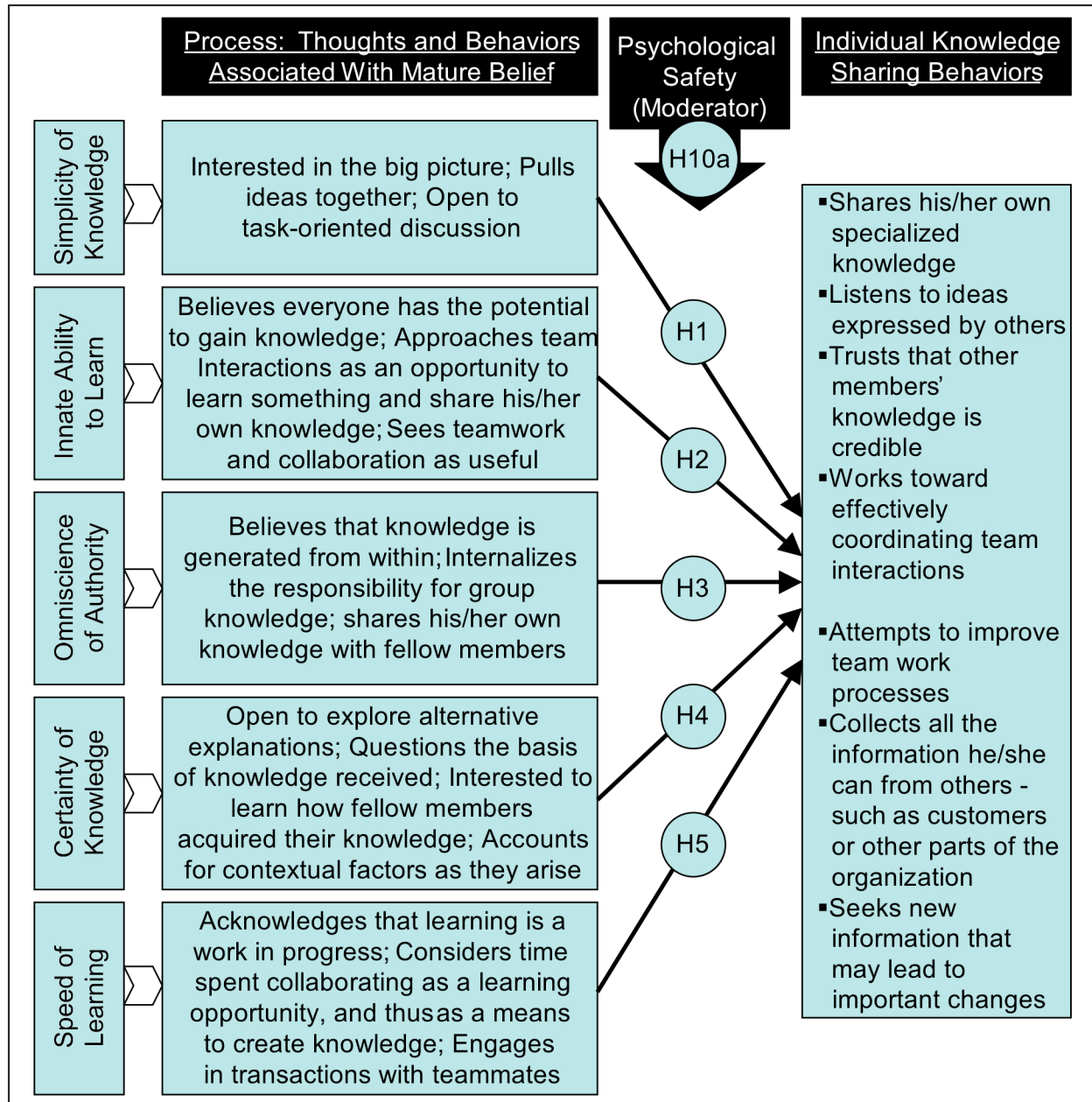
Edmondson (1999) describes team structure conditions that lead to team psychological safety. However, whereas her model continues to describe a direct relationship between team psychological safety and subsequent team learning behaviors, the present study argues that psychological safety (similarly aggregated to the outcome levels of analysis) acts as a moderating condition upon the relationships between individuals' beliefs and subsequent knowledge sharing behaviors. This reasoning follows a stream of research on group diversity that considers psychological safety as a means through which cognitions become enacted as behaviors. Group diversity research has suggested that certain contextual variables stimulate learning in diverse teams (e. g. Edmondson & Roloff, 2008; Gibson & Vermeulen, 2003). Edmondson and Roloff (2008) argue that psychological safety, by facilitating conditions suited to the release of individual knowledge, acts as just such a context. Thus, the presence of psychological safety is expected to facilitate learning, and reduce communication difficulties that could hinder knowledge sharing (Edmondson, 1999; Lau & Murnighan, 2005). Given this reasoning, I offer the following hypothesis:

*H10a. Each of the aforementioned anticipated relationships between team member personal epistemological beliefs and their knowledge-sharing behaviors will be moderated by perceived psychological safety, such that*

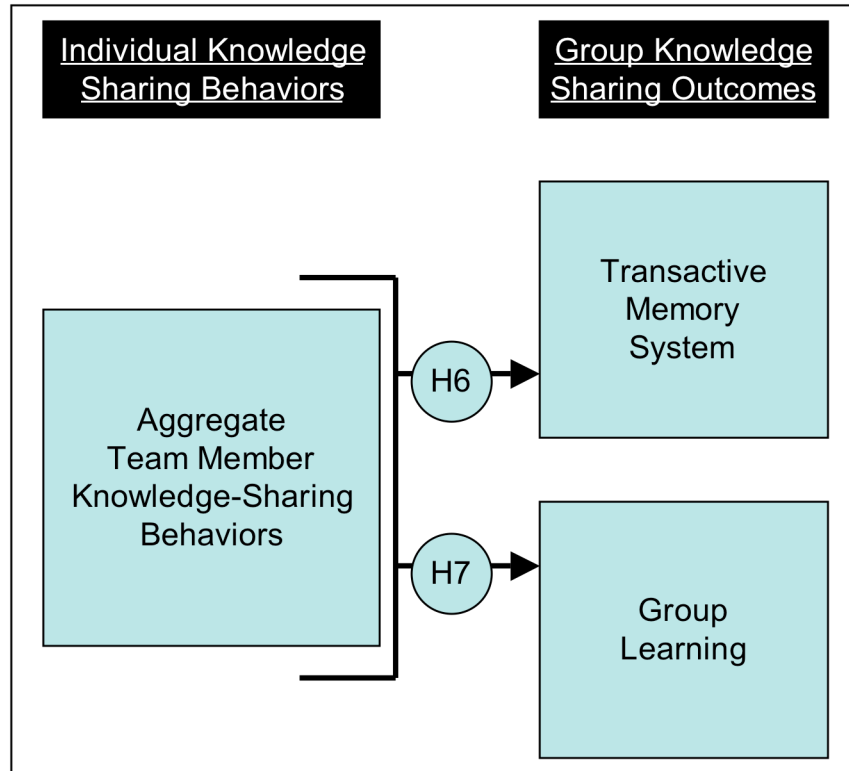
*the higher the degree of psychological safety, the stronger the relationship.*

A mentoring context offers its own challenges to a mentor who may be interested in engaging in the prosocial activity of mentoring. As elaborated by Wanberg, Welsh, and Hezlett (2003), mentoring relationships appear to have drawbacks to the mentor that must be considered. A first consideration is the possibility of risk to the mentor's reputation as he or she shares his or her experiences, including faults or blunders, openly (Zey, 1984). Further, fraternization may be frowned upon in the organization. Whereas Noe (1988) discusses this issue with regard to the public image associated with cross-gender relationships and the perceptions that peers may have about the relationship between the mentor and protégé, Allen, Poteet, and Burroughs (1997) discuss this issue more in terms of favoritism. For example, a mentor may feel uncomfortable paying special attention to one particular other person (Wanberg et al., 2003). Lastly, Allen et al (1997) discuss how a mentor's feelings of failure in the event of a failed relationship may pose a potential negative aspect of mentoring from the mentor's perspective. Given these potential mentor-centric drawbacks to engaging in a mentoring relationship, it appears realistic to assume that a mentor who believes that these possible downsides will *not* have a negative impact on his or her self-image, status, or career would be more likely to provide mentoring to the protégé. Thus, I offer one final hypothesis:

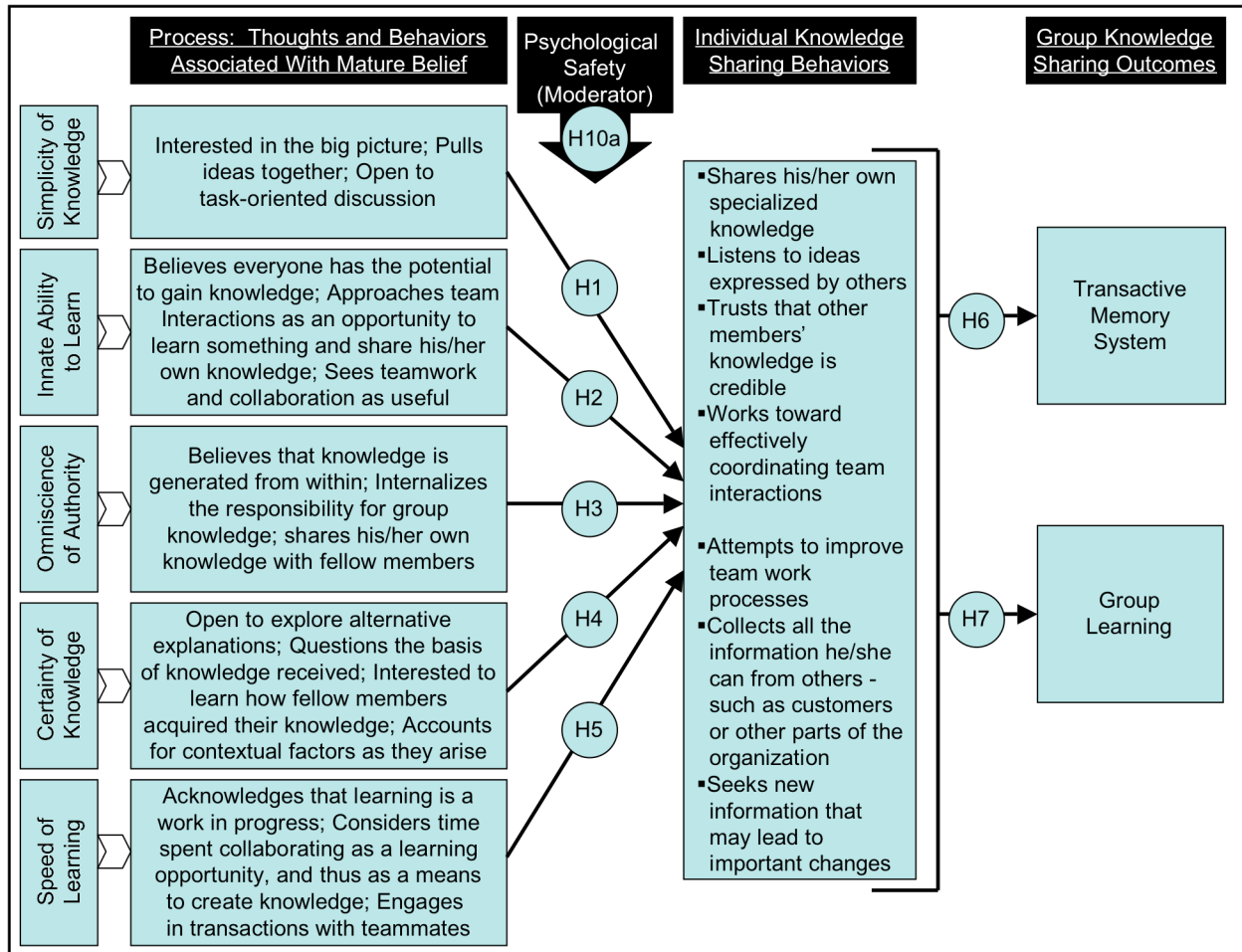
*H10b. Each of the aforementioned anticipated relationships between mentor personal epistemological beliefs and the mentoring he or she provides will be moderated by perceived psychological safety, such that the higher the degree of psychological safety, the stronger the relationship.*



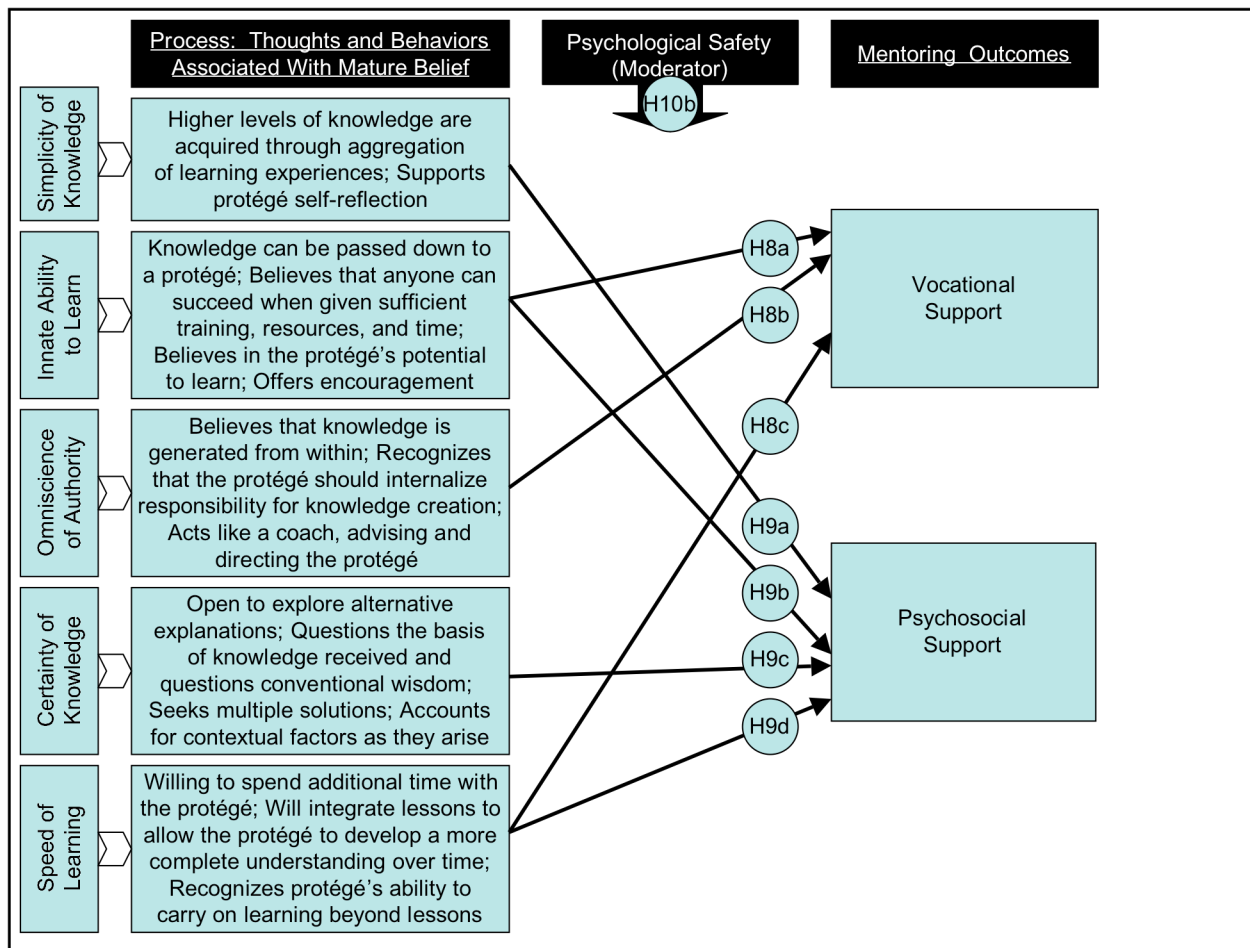
**Figure 3.1: Epistemological Beliefs impacting Individual Group Member Knowledge Sharing Behaviors**



**Figure 3.2: Aggregate Group Member Knowledge Sharing Behaviors impacting Team Transactive Memory Systems and Group Learning**



**Figure 3.3: A Social-Constructivist, Multilevel Model of Epistemological Beliefs Impacting Group Outcomes**



## **CHAPTER 4**

### **METHODOLOGY**

#### **Sample and Procedure**

In order to understand the relationship between personal epistemological beliefs about knowledge and knowledge-sharing behaviors of people in organizations, I conducted a study at an 820-member organization responsible for the maintenance and operation of the physical facilities, grounds, and utilities of a large Southeastern U.S. university. Employee responsibilities at this organization include working primarily in ongoing teams to provide such services as building maintenance, repairs, and alterations; grounds maintenance, repairs, and alterations; maintenance of mechanical and electrical systems; engineering support; custodial services; and other related support services. In addition, this organization operates the central steam and chiller plants of the university and operates an automotive vehicle fleet and maintenance shop. By proposing this research to the organization in a top-down manner (proposing the idea to the organization's top human resources manager, and subsequently to the organization's six division heads), I was able to establish high-level corporate support for the study, which allowed me to capture usable data from 536 organizational members, representing a 65.37% usable-data response rate.

With regard to participant gender, 58.1% of the study participants were male and 41.9% were female. Participant age ranged from 19-75 years, with an average of 46.5 years. Further, 47.6% of respondents were of African-American ethnicity compared to 45.9% White/Caucasian. In addition, 1.8% of respondents were of Hispanic descent, and 2.6% indicated their ethnicity as "other." As these two categories together represent only 4.4% of the total sample, they were excluded from any bivariate race comparisons. With regard to education, 10% of the employees



reported having less than a high school degree, 63% finished their formal education with either a high school degree or GED, 18.6% responded that they had some college experience, and 16.3% hold a higher education degree. Participants had an average total work experience of 25.46 years, averaged 10.42 years at their organization, and an average of 7.87 years in their current work group. Regarding the participants' work groups, 11.9% of the groups are professional-level or administrative teams, whereas the remaining 88.1% of the groups represent blue-collar service workgroups (given this large number of blue-collar workgroups in the study, I have dedicated a segment of the discussion section to discuss the constraints associated with this characteristic of the study sample). Further, 87.4% of the organization members considered themselves part of a permanent, continuous group, while 6.5% described their group as a temporary project team and 6.1% described their group as a hybrid of the two. Only those teams in which 50% or more of the members responded that the team was a permanent, continuous group were retained for analysis in the teams model. Lastly, participants had the option to take a paper-and-pencil version of the survey or an identical online survey. Approximately 48.8% of participants took the paper-and-pencil option, and the remaining 51.2% of participants took an online survey I created using the Qualtrics software package available through the Terry College of Business. T-tests comparing the means of participants in each of these two categories revealed that participants who took the online version of the survey tended to engage in significantly more knowledge sharing ( $t = 6.04, p < .001$ ) and psychosocial mentoring support ( $t = 2.96, p = .003$ ) than the participants who answered the same questions on the paper version of the survey. It is likely, however, that these differences reflect the influence of something other than the survey version; for example, although the survey was entirely voluntary, almost all participants who took the online version did so completely of their own volition and at the time

of their own choosing, whereas many of the participants who took the paper version of the survey did so in group settings which were arranged by the organization's division directors, and facilitated by the researcher. Thus, this difference between online and paper-and-pencil survey participants may reflect the influence of a potential unmeasured variable.

Although I spent considerable time on-site to help facilitate survey administration, I also employed Linskey's (1975) method to decrease non-response bias by contacting potential respondents prior to distributing the surveys, following-up via multiple communication media, and listing the names of not only the researchers, but also of the institution sponsoring the research (e.g. the Terry College of Business at the University of Georgia). Further, as it was important to communicate the organization's commitment to this study to potential participants, the survey was delivered to subjects via e-mail accompanied by a statement from the organization's Senior Human Resource Manager stating the organization's interest in this research, urging members to participate in the study, and notifying all employees that they were encouraged to use paid work time to complete the survey. Surveys were available for completion over a period of six weeks. After half a week, a first reminder e-mail was sent to subjects who had not yet completed the survey. A second and third reminder were sent at approximately two-week intervals, and a final reminder was sent to subjects approximately one week prior to the end of formal data collection.

This organization was selected for multiple reasons. First, many of the jobs held by members of this organization have traditionally been associated with apprenticeship-type learning, and this tradition may allow for a greater number of organization members who would identify themselves as mentors. Further, this organization was selected, in part, because of the large number of employees who engage in face-to-face workgroups to achieve work tasks.

Group inclusion criteria included a minimum of three-person workgroups, and the following response rates: For teams consisting of three or four members, a minimum 50% response rate was required; for teams consisting of 5 or more members, a 33% response rate was required. A further requirement for inclusion was that the team had worked together for a minimum of three months (any team member reporting less than three months in his/her current workgroup were excluded from the teams analysis). This three-month minimum requirement limits the study to teams that are more likely to have had enough interactions for members to have learned about each other's knowledge, skills, and abilities, to establish opinions regarding their levels of trust for one another, and to make determinations regarding the level of cooperation that exists in the team. In addition only teams in which at least 50% of team members reported that they consider the team to be a permanent, continuous work group were included. To this end, I created a categorical variable to differentiate the teams based on whether the team would be best described as: a) a continuous team with an ongoing mission; b) a temporary project team; or c) a hybrid team, including some permanent members and some temporary members. Those teams in which greater than 50% of the members indicated that the team was a temporary project team or a hybrid team were excluded from the study. Under these criteria, a total of 70 usable teams emerged from the data, ranging from three-person to 25-person teams.

## **Measures**

### **Independent Variable**

**Epistemological beliefs.** I employed a 32-item scale adapted from Schraw, Dunkle, and Bendixen's (1995) Epistemic Beliefs Inventory and modified when necessary for an organizational, rather than academic audience. Schraw et al's (1995) scale measures the five epistemological belief dimensions. Sample items include "too many theories just complicate

things” (representing simplicity of knowledge), “smart people are born that way” (representing innate ability to learn), “people should always obey the law” (representing omniscience of authority), “what is true today will be true tomorrow” (representing certainty of knowledge), and “if you don’t learn something quickly, you won’t ever learn it” (representing the speed at which learning occurs). Items are anchored by a 5-point Likert-type scale where 1 = “strongly disagree” and 5 = “strongly agree” (see Appendix A for a complete list of items included in this and all measurement instruments employed in the present study).

Schraw et al.’s (1995) epistemological belief measurement instrument is considered an improvement over Schommer’s original (1990) instrument, as it has been shown to separately capture the omniscience of authority dimension, a task that Schommer and her colleagues have continually struggled with (Schraw et al., 1995). However, multiple studies have discussed theoretical issues related to the dimensionality of epistemological beliefs (e.g. Hofer & Pintrich, 1997; Sandoval, 2005), and issues related to capturing the five aforementioned dimensions in empirical studies (e.g. Bernardo, 2008; Qian & Alvermann, 1995). Further, although Schraw et al.’s (1995) instrument includes 32 items, only twenty of these items made it into their reported factor analyses. Further, as epistemological beliefs have previously been recognized as only ‘relatively independent’ (Schommer, 1994), the dimensionality of this construct has been called into question by previous researchers (e.g. Hofer & Pintrich, 1997). For these reasons, I wanted to run a separate analysis on this measure.

**Epistemological beliefs construct dimensionality.** Utilizing the full sample of respondents, I conducted a factor analysis to examine the factor structure of the epistemological beliefs dimension. Exploratory factor analysis revealed non-convergence with any of the expected five dimensions. Results of the principal axis factor analysis with orthogonal (varimax)

rotation are displayed in Table 4.1, in which absolute values of  $< .40$  were suppressed for ease of readability in accordance with the suggestion of Ford, MacCallum, and Tate (1986) that only factor loadings of  $.40$  or higher should be considered significant. In addition, I attempted to run a confirmatory factor analysis (CFA) using the Mplus structural equation modeling program (Muthén & Muthén, 1998-2007) in an attempt to determine whether the items load on the five theoretically implicated dimensions as expected. The fit was so poor that the CFA failed to converge. Additionally, Chronbach's alpha tests of reliability revealed that the items for each epistemological belief component did not work together to represent their respective components as previously expected ( $\alpha = .33, .30, .56, .45$ , and  $.57$  for simple knowledge, certain knowledge, speed of learning, omniscient authority, and innate ability respectively).

**Questioning the dimensionality of beliefs.** There are numerous possible reasons why the education literature's five widely discussed dimensions of epistemological beliefs do not materialize in my sample of working adults. First, although some researchers have detected similar dimensions as those originally proposed and found by Schommer (1990) (e.g. Bendixen, Dunkle, & Schraw, 1994; Paulsen & Wells, 1998; Schraw et al., 1995), a number of previous researchers have questioned the dimensionality of epistemological beliefs, particularly with regard to Schommer's (1990) categories (e.g. Bernardo, 2008; Hofer, 2004; Hofer & Pintrich, 1997; Jehng, Johnson, & Anderson, 1993; Qian & Alvermann, 1995). Further, even Schommer herself has had considerable difficulty distinguishing her omniscience of authority dimension (Schommer, 1990; Schraw et al., 1995), and on three additional attempts, failed to even converge on the remaining four dimensions (e.g. Schommer, 1993; Schommer, Crouse, & Rhodes, 1992; M. Schommer-Aikins, Mau, Brookhart, & Hutter, 2000).

In some cases (e.g. Hofer, 2004; Jehng et al., 1993), researchers have made somewhat slight adjustments to Schommer's dimensionality, retaining some of her dimensions and changing others, or empirically finding that certain factors did not emerge or that two conceptually distinct factors factored as one. Other studies (e.g. Bernardo, 2008) have found evidence for completely unique belief dimensionality from that described by Schommer. For example, Hofer (2004) echoed Qian and Alvermann's (1995) finding that certainty of knowledge and simplicity of knowledge did not emerge as separate factors. However, in a more recent study, Bernardo (2008) found that a sample of Filipino preservice teachers held epistemological beliefs that fit into two factors and one factor in the English- and Filipino-language versions of the questionnaire, respectively. He described these two factors as "simple learning items" and "unstructured learning items," and, although they both initially emerged in the Filipino-language survey, as well, the two factors had significantly negative correlations with one another, and, as a test of a one-factor model had nearly identical fit as the two-factor model, the more parsimonious one-factor model was retained.

In addition to these empirical discrepancies, disagreement also exists at a purely conceptual level with regard to what constitutes epistemological beliefs. Whereas Schommer (1990) has described dimensions of epistemological beliefs that include factors related to learning, Hofer and Pintrich (1997) and Sandoval (2005) argue to exclude views about the nature of learning from the definition of personal epistemology. Given the discrepancies that currently exist in both empirical and theoretical discussions of epistemological beliefs, a recent article has gone so far as to suggest that the scope of epistemological beliefs should not be determined entirely a-priori (Elby, 2009). It appears that, just as the participants in these previous studies often did not hold epistemological beliefs that converged on Schommer's original (1990)

dimensions, the present study's sample of working adults appear to hold a belief system about knowledge and learning that is distinct from this set of relatively independent categories. Thus, it is possible that some explanation other than Schommer's (1990) five-factor conceptualization of beliefs may more accurately generalize to the population at large.

**Individual differences and beliefs.** In addition, previous research has made it clear that characteristics of different individuals have an impact on their beliefs. For example, researchers have found that characteristics such as age and gender (Schommer, 1990) and education level (Perry, 1970) may impact one's beliefs. These statements, however, may have been made based primarily on potentially severely truncated data. Studies on epistemological beliefs have almost exclusively sampled undergraduate students, and have thus far only been linked conceptually (not empirically) to individuals in the workplace (e.g. Tickle et al., 2005). As such, the majority of epistemological belief studies have not explored populations that have greater variances with regard to education, age, work experience, and organizational tenure that are likely to be found in samples of working adults rather than in typical samples of undergraduate students. The present study's sample of working adults represents a much wider range of individuals with regard to age, work experience, and organizational tenure than do typical sample participants in studies of epistemological beliefs. Thus, it is possible that these increased averages (of age and work experience-related variables) and wider ranges (in the variables of education and age) may account for the nonconvergence found with regard to the typical epistemological belief dimensions.

As I was able to collect information from study participants regarding these individual difference variables, I was able to determine whether differences among workers on these variables impacted their reported belief structures. To do so, I separated the sample into the

following segments, and ran a separate EFA on each subsample: 1) Education (based on the four categories of education discussed earlier); 2) Age (separated in to even quarters based on sample variance, resulting in ages 19-30, 30.001-45, 45.001-60, and 60.001+ to act as separate subsamples); and 3) Organizational tenure (separated into even thirds based on sample variance, resulting in tenure of 0-5 years, 5.001-13 years, and 13.001+ years to act as separate subsamples). Across *all* education, age, and tenure sub-samples, EFA resulted failed to produce adequate factors to represent respondents' beliefs in a way that is consistent with Schommer's (1990) theory. Of particular interest are the results of those participants whose demographics most closely resemble the typical undergraduate sample (i.e. the subgroup who reported having "some college" experience, the 19-30 year age subgroup, and those workers who had 0-5 years of tenure at the organization. If Schommer's (1990) conceptualized dimensions were to generalize in a sample of working adults, it is likely that they would *at minimum* manifest in those workers whose other demographics are similar to the typical undergraduate student population. Yet, without exception, not one of these subgroups produced adequate factors, nor reasonable alphas ( $>.70$ ) to represent *any* of Schommer's five dimensions. Thus, we can reasonably rule out the effect of individual differences as a cause for the scale to break down as it has. Accounting for this lack of results with regard to individual difference variables, it remains possible that something about the workplace context in which the present study's participants are situated may have had an impact on the study's results.

**Context-specificity of beliefs.** There exists an ongoing debate within the epistemological beliefs literature as to whether beliefs tend to be more general or more context-specific (Buehl & Alexander, 2001). As this study indicates an initial examination of epistemological beliefs in a workplace setting, and followed Schommer's (1990) theory of



beliefs, I chose to capture non-context specific, general individual beliefs consistent with her theory. This decision is further consistent with Buehl and Alexander's (2001) argument that posing broad questions about learning and intelligence may allow beliefs about knowledge to surface, and follows a stream of research which employ context-free, general epistemological belief constructs (e.g. King & Kitchener, 1994; Kuhn, 1991). However, researchers such as Clarebout, Elen, Luyten, and Bamps (2001), Holschuh (2006), and Pajares (1992) have discussed the possibly contextual nature of epistemological beliefs, and argue that an individual's beliefs about knowledge and learning may differ based on the referent context in which they employ the belief. Generally, the argument for contextually contingent beliefs tend to build on Pajares' (1992) contention that individuals fall prey to what he labels "it depends" thinking, where an individual might reflect on a question and determine that his or her response may differ based on the situation. One example of this sort of bi-polar belief may be reflected in the omniscience of authority domain, where a religious individual may believe that his or her God has unquestioned authority, but that his or her supervisor's authority should be questioned. Another example, within the realm of certainty of knowledge, may exist when an individual, asked whether he or she believes that "what is true today will be true tomorrow," reflects on rather stable items such as scientific laws (i.e. gravity), while simultaneously contemplating the generally more tentative nature of human laws (i.e. labor laws governing his or her job).

Although scholars agree that the Likert-type method of collecting data allows for an efficient way through which to collect data from large samples of individuals and allows researchers to apply more rigorous statistics to this stream of knowledge than previously available (Buehl & Alexander, 2001; Holschuh, 2006), these same researchers lament the context-free nature of these types of instruments. Holschuh elaborates that without a referent

context student responses to questions regarding their beliefs may not accurately reflect their true belief with regard to the outcomes of interest to the researcher. However, although Schraw et al.'s (1995) instrument was designed to build on Schommer's (1990) context-free conceptualizations, some of the items in Schraw et al.'s instrument do appear to have contextual specificity, as they ask questions directly related to classroom (or, in the case of the present study, workplace) processes and outcomes. Examples of these items include "Employees who learn things quickly are the most successful" and "How well you do at work depends on how smart you are." Thus, in an attempt to determine whether deletion of the context-specific or context-free items made a difference to the scale's factor structure, I isolated these work-context-specific items and ran two sets of EFAs: One which included only the work-context-specific items, and one where these context-specific items were excluded from the analysis, and which retained only those items which were context-free. Neither of these analyses revealed improved multi-dimensional constructs. The results of these analyses allow me to tentatively conclude that, within the limitations of the questions posed in Schraw et al.'s (1995) instrument, the issue of referent context does not appear to make any difference with regard to the instrument's dimensionality in a sample of working adults.

**Domain-specificity of beliefs.** The notion of context, however, extends outside of merely the setting in which the individual employs his or her belief system. Rather, context implies an entire set of circumstances in which the processing of one's beliefs occurs, and could include the referent form of knowledge that one's beliefs specify. Thus, a further possible explanation as to why working adults may not identify the five commonly discussed general belief dimensions stems from the argument that beliefs may differ based on the contextual domain in which they reside. Schommer has argued that epistemological beliefs are

predominantly domain-independent, and thus, her epistemological beliefs construct was admittedly developed to assess general beliefs, and not domain-specific beliefs (Schommer & Walker, 1995). However, subsequent researchers have argued that there are potential variations among individuals' conceptions of knowledge and learning relative to specific areas of concentration (Buehl & Alexander, 2001; Hofer, 2000).

According to Buehl and Alexander, "individuals may possess general beliefs about knowledge, but still hold distinct beliefs about more finely specified forms of knowledge" within different domains of concentration (2001: p. 389). That is, although the five dimensions of beliefs allow us to categorize an individual's general beliefs, they still relate to general beliefs that are not domain-specific, disallowing researchers to focus on specific activities or areas of concentration. However, the literature that focuses on different domains of concentration tends to be fragmented based on the general structure of activity associated with each domain. For example, although all domains tend to involve multiple types of tasks and learning opportunities, they have been classified loosely as falling into one of two categories: well-structured or ill-structured (Buehl & Alexander, 2001). Well-structured domains tend to deal most frequently with problems or tasks that have "agreed-upon solutions derived from algorithm-[type] procedures," whereas ill-structured domains tend to solve problems "through more heuristic procedures" (Buehl & Alexander, 2001, p. 401; Spiro, Coulson, Feltovich, & Anderson, 1994; Wineburg, 1996). After conducting an extensive review of the epistemological beliefs literature, Buehl and Alexander found evidence of the domain-specificity of beliefs; however, their conception of "domain" was primarily with regard to different areas of concentration within academia – i.e. science, history, or math. An extension of this conception would be to examine

domains or loci of concentration outside of such academic categories and to include additional centers of activity or concentration on which individuals focus their attention.

**The locus of effort.** With the intention of seeking out a domain of activity or concentration characterized by a specific unifying feature within the epistemological beliefs construct, I analyzed the epistemological belief items to determine whether I could identify any one concentrated domain that might be represented within the realm of general beliefs. A careful inspection of the items indicates that one particular locus of concentration emerges: Individuals' beliefs about the amount of effort related to knowledge and learning processes. Nine items (SK2, SK6, QL2, QL3, QL4, QL5, IA2, IA3, and IA4), spanning across three of Schommer's (1990) dimensions of general beliefs (simplicity of knowledge, speed of learning, and innate ability) appear to focus specifically on the extent of effort involved in processing the knowledge or learning, whereas the remainder of the items do not have this specific focus on effort. These nine items appear to relate to the individual's perception of the effort (or, alternatively, the ease) with which learning and the construction of knowledge come about.

The emergence of this effort-oriented epistemological belief construct is consistent with one of the two approaches to learning discussed by Bernardo (2008). Specifically, this new construct appears consistent with the approach to learning "that emphasizes more critical, constructive, and effortful approaches" associated with the degrees to which the nature of knowledge is complicated or problematic, and that it is "an evolving process that needs to be effortfully and reflectively pushed forward" (Bernardo, 2008, pp. 104-105). Moreover, Bernardo explains how this effortful view of learning is consistent with constructivist pedagogies and views of learning, consistent with those discussed as the part of the theoretical rationale for epistemological beliefs having an impact on workplace outcomes, presented earlier in the present

study. The asterisks in Appendix A indicate the items that relate to effort-oriented epistemological beliefs. A CFA on these nine effort-oriented beliefs revealed that these items do, indeed, represent one unified factor ( $\chi^2 = 77.65$ ,  $\chi^2/\text{df} = 2.99$ , CFI = .93, RMSEA = .06 with 90% confidence intervals of .046 and .077, and SRMR = .04)<sup>2</sup>, and the reliability analysis on these items indicates that the measure is internally consistent, with a Chronbach's alpha of  $\alpha = .75$ . Thus, the subsequent analysis in this study will employ a domain-specific, single-construct measure of individuals' effort-oriented epistemological beliefs. However, in order to simplify analysis, after reverse-coding the appropriate items based on Schraw et al.'s (1995) original procedure for their measurement instrument, I subsequently reverse-coded the entire 9-item measure so that mature or sophisticated beliefs were reflected by the higher, rather than lower, responses on the scale's 1-5 point Likert-type scale.

It is my contention that this new construct of effort-oriented epistemological beliefs (represented by the 9-item measure that emerged in the above analyses) may be less susceptible to some of the pitfalls evident in a general epistemological beliefs framework. The first issue discussed above is that of the dimensionality of beliefs. Epistemological belief dimensionality issues stem, in part, from the all-encompassing nature in which beliefs have been discussed. Given the debate over epistemological belief dimensionality, it is clear that researchers have yet to agree on the breadth of beliefs. Thus, it may be worthwhile to look at more specific, focused areas within individuals' belief systems, such as an individual's beliefs about the degree of effort and complexity involved in the learning and knowledge creation process. Such specific conceptions of beliefs might allow us to further reconcile some of the issues regarding general belief dimensionality.

The next issue that plagues general epistemological beliefs research is that of context-specificity. Chan and Elliott (2002, 2004a) have indicated that cultural differences and influences affect the epistemological belief structures of individuals embedded in each culture. Although these interpretations were made based on findings relating to differences across national cultures, it appears reasonable to assume that the workplace context may have a similar impact on one's general epistemological beliefs that may cause them to differ from individuals situated in a classroom environment. However, this measure of ease or effort an individual relates to knowledge and learning outcomes appears to be context-free, as the concept of interest is the degree of effort associated with the creation of knowledge and learning, rather than on the outcomes of those processes. Thus, the locus of effort is somewhat of a universal concept that may be less likely to fall prey to the bi-polar factors associated with "it depends" thinking, as discussed earlier.

Further, although the measure of effort-oriented beliefs developed in the present study retains Schommer's (1990) conceptions of context- and domain- independence, it has the added benefit of meeting Bandura's (1986) criteria that in order to be useful, self-beliefs should be relevant to the behaviors associated with those beliefs. As such, the present study offers a starting point at which we may begin to examine the fortitude of effort-orientated beliefs and the relationship that such beliefs may have on knowledge and learning outcomes, and provides a construct of study that is potentially less susceptible to some of the concerns previously associated with epistemological belief conceptualization. Thus, I ran the full measurement model for my team and mentoring hypotheses using the effort-oriented epistemological belief construct as the independent latent variable for each of these models (see Results section below).

## **Dependent Variables**

**Individual knowledge sharing behaviors.** Knowledge sharing behaviors exhibited by individual organizational members were measured using an original scale I developed to assess several features of this construct, including sharing one's own specialized knowledge, seeking out and relying on new potentially useful information, and attempting to improve team coordination. Eleven items, developed from a combination of a review of the literature on knowledge sharing and brief focused interviews with undergraduate students involved in semester-long team projects, were tested as possible items to represent this construct. To develop this new measurement instrument, I followed the content adequacy procedure outlined by Schriesheim, Powers, Scandura, Gardiner, and Lankau (1993) to design a measure that is adequate to represent its respective underlying construct. As constructs are abstract, unobservable concepts, it is important to test the theoretical correspondence between a measure's items and the abstract constructs of interest (Schriesheim et al., 1993). Such analysis is particularly important when developing new scales, as in the case of my Individual Knowledge-Sharing Behaviors measure.

In assessing the content adequacy of my new knowledge sharing measure, I ran it concurrently with Campion, Medsker, and Higgs' (1993) 12-item measure of group processes, which includes the four dimensions of potency, social support, workload sharing, and communication and cooperation within the group (see Appendix B for Content Adequacy Assessment Questionnaire). Fifty junior- and senior-level undergraduate business students participated in the content adequacy testing. These students were first provided with a definition of individual knowledge sharing behaviors in a group context, which I defined as, "behaviors in which a person engages which should enhance knowledge exchange among team members."

This definition was followed by separate definitions for each of Campion et al.'s (1993) four group process dimensions as indicated in these authors' manuscript. The final definition was that for the term "other" as it was to be used in this assessment: "If you believe that the response cannot be easily coded using the existing categories, indicate the extent to which you believe the following statements are characteristic of another category not captured by the categories provided above." The students were then asked to make theoretical judgments about each item's content as they perceive it relating to each of these defined constructs. Following Schriesheim et al.'s (1993) quantitative method to content adequacy testing involves first defining each construct, developing a list of items to represent that definition, having judges rate the items for specific content categories, and, finally, factor-analyzing the judgments to determine the items' dimensionality and the distinctiveness of the content categories (and, in so doing, determining the distinctiveness of the definitions provided to the judges) (Schriesheim et al., 1993). Due to resource limitations, I ran a Q-Factor analysis to determine the similarity among factors. Q-Factor analysis requires only 30-50 judges, since the sample size for Q-Factor analyses is restricted to the number of dimensions assessed, and not to the number of judges. Results of the principal axis factor analysis conducted on the judges' ratings are displayed in Table 4.2. Unconstrained factor analysis procedures using orthogonal (varimax) rotation and listwise deletion were conducted. The factor solution was determined using the criteria of eigenvalues > 1.0, the scree test, and the interpretability of factors (Gorsuch, 1983). As suggested by Ford et al. (1986), factor loadings of .40 or higher were considered significant.

Results show that 13 items initially loaded onto the first factor. Of these, five items (three of Campion et al.'s 1993 group process items and two of my knowledge sharing items) cross-loaded onto other factors, and were thus disregarded accordingly. With the exception of



two items, the remaining items loading onto the first factor all related to the knowledge-sharing construct that I had hoped would emerge from the procedure. The two dissimilar items were “members of my team are very willing to share information with other team members,” and “Teams enhance the communication among people working on the same product,” which both represented Campion et al.’s (1993) communication/cooperation dimension. I felt confident to remove both of these items from further analysis for a number of reasons. First, as the first item is not about individual behavior, but rather explicitly discusses group-level behavior, it would be inappropriate to include in a measure individual member behavior. The second item also does not relate to the behavior of an individual team member, but rather captures his or her opinion about teams in general and why they exist. With the removal of these two items, six items emerged as a unique measure of individual knowledge sharing behavior. The six retained items include (1) In my current work group, I have shared my own specialized knowledge with my coworkers, (2) I encourage and/or participate in brainstorming activities, (3) I often listen to ideas expressed by others in my group, (4) I often attempt to improve team work processes, (5) I often contribute to group discussions, and (6) I encourage coworkers to share their ideas. These six items represent the complete spectrum of knowledge sharing, from sharing one’s own knowledge to eliciting and accepting that of others. The resulting 6-item measure has a Chronbach’s alpha of 0.83, suggesting that the scale’s items hold together adequately.

**Transactive memory.** Transactive memory was assessed using a 14-item scale developed by Lewis (2003) that was designed to be used at the team level. This scale measures team transactive memory systems, including specialization, credibility, and coordination. Lewis’s (2003) analyses revealed that these subscales are internally consistent at both the member ( $\alpha = .80, .83, \text{ and } .78$ , respectively) and team ( $\alpha = .84, .81, .83$ , respectively) levels.

However, as I do not have any a priori expectation that the individual components of transactive memory would be impacted differentially, I will combine these components into one higher-order factor. This combination is consistent with Lewis's subsequent empirical analyses with this measurement instrument (e.g. Lewis, 2003, study 2; 2004). Sample items include "each team member has specialized knowledge of some aspect of our project," "there is often very little confusion about how we will accomplish a task," and "our team worked together in a well-coordinated fashion." All items are anchored by a 5-point Likert-type scale, ranging from 1 = "strongly disagree" to 5 = "strongly agree." Chronbach's alpha results of  $\alpha = 0.85$  on the overall measure of transactive memory suggests that the items work together to adequately represent the underlying transactive memory construct.

**Group learning.** Edmondson's (1999) 7-item Team Learning Behavior scale was employed to measure group learning. Sample items include "this team frequently seeks new information that leads us to make important changes," and "in this team, someone always makes sure that we stop to reflect on the team's work process." Items are anchored by a 7-point Likert-type scale, where 1 = "very inaccurate" and 7 = "very accurate." Chronbach's alpha reveals that this measurement instrument is internally consistent at  $\alpha = 0.71$ .

**Mentoring.** Near the end of the survey, team members were asked to identify whether they are presently or have recently been a mentor to someone in an organization. Specifically, following the procedure used by Burke, McKeen, and McKenna (1993, pp. 887-888), respondents were given instructions designed to elicit consideration of a time in which they acted as a mentor:

Consider all the people [less experienced] than yourself whose careers you  
have influenced in a positive way over the last few years, even those

individuals who have not been your direct subordinates. Choose one individual with whom you have shared an especially close relationship and whose career you have influenced the most. Remember – this could be someone you presently manage, someone you have managed in the past, or even someone you have never managed directly. Please answer the following questions with this individual and relationship in mind. If you are not currently active in this individual's career, describe the relationship you had with this person at that point in time when you were actively involved in [his or her] career.

Those individuals who identified as mentors were instructed to complete an additional section where they answered questions pertaining to the extent of mentoring they have provided to their protégés. Mentoring functions in the forms of vocational and psychosocial support were measured using an instrument developed by Noe (1988), and adapted by Allen (2003) to reword items from an academic to an organizational context and to specifically capture data from the mentor's perspective. Noe's (1988) original measure was designed to assess career and psychosocial mentoring functions as discussed by Kram (1985). Seven items assess vocational mentoring functions, and ten items assessed psychosocial mentoring functions. A sample of vocational support items includes "Gave your protégé assignments that increased written and personal contact with senior management," and a sample of psychosocial support items includes "Conveyed empathy for the concerns and feelings that your protégé discussed with you." Respondents assessed (on a 5-point Likert-type scale, where 1 = "to a very slight extent," and 5 = "to a very large extent") the extent to which they have engaged in these activities. Reliability

analysis found that this measurement instrument was internally consistent, with alphas of  $\alpha = .90$  and  $\alpha = .95$  for vocational functions and psychosocial functions, respectively.

### **Moderator Variables**

**Psychological safety.** Team members' perceptions of psychological safety within the team was measured using Edmondson's (1999) 7-item Team Psychological Safety instrument. Sample items include "It is safe to take a risk on this team," and "People on this team sometimes reject others for being different" (reverse-scored). Items are anchored by a 7-point Likert-type scale, where 1 = "very inaccurate" and 7 = "very accurate." Although Edmondson (1999) found that this measurement instrument was internally consistent, returning an alpha of  $\alpha = .82$ , the present study returned an alpha of  $\alpha = .67$ , indicating a potentially problematic construct reliability with this measure as it was applied in the current context. Further, those respondents who identify themselves as mentors were asked to also report their perceptions of psychological safety in the organization (in addition to their perception of psychological safety in their team, as the mentoring model is not constrained to a team context). To collect this data, I used an instrument based on Edmondson's (1999) Team Psychological Safety scale, but modified to mention the organization as the referent, rather than the team (e.g. "People in this organization sometimes reject others for being different"). Reliability analysis with this measure of individuals' perceptions of psychological safety in the organizational context echoed that of the team-referent scale's reliability, again with an alpha of  $\alpha = 0.67$ . The bivariate correlation between the team-referent and organization-referent psychological safety constructs are significantly correlated at 0.55 ( $p < 0.01$ ), but this correlation is not so high as to indicate any issues of multicollinearity between these two constructs.

**Group member knowledge sharing behavior similarity.** The final variable, similarity among team members' knowledge-sharing behaviors, represents an interaction of group member individual knowledge sharing behaviors and the behavioral similarity of team members. Thus, this variable was computed by multiplying  $r_{WG}$  (R. L. James, Demaree, & Wolf, 1984) values for each team by the team's aggregated mean individual-level knowledge-sharing behaviors.

## **Levels of Analysis**

### **Aggregation of Individual Behaviors**

In order to examine the aggregate effects of individual knowledge sharing behaviors on the group knowledge sharing outcomes of transactive memory and group learning, group members' individual behaviors will be aggregated by averaging these behaviors across group members at the work group level of analysis. The aggregation of individual knowledge-sharing behaviors to the group level may raise the question of misspecification (Rousseau, 1985). However, there are several reasons why aggregation of these behaviors is, in this case, not only essential, but also justified. Specifically, as discussed earlier, knowledge-sharing behaviors are meaningless if they occur in a vacuum. That is, no one individual is said to share knowledge with him or herself; rather, a collective context such as a group or organization are required in order for the individual knowledge sharing behaviors to take place. An example of this style of reasoning comes from organizational citizenship behavior (OCB) research. For example, OCB researchers (e.g. Organ, 1988; Podsakoff, Ahearne, & MacKenzie, 1997) have argued that "most OCB actions, taken singly, would not make a dent in the overall performance of the organization ... any single occurrence is modest or trivial" (Organ, 1988, p. 8). In a related vein, transformational leadership researchers (e.g. Avolio & Bass, 1995) have made a similar argument regarding the "individual consideration" construct. Specifically, these authors argue

that individualized consideration can be operationalized and measured at multiple levels of analysis, with the more micro levels embedded or nested within the more macro. This same rationale appears to apply to knowledge sharing behaviors, as these behaviors similarly occur within a social context. My team model can thus be viewed as a multilevel model because I aggregate transactive memory and group learning to the group level, but examine their relationship with the individual-level construct of individual knowledge sharing behaviors.

### **Levels Issues**

One concern to multilevel studies involves the issue of determining the level at which a variable's variance occurs. According to Bliese and Halverson (1998), "this issue is important because the amount of the total variance that is due to the group-level properties of the data has theoretical implications about underlying group processes" (p. 157). Thus, in order to determine whether multilevel analysis is appropriate for my data, I estimated "the proportion of systematic between-group variation for each observed variable in the model" (Dyer, Hanges, & Hall, 2005, p. 155) by employing both the  $r_{WG}$  (R. L. James et al., 1984), and ICC (ICC(1), and ICC(2)) (Bliese & Halverson, 1998) values to detect the multilevel nature of the reports of individual knowledge sharing, team transactive memory, and group learning. With regard to the  $r_{WG}$  calculation, I employed the  $r_{WGj}$ , where  $j$  is the number of items in the scale. Employing the  $r_{WGj}$  is appropriate when a sample has a varying number of members across groups. These values offer complimentary analyses, as the  $r_{WG}$  assesses the within-group agreement, applied to each group separately; ICC(2) indicates the reliability at the aggregate level, estimating the reliability of the mean scores; and the ICC(1) indicates the degree to which individuals within a group respond similarly to a set of items. Thus, examining these values in tandem should offer a reasonable outlook at whether the bulk of variance in knowledge sharing behaviors is occurring

at the individual or group level. Results of these analyses appear to justify aggregation to the group level in order to observe the relationships that transactive memory and group learning have with group knowledge sharing outcomes (knowledge sharing average  $r_{WGj} = .69$ ,  $ICC(1) = .616$ , and  $ICC(2) = .906$ ; transactive memory average  $r_{WGj} = .82$ ,  $ICC(1) = .709$ , and  $ICC(2) = .880$ ; and group learning average  $r_{WGj} = .700$ ,  $ICC(1) = .406$ , and  $ICC(2) = .804$ ). The  $ICC(1)$  values, which estimate the degree to which individuals within the groups respond similarly (L. R. James, 1982) are surprisingly high, especially for the knowledge sharing and transactive memory constructs; the implications of such similarity are addressed more specifically in the discussion section. Further, although the knowledge sharing  $r_{WGj}$  of .69 may initially appear potentially problematic, the median  $r_{WGj}$  for knowledge sharing is .71, and, when the group-aggregate  $r_{WGj}$  is assigned to each group member for model analysis, the average team  $r_{WGj}$  across the sample is .73, implying that there are few individuals who are members of groups with low  $r_{WGj}$  values. Thus, the data appears to support aggregation of group member knowledge sharing behaviors, along with transactive memory and group learning in the teams analysis.

### **Analysis Strategy**

In order to test the impact of effort-oriented beliefs on knowledge sharing outcomes in groups and mentoring relationships, I have employed a structural equation modeling approach using the Mplus software package (Muthén & Muthén, 1998-2007). Mplus allows me to utilize procedures to support the analysis of continuous dependent variables for hierarchical effects, and thus has the capacity to handle the multilevel predictions posed in my teams model. Further, to test for the moderation effect of psychological safety on the relationships between epistemological beliefs and exhibited behaviors, I followed the procedure outlined by Baron and Kenny (1986). Two separate structural models were analyzed – first, a multilevel teams model,

and second an individual-level mentoring model – and the results of these analyses are presented below in the Results section.



**Table 4.1: Exploratory Factor Analysis of Epistemological Belief Factor Dimensionality**

Item	1	2	3	4	5	6	7	8	9	10
<i>Expected to load as Simple Knowledge</i>										
SK1								-.42		
SK2				.65						
SK3							.75			
SK4		.51								
SK5		.40		.43						
SK6	.49									
SK7										
SK8					.59					
<i>Expected to load as Certain Knowledge</i>										
CK1								.45		
CK2										
CK3		-.43								
CK4	.50									
CK5						.41				
CK6						.66				
CK7					.51					
<i>Expected to load as Quick Learning</i>										
QL1										
QL2				.60						
QL3	.43		.42							
QL4	.62									
QL5	.52									

**Table 4.1, cont:**      **Exploratory Factor Analysis of Epistemological Belief**  
**Factor Dimensionality**

Item	1	2	3	4	5	6	7	8	9	10
<i>Expected to load as</i>										
<i>Omniscient Authority</i>										
OA1		.52								
OA2		.64								
OA3	-.50									
OA4					-.40					
OA5									.43	
<i>Expected to load as</i>										
<i>Innate Ability</i>										
IA1			.50							
IA2			.60							
IA3										
IA4			.40							
IA5										
IA6									.45	
IA7					-.58					

**Table 4.2: Exploratory Factor Analysis for Knowledge Sharing Content Adequacy<sup>a</sup>**

Anticipated Dimension	Item	1	2	3	4
GP (WS)	Everyone on my team does their fair share of the work			.795	
KS	This team member shares his or her own specialized knowledge with teammates	<b>.720</b>			
GP (P)	Members of my team have great confidence that the team can perform effectively		.768		
KS	This team member encourages and/or participates in brainstorming activities	<b>.635</b>			
GP (CC)	Members of my team are very willing to share information with other team members about our work	.736			
GP (WS)	No one in my team depends on other team members to do the work for them			.725	
KS	This team member often listens to ideas expressed by others	<b>.792</b>			
GP (SS)	Being in my team gives me the opportunity to work in a team and provide support to other team members	.611	.429		
KS	This team member often distrusts the credibility of other members' knowledge	.440	.427		.417
GP (P)	My team can take on nearly any task and complete it		.810		
GP (SS)	My team increases my opportunities for positive social interaction	.502	.553		
GP (CC)	Teams enhance the communication among people working on the same product	.764			
KS	This team member works toward effectively coordinating team interactions				
KS	This team member attempts to improve team work processes	<b>.692</b>			
KS	This team member collects all the information he/she can from others – such as from customers or from other parts of the organization	.509	.458		
GP (SS)	Members of my team help each other out at work when needed	.537		.401	
KS	This team member seeks new information that may lead to important changes		.436		.676
GP (P)	My team has a lot of spirit		.840		
KS	This team member contributes to group discussions	<b>.745</b>			
GP (CC)	Members of my team cooperate to get the work done			.553	
KS	This group member comes up with a lot of ideas				.494
KS	This group member encourages others to share ideas	<b>.696</b>			
GP (WS)	Nearly all members on my team contribute equally to the work			.844	

## **CHAPTER 5**

### **RESULTS**

#### **Descriptive Analysis**

Table 5.1 reports the means, standard deviations, and correlations among the study variables. However, these correlations do not consider the multilevel nature of the data. Since transactive memory and group learning scores will be assigned to individuals within the group, the correlations of group-level variables reported in Table 5.1 may be confounded. Preliminary analyses focusing on assessment of univariate normality and multicollinearity were performed to examine any violations of assumptions required for structural equation modeling. First, to check assumptions of univariate normality, the skewness and kurtosis values of observed variables were investigated. Overall, absolute kurtosis values of more than 3.0 can affect the fit of the SEM model (Kline, 2005). Analysis of skewness and kurtosis values revealed no severe deviations from normality. Next, I assessed multicollinearity, which represents the existence of a high correlation among two or more variables, by analyzing the bivariate correlations presented in Table 5.1. Generally, if a correlation of .85 or higher is present between two variables, then those two variables are likely measuring the same construct (J. Cohen & Cohen, 1975). In the present study, no two variables were correlated above .85, indicating that multicollinearity was not a problem represented in this study.

#### **Evaluation of the Individual-Level Measurement Model Fit**

The purpose of the measurement model in structural equation modeling approach is to specify the relationship between the latent variables and the observed variables. Testing the measurement model allows us to determine the extent to which the observed variables are measuring their hypothesized latent constructs. Following the procedures outlined by Lance and

Vandenberg (2001) and Williams, Vandenberg, and Edwards (2009), I first tested the fit of the measurement model with all items loading under their theorized factors, using maximum likelihood estimation. This revealed a poor fitting model ( $\chi^2 = 5792.73$ ,  $\chi^2/df = 3.98$ , CFI = .73, RMSEA = .075 with 90% confidence intervals of .073 and .077, and SRMR = .07), suggesting that modification to the measurement model is necessary. However, the measurement model with all items loading as one factor revealed a considerably worse fit ( $\chi^2 = 10616.06$ ,  $\chi^2/df = 7.15$ , CFI = .42, RMSEA = .107 with 90% confidence intervals of .105 and .109, and SRMR = .12), indicating that factors exist which measure different constructs.

Once I was confident that different factors exist in the model, the next step was to run additional models to determine whether any potentially similar constructs load together as one factor. This involved testing a number of measurement models where items from similar yet distinct constructs were allowed to load together. First, I ran a measurement model in which all items represented their expected factors, but where vocational and psychosocial mentoring items were combined into one factor. This, too, resulted in poor model fit ( $\chi^2 = 6238.45$ ,  $\chi^2/df = 4.26$ , CFI = .70, RMSEA = .08 with 90% confidence intervals of .076 and .080, and SRMR = .07), suggesting that vocational and psychosocial mentoring are two unique constructs in the model. Next, I ran a model where knowledge sharing behaviors and group learning items loaded as one factor, and this, too, revealed poor model fit ( $\chi^2 = 6499.49$ ,  $\chi^2/df = 4.44$ , CFI = .68, RMSEA = .08 with 90% confidence intervals of .078 and .082, and SRMR = .08), suggesting that knowledge sharing and group learning are two unique constructs in the model. A test of a model where knowledge sharing behavior and transactive memory items loaded as one factor similarly resulted in a poor fitting model ( $\chi^2 = 6059.23$ ,  $\chi^2/df = 4.14$ , CFI = .71, RMSEA = .08 with 90% confidence intervals of .075 and .079, and SRMR = .07), as did a test of a model where group

learning and transactive memory items loaded as one factor ( $\chi^2 = 6223.48$ ,  $\chi^2/\text{df} = 4.25$ , CFI = .70, RMSEA = .08 with 90% confidence intervals of .076 and .080, and SRMR = .08). Finally, I tested a model where the items representing psychological safety in the team and the organization respectively loaded together, and this, too resulted in poor model fit ( $\chi^2 = 5881.89$ ,  $\chi^2/\text{df} = 4.02$ , CFI = .72, RMSEA = .08 with 90% confidence intervals of .073 and .077, and SRMR = .07).

According to Lance and Vandenberg (2001) and Landis, Edward, and Cortina (2008), the next step to obtaining measurement model fit is to remove appropriately problematic items from the model rather than allowing the residual error terms to correlate. As Landis et al. elaborate, such item deletion, when necessary, will allow for the creation of strong, unidimensional measurement models prior to estimation of the latent variables' respective relationships. Appropriate items for deletion are those items that both conceptually and empirically appear to either not fit with the other items in a construct or appear redundant, given either a nonsignificant path or a large correlated error term with other item or items as displayed in the SEM modification indices. Thus, the process of selecting items for removal from the model must be guided not only by the modification index suggestions, but also by theoretical rationale.

Following this procedure, the first item I removed was the item "We invite people from outside the team to present information or have discussions with us" from the group learning construct, as this item was about inviting others into the group while the other six items are about the group members themselves. Removal of this item resulted in a slightly better, but still poor-fitting model ( $\chi^2 = 5590.33$ ,  $\chi^2/\text{df} = 3.99$ , CFI = .73, RMSEA = .08 with 90% confidence intervals of .073 and .077, and SRMR = .07). Next, I removed the items "It is safe to take a risk on this (team/organization)" and "No one on this (team/organization) would deliberately act in a

way that undermines my efforts” from the team and organizational psychological safety measures, due to nonsignificant paths. Again, the resulting model had slightly better, but still poor fit ( $\chi^2 = 4565.10$ ,  $\chi^2/\text{df} = 3.82$ , CFI = .77, RMSEA = .07 with 90% confidence intervals of .070 and .075, and SRMR = .08). Next, I deleted the item “Working with members of this (team/organization), my unique skills and talents are valued and utilized” from the team and organizational psychological safety construct, as, unlike the other items, it appears to capture one’s perception of their value, rather than their perception of safety in the team or organization ( $\chi^2 = 3988.09$ ,  $\chi^2/\text{df} = 3.63$ , CFI = .79, RMSEA = .07 with 90% confidence intervals of .068 and .072, and SRMR = .07).

Before removing any additional psychological safety items, I systematically and individually removed the items “Conveyed feelings of respect for this person as an individual” from the psychosocial mentoring construct, and “Gave this person assignments that increased written and personal contact with senior management” from the vocational mentoring construct due to the substantially highly correlated residual errors these items shared with a number of other respective psychosocial and vocational mentoring items (respectively  $\chi^2 = 3530.03$ ,  $\chi^2/\text{df} = 3.36$ , CFI = .81, RMSEA = .07 with 90% confidence intervals of .064 and .069, and SRMR = .07; and  $\chi^2 = 3308.61$ ,  $\chi^2/\text{df} = 3.29$ , CFI = .82, RMSEA = .07 with 90% confidence intervals of .063 and .068, and SRMR = .07). Next, I removed the team and organizational psychological safety item “Members of this (team/organization) are able to bring up problems and tough issues” as it was the only remaining non-reverse-worded item in the psychological safety set, and thus was the only item in this measure that did not discuss a negative repercussion associated with a given behavior. Removal of this item resulted in substantially better, but not yet adequate

fit of the measurement model ( $\chi^2 = 2824.74$ ,  $\chi^2/\text{df} = 3.08$ , CFI = .84, RMSEA = .06 with 90% confidence intervals of .060 and .065, and SRMR = .05).

At this point, the model fit was almost adequate, and so I conducted one final phase of item deletion in order to achieve good fit. Achievement of model fit required the deletion of one additional vocational mentoring item and three psychosocial mentoring items. The items that were chosen for deletion had residual errors that correlated highly with other items in their respective constructs, and thus appear to be redundant items. Systematically, I removed the items in the following order until I achieved good measurement model fit: “Shared history of your own career with him/her” from the psychosocial mentoring construct ( $\chi^2 = 2695.04$ ,  $\chi^2/\text{df} = 3.08$ , CFI = .84, RMSEA = .06 with 90% confidence intervals of .060 and .065, and SRMR = .05); “helped this person finish assignments/tasks or meet deadlines that otherwise would have been difficult to complete” from the vocational mentoring construct ( $\chi^2 = 2534.72$ ,  $\chi^2/\text{df} = 3.02$ , CFI = .85, RMSEA = .06 with 90% confidence intervals of .059 and .065, and SRMR = .05); “Encouraged this person to try new behaviors in his or her job” from the psychosocial mentoring construct ( $\chi^2 = 2391.59$ ,  $\chi^2/\text{df} = 3.02$ , CFI = .85, RMSEA = .06 with 90% confidence intervals of .059 and .064, and SRMR = .05); and finally “Encouraged him or her to talk openly about anxiety and fears that distract from his/her work” from the psychosocial mentoring construct, which resulted in a well-fitting measurement model ( $\chi^2 = 2196.91$ ,  $\chi^2/\text{df} = 2.93$ , CFI = .86, RMSEA = .06 with 90% confidence intervals of .057 and .063, and SRMR = .05). Although the CFI in the model is just a bit below .90, the fit on the three other indicators ( $\chi^2/\text{df}$ , RMSEA, and SRMR) indicate excellent fit, and thus, based on the values of these indices, I discontinued the process of removing any more items from the model.



Given the number of items deleted in order to achieve a good fit for the final measurement model, it was necessary to test the reliability of each of the measurement instruments truncated through the preceding process. The constructs of effort-oriented epistemological beliefs, individual knowledge-sharing behaviors (in the group context), and team transactive memory were unaffected by the modifications, and thus these constructs may be considered reliable as indicated by their respective alphas reported previously. However, the constructs of group learning, psychological safety (team), psychological safety (organization), vocational mentoring, and psychosocial mentoring were truncated in order to achieve overall measurement model fit, and thus, I have reexamined the reliabilities of these constructs, as represented by the items retained in my final analysis. Unfortunately, the reliability of the six-item group learning measurement instrument no longer meets the .70 criterion, as it now has an alpha of  $\alpha = .65$ , indicating a potential issue of inconsistency with regard to how well this truncated group of items focuses on the single construct of group learning. However, the psychological safety measurement instruments now both have acceptable reliability coefficients of  $\alpha = .72$  and  $\alpha = .75$  for team and organizational safety, respectively, whereas they returned less than reliable coefficients previously. Further, the vocational and psychosocial mentoring scales still have acceptable alphas of  $\alpha = .87$  and  $\alpha = .92$ , respectively, indicating that these items sufficiently focus on the single constructs they are expected to represent.

### **Evaluation of the Multilevel Measurement Model Fit**

The purpose of the multilevel measurement analysis is to determine whether there is acceptable fit between the group-aggregated data and the model both within and between groups. The first step in determining whether the measurement model fits the data is to examine the multilevel characteristics of the group-aggregated latent variables. As indicated in the methods

section above, results of the  $r_{WGj}$ , ICC(1) and ICC(2) analyses appear to justify aggregation of knowledge sharing behaviors, transactive memory, and group learning to the group level. Thus, my next step was to run multilevel CFAs for each of these latent structures. As indicated in Table 5.3, the group learning and transactive memory models fit well; however, an attempt to run a multilevel CFA on the six-item knowledge-sharing construct resulted in a poor fitting model. Knowledge sharing items 2 and 3 appeared the most problematic according to the modification indices, and item 5 had the lowest ICC scores of all six items; however, before dropping any potentially problematic items from the construct, I attempted to keep all six of the items in the analysis by setting the individual items' respective *within* loadings equal to the *between* loadings. The results of this process determined that, regardless of which item(s) I constrained in this manner, the model never emerged with well-fitting indices (e.g. an analysis in which I bound the *within* loadings of item 2 to its *between* loadings resulted in  $\chi^2 = 116.44$ ,  $\chi^2/df = 6.13$ , CFI = .88, RMSEA = .11, SRMR (within) = .07, and SRMR (between) = .42; an analysis in which I bound the *within* loadings of item 3 to its *between* loadings resulted in  $\chi^2 = 115.70$ ,  $\chi^2/df = 6.09$ , CFI = .88, RMSEA = .11, SRMR (within) = .07, and SRMR (between) = .42; and an analysis in which I bound the *within* loadings of item 5 to its *between* loadings resulted in  $\chi^2 = 124.99$ ,  $\chi^2/df = 6.58$ , CFI = .87, RMSEA = .12, SRMR (within) = .07, and SRMR (between) = .24).

Given the unremitting inadequate fit of the six-item knowledge-sharing factor to the multilevel analysis, the next appropriate step is to begin to remove items based on empirical and conceptual grounds. Thus, I began by looking at items 2 ("I often listen to ideas expressed by others in my group") and 3 ("I often encourage and/or participate in brainstorming activities"), as item 2 does not appear to represent an active process, and item 3 is the only item that did not differentiate between the contributing (one's own knowledge) and encouraging (others'

knowledge) aspects of knowledge sharing behavior. I started by removing item 2, which identifies the passive behavior of listening, rather than an active step toward sharing knowledge. Removal of this item alone resulted in similarly poor fit ( $\chi^2 = 50.15$ ,  $\chi^2/\text{df} = 5.02$ , CFI = .93, RMSEA = .10, SRMR (within) = .06, and SRMR (between) = .21). Next, I removed only item 3, and removal of this item resulted in an equally poor-fitting model ( $\chi^2 = 69.55$ ,  $\chi^2/\text{df} = 6.96$ , CFI = .91, RMSEA = .12, SRMR (within) = .07, and SRMR (between) = .47). Lastly, I removed both of these items, and the four remaining items converged into a very well fitting confirmatory model ( $\chi^2 = 1.90$ ,  $\chi^2/\text{df} = .48$ , CFI = 1.00, RMSEA = .00, SRMR (within) = .007, and SRMR (between) = .072). Given the outstanding fit indicated in this CFA, I was concerned that such a well-fitting model might indicate an issue of collinearity among the knowledge sharing items; however, a correlational analysis among the items revealed that no collinearity issues are present among any of the knowledge sharing items. Thus, the four remaining knowledge-sharing items were retained to represent the latent knowledge-sharing factor in the multilevel measurement model.

The multilevel measurement model includes the individual-level factors of effort-oriented epistemological beliefs and perception of psychological safety (team-referent), in addition to the aforementioned team-level factors. In my proposed conceptual model, knowledge sharing behaviors are argued to emerge as individual behaviors resulting, in part, from the individual's belief structure; however, the second half of this conceptual model also treats these individual team member knowledge sharing behaviors as an aggregate function of the team. Thus, I ran two multilevel measurement models – one in which knowledge sharing behaviors are treated as a within-group individual-level variable ( $\text{KS}_W$ ), and a second one in which these behaviors are treated as a between-group team-level variable ( $\text{KS}_B$ ). My tests of the data's fit to these

multilevel measurement models resulted in the data fitting well to the model (KS<sub>W</sub>:  $\chi^2 = 267.83$ ,  $\chi^2/\text{df} = 2.11$ , CFI = .89, RMSEA = .05, SRMR (within) = .04, and SRMR (between) = .04; KS<sub>B</sub>:  $\chi^2 = 243.83$ ,  $\chi^2/\text{df} = 2.12$ , CFI = .88, RMSEA = .05, SRMR (within) = .03, and SRMR (between) = .05). Thus, given the adequate fit of the data to the multilevel measurement models, I confidently continued to test the path coefficients in a multilevel structural analysis of my team-related hypotheses.

## **Teams Structural Model**

### **Hypothesis Testing**

The structural model tests for relationships among the latent variables in the model. Structural analysis revealed that the within-level path from effort-oriented beliefs to knowledge sharing behaviors was not significant, indicating that team member mature or sophisticated beliefs about the amount of effort involved in learning and knowledge creation do not directly predict their individual knowledge-sharing behaviors in the group context. However, the team-level predictions revealed more positive results, as the relationships between aggregate knowledge sharing behaviors and transactive memory (*unstandardized<sup>3</sup> path coefficient* = .92,  $p < .001$ ), and group learning (*path coefficient* = .1.59,  $p < .001$ ) both yield significant paths. These results indicate that teams in which members, on average, engage in more knowledge sharing behaviors, tend to have higher levels of transactive memory and group learning.

Further, I had hypothesized that a team member's perception of psychological safety would moderate the relationship between his or her beliefs and reported knowledge sharing behaviors. To test this moderation, I ran an additional model in which I created an interaction term of epistemological beliefs with psychological safety (referent to the team), and included it in the model. In this moderation model, although the path between effort-oriented beliefs and

knowledge sharing remains nonsignificant, the path coefficient between the interaction term and reported knowledge sharing behaviors was significant (*path coefficient* = .185,  $p = .029$ ), suggesting that although sophisticated beliefs alone may not motivate a team member to engage in higher levels of knowledge sharing, it is possible that a member who holds such beliefs and who at the same time perceives a psychologically safe environment, may be more likely to do so. However, it is equally possible that the significant relationship between perceived psychological safety and knowledge sharing behaviors (*path coefficient* = .08,  $p = .03$ ) may be the driving force behind the significant moderation term.

Analysis of the chi-square difference test reveals that, of the two models, the moderation model has a significantly better fit. To test this, I first subtracted the difference between the degrees of freedom between the two models (80 *df* in the moderation model – 79 *df* in the original model = 1). The chi-square table shows that for  $p = .05$  and one degree of freedom, the critical value is 2.71. The next step is to take the difference between the absolute values of the loglikelihood values, and multiply this by 2 ((9725.554 - 9718.395 = 7.159)\*2 = 14.32). As 14.32 is greater than the 2.71 critical value, we can conclude that the model with the interaction term is a significantly better fit than the model without the interaction term. Thus, the moderation model is retained, and its relationships are depicted graphically in Figure 5.1.

Further, the interaction plot representing this moderation effect, shown in Figure 5.2, helps to at least partially explain why I did not observe a direct relationship between a team member's effort-oriented beliefs and the knowledge sharing behaviors he or she engages in. The interaction shows that while members who hold sophisticated beliefs and perceive high levels of psychological safety in the team appear to engage in considerably *higher* levels of knowledge sharing ( $\mu = 4.06$ ) than members with less sophisticated beliefs ( $\mu = 3.76$ ), members who hold

sophisticated beliefs but who perceive low psychological safety appear to engage in considerably *less* knowledge sharing behaviors ( $\mu = 3.64$ ) than members with less sophisticated beliefs ( $\mu = 3.78$ ).

### **Test of the Research Question**

In addition to analyzing the hypothesized paths, I also tested the research question, which asked whether the similarity among group members' individual knowledge sharing behaviors interacts with those aggregate behaviors to impact the group knowledge sharing outcomes of transactive memory and group learning. A test of this research question will involve the moderating effect of team member knowledge sharing similarity to determine whether teams in which members tend to engage in similar degrees of knowledge sharing behaviors differs significantly from a team in which the members each tend to engage in differing degrees of behaviors.

To test this moderation, I ran an additional model in which I created an interaction term of aggregate team member knowledge sharing behaviors with the team's  $r_{WG}$  for this factor, and included this interaction term in the model. In this new moderation model, the within-level relationships between effort-oriented beliefs and knowledge sharing remained unchanged, but some differences are apparent in the between-level side of the model. First, although the path coefficient between aggregate knowledge sharing in the team and transactive memory remained significant (*path coefficient* = 2.32,  $p < .001$ ), the path coefficient between aggregate knowledge sharing and group learning became nonsignificant. Regarding the moderation, the path between the interaction term and transactive memory was significant (*path coefficient* = -2.17,  $p = .014$ ), but in this model, the path between the interaction term and group learning was nonsignificant. However, the moderated model produced unusually high standard error terms for both the path

from knowledge sharing to group learning (standard error = 1.53) and the path from the interaction term to group learning (standard error = 2.24). The standard error measures how closely data points congregate around a linear regression line, and thus a high standard error term indicates a rather imprecise estimate of the path. A potential explanation for why this anomaly occurred is that it may have come about as an artifact of the similarity between the sample groups'  $r_{WG}$  values on knowledge sharing and group learning. The mean difference between these two values across groups is only .081. With such a high similarity between the  $r_{WG}$  values of these two variables, it is likely that when I include the interaction term, which in part consists of the  $r_{WG}$  value for knowledge sharing, it corrodes the variance between the two variables. It is not that the latent knowledge sharing and group learning variables are answering the same thing; rather, it's that the variability of the way in which the group members responded to these questions within their respective groups are very similar. These results of these moderation analyses suggest that teams in which members engage in *differing* levels of knowledge sharing behaviors (those teams in which the team's  $r_{WG}$  on knowledge sharing is low) tend to have stronger transactive memory systems, but that we are unable to determine the degree to which knowledge sharing similarity of team members affects the team's group learning outcomes (if at all).

Analysis of the chi-square difference test reveals that, of the two models (the original model, in which the only moderator is the within-level moderation of perceived psychological safety on the belief-knowledge sharing relationship; and the second model, in which there is additionally a between-level moderation of member knowledge sharing similarity on the relationship of aggregate knowledge sharing behaviors on transactive memory and group learning), the second model has a significantly better fit. To test this, I first subtracted the

difference between the degrees of freedom between the two models (98 *df* in the moderation model – 94 *df* in the original model = 4). The chi-square table shows that for  $p = .05$  and one degree of freedom, the critical value is 7.78. The next step is to take the difference between the absolute values of the loglikelihood values, and multiply this by 2 ((9808.376- 9776.412 = 31.964)\*2 = 63.93). As 63.93 is greater than the 7.78 critical value, we can conclude that the model with the interaction term fits significantly better than the model without the interaction term, and thus it is reasonable to draw conclusions regarding the moderating effect of knowledge sharing similarity. These relationships are depicted graphically in Figure 5.3.

A plot of this interaction (displayed in Figure 5.4) offers clarification with regard to the direction of this moderation effect. First, it appears that teams in which low aggregate levels of knowledge sharing occur do not appear to be affected by the similarity or dissimilarity of member knowledge sharing behaviors ( $\mu = 3.39$  and  $3.37$  for similar and dissimilar behaviors, respectively). However, the effect of knowledge sharing similarity does appear to make a difference in teams who report high aggregate knowledge sharing behaviors. In these teams, it appears that the teams whose members are dissimilar from one another with regard to their knowledge sharing behaviors have considerably higher transactive memory systems ( $\mu = 3.79$ ) than those teams whose members engage in similar levels of knowledge sharing behaviors ( $\mu = 3.60$ ).

### **Mentoring Structural Model**

A test of the relationships among the latent variables in the individual-level mentoring model revealed that the path coefficient from effort-oriented epistemological beliefs to vocational mentoring was not significant, indicating that mentors' mature or sophisticated beliefs about the amount of effort involved in learning and knowledge creation do not directly predict



their output of vocational support to their protégés; however, the standardized path coefficient from effort-oriented beliefs to psychosocial mentoring was significant, indicating that mentors who hold mature or sophisticated beliefs about the amount of effort involved in learning knowledge creation are more likely to offer psychosocial support to their protégés (*path coefficient* = .22,  $p < .001$ ).

Further, I had hypothesized that the mentor's perception of psychological safety would moderate the relationships between holding mature beliefs and exhibiting vocational and psychosocial mentoring behaviors. To test this moderation, I ran an additional model in which I created an interaction term of epistemological beliefs with psychological safety (referent to the organization), and included it in the model. In this moderation model, although the path between effort-oriented beliefs and vocational mentoring remains nonsignificant (*path coefficient* = .14,  $p = .084$ ), the path coefficient between the interaction term and vocational mentoring was significant (*path coefficient* = .195,  $p < .001$ ), suggesting that although sophisticated beliefs alone may not motivate a mentor to provide higher levels of vocational support to a protégé, a mentor who holds such beliefs and who at the same time perceives a psychologically safe environment, may be more likely to do so, particularly given that the direct relationship between the mentor's perception of psychological safety and vocational mentoring did not yield a significant path (*path coefficient* = .255,  $p < .01$ ); if this path were to have been significant, it may have implied that psychological safety may be the driving force behind the significant moderation path, but because the path is not significant, this is not the case in this model.

With regard to psychosocial mentoring support, the path between a mentor's effort-oriented beliefs and his or her output of psychosocial support remained significant (*path coefficient* = .035,  $p = .28$ ) in the moderation model. Further, the path between the interaction

term and psychosocial mentoring is also significant (*path coefficient* = .255,  $p < .01$ ), suggesting that psychological safety significantly moderates this relationship, as well. The findings from the moderation model suggest that a mentor with mature or sophisticated beliefs is more likely to translate those beliefs into both vocational and psychosocial mentoring behaviors if he or she perceives that the workplace is a psychologically safe environment. Further support for the moderation effect of psychological safety on the relationship between beliefs and mentoring behaviors comes from a comparison of the moderation model with the model that does not include the interaction term. Analysis of the chi-square difference test reveals that, of the two models, the moderation model has a significantly better fit. To test this, I first subtracted the difference between the degrees of freedom between the two models (77 *df* in the moderation model – 75 *df* in the original model = 2). The chi-square table shows that for  $p = .05$  and two degrees of freedom, the critical value is 5.99. The next step is to take the difference between the absolute values of the loglikelihood values, and multiply this by 2 ((16085.232 – 16079.569 = 5.665)\*2 = 11.33). As 11.33 is greater than the 5.99 critical value, we can conclude that the model with the interaction term is a significantly better fit than the model without the interaction term. Thus, I can confidently assert that a mentor's perception of psychological safety in the organization moderates the relationship between his or her beliefs about the effort involved in learning and creating knowledge and his or her reported mentoring behaviors. Figure 5.5 displays the moderated mentoring model graphically. Closer analysis of the interaction effect shows that those mentors who perceive low psychological safety in the organization and who hold sophisticated beliefs indicated similar levels of vocational mentoring ( $\mu = 2.92$ ) as did mentors who perceive low levels of psychological safety and hold less sophisticated beliefs ( $\mu = 2.95$ ). However, those mentors who perceive high levels of psychological safety and hold

sophisticated beliefs reported considerably higher levels of vocational mentoring support ( $\mu = 3.26$ ) than those who perceived high safety but less sophisticated beliefs ( $\mu = 2.81$ ). Additional analysis revealed that the positive direct relationship found between a mentor's mature beliefs and the psychosocial support he/she offers appears to be enhanced under conditions of high perceived psychological safety, as the mean score for high knowledge sharers who perceive high psychological safety is 3.69, compared with 3.47 for those who perceive low psychological safety. Plots of these interactions are displayed in Figure 5.6.

**Table 5.1: Individual Responses – Means, Standard Deviations, Alphas, and Intercorrelations<sup>b</sup>**

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17
1. Gender (male/female)	.40	.49	-															
2. Age	46.57	10.96	.17**	-														
3. Race (white/black)	.50	.50	.33**	.17**	-													
4. Education	2.42	.89	-.22**	-.17**	-.37*	-												
5. Organizational Tenure	10.38	8.23	.04	.38**	-.07	-.17**	-											
6. Online vs. Paper Survey	.49	.50	.14**	.15*	.44**	-.36**	-.04	-										
7. Years in Current Team	7.83	7.41	.09*	.35**	-.08	-.14**	.75**	-.05	-									
8. Professional vs. Blue-Collar Group	.89	.31	-.05	.02	.28**	-.46**	-.02	.32**	-.01	-								
9. Effort-Oriented Beliefs	3.53	.57	-.04	.22**	-.31**	.27**	-.13**	-.28**	-.07	-.20**	(.75)							
10. Psychological Safety (Team)	4.71	1.44	-.04	.00	-.13**	.23**	-.07	-.19**	-.03	-.28**	.25**	(.72)						
11. Psychological Safety (Org)	4.42	1.44	-.01	-.01	-.04	.05	-.05	-.05	-.01	-.10*	.15**	.65**	(.75)					
13. Individual Knowledge Sharing (KS)	3.81	.59	-.15**	-.11*	-.14**	.29**	-.07	-.24**	-.07	-.18**	.09*	.26**	.13**	(.83)				
14. Team Transactive Memory	3.53	.51	-.03	.05	-.11*	.18**	.06	-.19**	.01	-.26**	.04	.35**	.19**	.56**	(.85)			
15. Group Learning	4.36	.97	-.07	.02	-.08	.17**	-.01	-.18**	-.05	-.20**	.02	.31**	.24**	.38**	.48**	(.65)		
16. Vocational Mentoring	3.01	.95	-.05	-.09	.05	.08	-.05	.01	-.03	-.07	.10*	.07	.09	.21**	.22**	.16**	(.87)	
17. Psychosocial Mentoring	3.38	.95	-.00	-.07	-.07	.19**	-.01	-.15**	.00	-.18**	.21**	.11*	.06	.31**	.28**	.16**	.73**	(.92)

**Table 5.2: Aggregate Group Responses – Means, Standard Deviations, and Intercorrelations<sup>b</sup>**

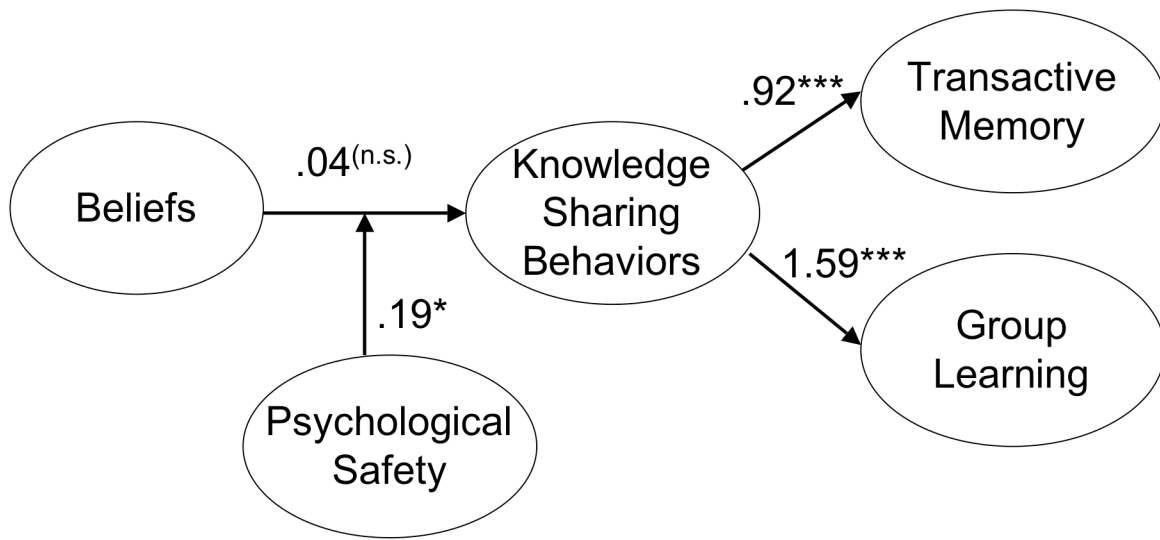
Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Group Size	7.84	4.06	-						
2. Professional vs. Blue-Collar Group	.86	.35	.22	-					
3. Average # Years on Current Team	7.18	3.86	.50**	.05	-				
4. Aggregate Group Member Knowledge Sharing (KS)	3.85	.34	-.19	-.35**	-.09	-			
5. Group Member KS Similarity ( <i>r</i> <sub>WG</sub> value for KS)	.69	.18	.66**	.00	.33**	-.23	-		
6. Team Transactive Memory	3.55	.29	-.17	-.37**	-.12	.60**	.33**	-	
7. Group Learning	4.37	.57	-.06	-.31**	-.13	.49**	-.13	.63**	-

**Table 5.3: Summary of Fit Statistics for Multilevel CFA Analyses**

Model	$\chi^2$ (df)	<i>p</i>	$\chi^2/\text{df}$ (ratio)	CFI	RMSEA	SRMR	
						within	between
Transactive Memory*	137.30 (52)	.000	2.64	.95	.063	.061	.726
Group Learning	54.83 (18)	.000	3.05	.96	.070	.038	.073
Knowledge Sharing (all 6 items)	115.61 (18)	.000	6.42	.88	.114	.071	.426
Knowledge Sharing (without item 2)	50.15 (10)	.000	5.02	.93	.098	.055	.207
Knowledge Sharing (without item 3)	69.55 (10)	.000	6.96	.91	.120	.066	.470
Knowledge Sharing (without items 2 and 3)	1.90 (4)	.754	.48	1.00	.000	.007	.072

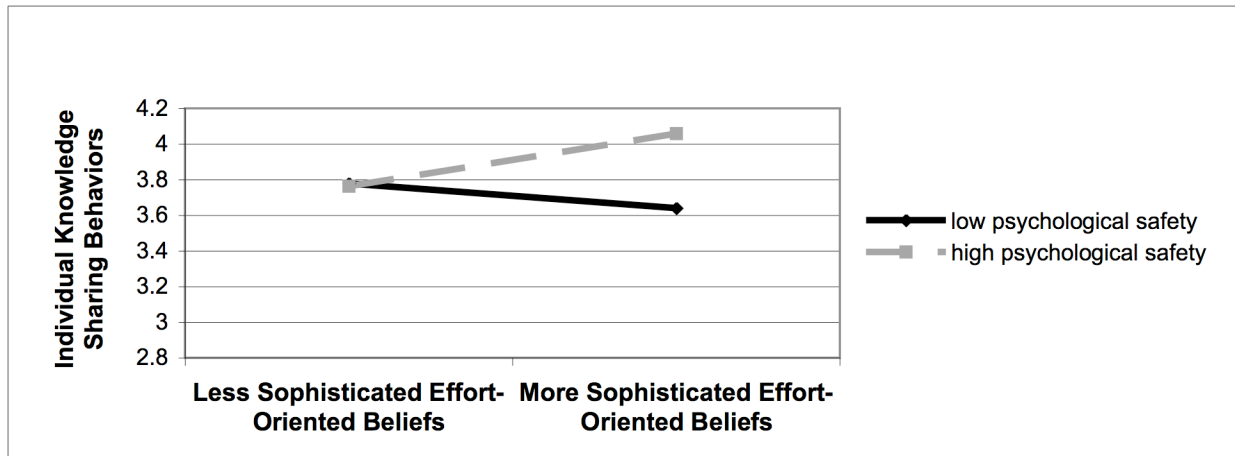
Notes:  $\chi^2$  = Model Chi-square, (df) = degrees of freedom, *p* = probability,  $\chi^2/\text{df}$  = ratio of chi-square to degrees of freedom/normed chi-square, RMSEA = Residual Mean Squared Error of Approximation; SRMR = Standardized Root Mean Square Residual

\* The CFA for transactive memory was run concurrent with group learning items included in the model, because the three transactive memory subscales alone would provide zero degrees of freedom in the analysis, rendering the goodness-of-fit indices moot. However, the multifactor nature of this model explains the low SRMR (between) value that emerged in this analysis.



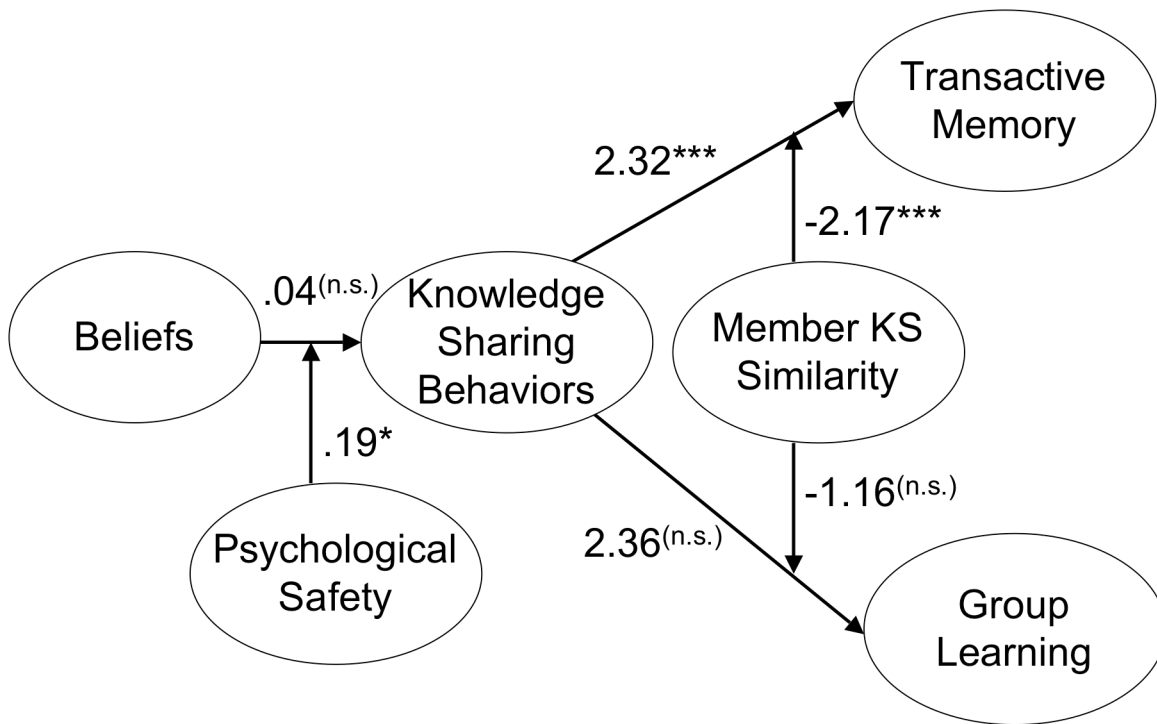
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**Figure 5.1: The Structural Teams Model with Psychological Safety Moderation**



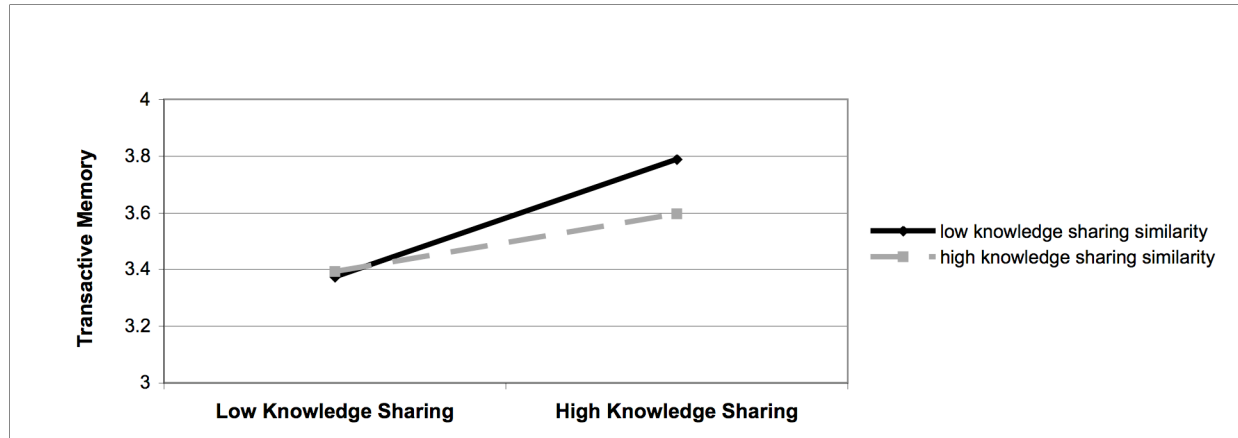
**Figure 5.2: Interaction Plot for Knowledge Sharing Behaviors**



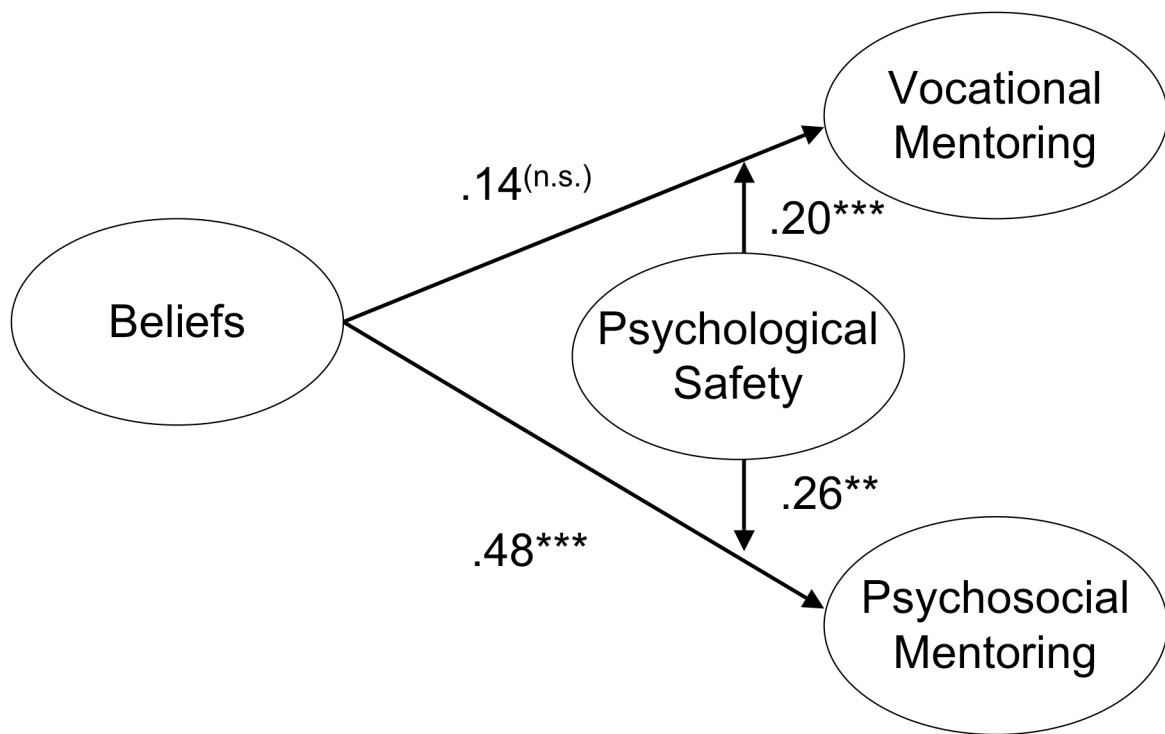



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**Figure 5.3: The Structural Teams Model with Psychological Safety Moderation and Member Knowledge Sharing Similarity Moderation**

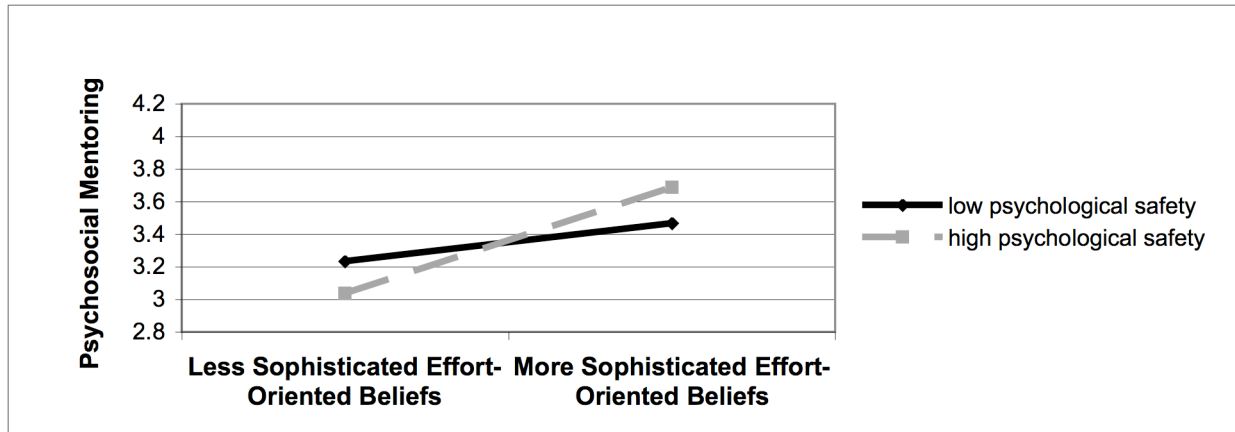
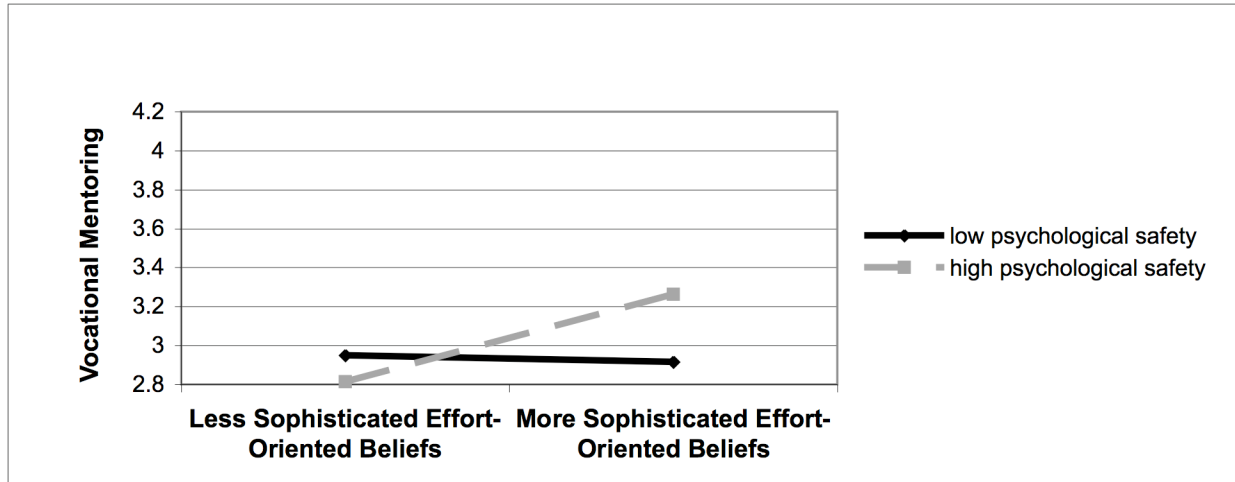


**Figure 5.4: Interaction Plot for Transactive Memory Systems**



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**Figure 5.5: The Structural Mentoring Model with Psychological Safety Moderation**



**Figure 5.6: Interaction Plots for Mentoring Behaviors**

## **CHAPTER 6**

### **DISCUSSION**

The present study offers a number of advances to our understanding of knowledge sharing processes in the workplace, and offers a social-constructivist framework upon which we may build in order to ultimately strengthen team and mentoring outcomes at work. One important finding from this study is that Schommer's (1990) epistemological belief dimensionality, though rather widely accepted in the education literature, did not appear to hold in a sample of working adults. Rather, a unique subset of epistemological beliefs – beliefs about the effort involved in processing learning and constructing knowledge – emerged. I have argued that these effort-oriented beliefs may be somewhat less susceptible to some of the pitfalls evident in a general epistemological beliefs framework, such as dimensionality and context-specificity. Drawing on this finding, the study also found that a mentor's beliefs about the effort involved in learning and knowledge processes ultimately impact the degree of psychosocial mentoring support he or she provides to a protégé. Further, the study found that the relationship between aggregate team member knowledge sharing behaviors and transactive memory is stronger in teams in which the members engage in differing degrees of knowledge sharing (rather than in groups where member behaviors are more similar to one another).

First, mentors who held more sophisticated beliefs about the effort involved in knowledge and learning processes were found to report offering significantly greater levels of psychosocial support to their protégés, and the mentor's perception of psychological safety in the organization appears to moderate this mentoring process such that mentors who perceive higher levels of psychological safety are more likely to act on their beliefs. This finding could have a potentially important implication for workplace outcomes. Weinberg and Lankau (in press)

recently found that, even in a formal mentoring program, “where all of the mentoring relationships tend to revolve around an organizational desire for advancing protégé careers [e.g. vocational-type support]” (p. 28), it was the mentors who provided the greatest levels of psychosocial support who were rated as the most effective by their protégés. Further, psychosocial support has been discussed as an important mentoring component that has been associated with numerous career outcomes (see Allen, Eby, Poteet, Lentz, & Lima, 2004 for a more exhaustive discussion of the benefits associated with psychosocial support). Thus, it is clear that the social-developmental interactions associated with psychosocial support play an important role in achieving mentoring objectives, and the present study has identified an internal belief structure that appears to potentially motivate individuals to provide this type of support.

This finding that the sophisticated beliefs of a mentor are related to psychosocial mentoring support is encouraging, as it is one of the first studies to examine the impact that a mentor’s cognitive processes have on important organizational outcomes. Similarly, it adds to the small but growing literature on a mentor-centric approach to mentoring, as it confirms the importance of understanding mentor-centric processes and their relationship with mentoring in the workplace. Specifically, the finding that a mentor’s sophisticated beliefs are associated with psychosocial support upholds my core theory that mentors who have a greater appreciation for the complexity of the processes associated with effortfully engaging in knowledge and learning practices are more likely to put forth the effort required to provide the support and encouragement associated with psychosocial mentoring. It thus appears as though mentors with such beliefs, who view ambiguous and challenging situations as opportunities (Furnham & Ribchester, 1995), are likely to foster the type of creativity-inducing and self-confidence-building environment that is synonymous with psychosocial support. Additionally, drawing on

the processes associated with expectancy theory (Vroom, 1964), these findings suggest that a mentor who holds sophisticated beliefs is more likely to recognize his or her efforts as contributing to his or her desired mentoring outcomes, further motivating him or her to engage in psychosocial mentoring behaviors. Lastly, the finding that this relationship is moderated by the mentor's perception of psychological safety confirms my theory that a mentor who believes that the potential downsides associated with mentoring will not have an impact on his or her self-image, status, or career will be more willing to act on his or her beliefs and act in a way associated with psychosocially supportive behavior.

An additional finding from this study is that teams whose members engage in higher levels of aggregate knowledge sharing behaviors tend to have greater team levels of transactive memory and group learning. Although this finding may not be very surprising, it is important to recognize an assumption implied in this finding. In its raw form, this finding assumes that group members' aggregate individual behaviors impact group-level outcomes in such a way that groups that have members high in knowledge-sharing behaviors will have higher transactive memory and group learning, while groups with members low in such behaviors will have less positive outcomes. However, the question remained as to what extent group member similarity in reported behaviors impacts this relationship. My analysis revealed that the greatest levels of transactive memory were found in teams where members are *dissimilar* from one another in their reported knowledge-sharing behaviors. This finding implies that not only is the individual proactive behavior of team members on aggregate important toward reaching higher levels of transactive memory, but that transactive memory outcomes appear to be the strongest when there are varying degrees to which the members engage in knowledge sharing. One possible explanation for this finding is that the high knowledge-sharing members of the group may

recognize that not all members of the team are as highly engaged in the knowledge sharing process, and thus might take proactive measures on his or her own to learn what the other members know (and how to access this information) so that he/she could take the proactive steps toward accessing this information when necessary in the event that the other members are not as forthcoming. A second, but related, possible explanation involves the role of teaching that could be associated with being a high knowledge-sharer in a group whose knowledge sharing is considerably diverse. It is possible that the high knowledge sharers in such a group might find themselves obligated to take on the role of “teacher” in the group, sharing their own knowledge and encouraging others to do so, as well. Tichy and Cohen (1997) discuss how a person in this situation is likely to develop his or her own “teachable point of view,” drawing on lessons from his or her own experiences and articulating and teaching them to others. As an individual develops this type of system, these authors argue that he or she is likely to become committed to, and personalize this knowledge. Such personal commitment to knowledge as that which stems from the development of one’s own teachable point of view could possibly compel these high knowledge-sharers to drive the knowledge-sharing process within his or her team. However, it is beyond the scope of the present study to empirically explore the causal attributes of this finding; future research is needed to determine whether it is the group’s high knowledge-sharers who truly drive this moderation, or whether some other as-yet untested determinant is behind this finding.

Lastly, it is important to note that some of the study’s hypothesized relationships did not produce significant main effect results. First, although I found that a mentor’s effort-oriented beliefs appear to impact the psychosocial support he or she provides, I did not find a main effect with regard to the relationship between beliefs and vocational support nor with regard to a team



member's knowledge sharing behaviors. Although no main effect emerged in either of these cases, it is clear that these relationships do appear to exist within the context of a psychologically safe workplace. The finding that psychological safety plays an important moderating role in the relationship between a team member's effort-oriented beliefs and his or her reported knowledge sharing behaviors indicates that team members who hold sophisticated beliefs, and who feel safe to speak their mind within the workgroup context, are significantly more likely to report that they engage in knowledge-sharing behaviors. Similarly, the finding that psychological safety plays a key moderating role in the relationship between a mentor's effort-oriented beliefs and the vocational support he or she reports indicates that mentors who hold sophisticated beliefs, and who do not feel nervous about enduring any negative repercussions for speaking out at work are significantly more likely to provide vocational support to a protégé. These findings bring to question the potentially contextual nature of epistemological beliefs. Building on Ajzen and Fishbein's (1970) theory of propositional control, my initial argument held that an individual's beliefs would impact his or her intention to engage in knowledge sharing, and that this intention to behave would ultimately lead to reported knowledge-sharing behaviors. However, sophisticated beliefs appear to impact reported knowledge sharing behaviors only in the context of perceived psychological safety. Hence, as the belief-behavior relationship is bound by a condition of psychological safety, it appears as though effort-oriented beliefs may not be a context-free construct. Future research on effort-oriented beliefs is needed to test the context-specificity of these organization member beliefs.

Outside of the context of psychological safety, there are a few additional possible explanations that may account for why an individual's effort-oriented epistemological beliefs did not appear to produce a significant main effect on specifically task or career-related knowledge

sharing (sharing knowledge in teams and vocational mentoring support). First, given the near-significant ( $p = .08$ ) significance level of the path between effort-oriented beliefs and vocational mentoring and the significant path between the psychological safety-belief interaction term, I analyzed whether this result may be due to a disproportionately high number of participants who reported low levels of psychological safety. However, a scatterplot of participant responses to these items did not reveal such a finding. Thus, it appears that there may be other reasons why one's effort-oriented beliefs do not appear to impact these task-oriented outcomes. One possible explanation may reflect the context in which the study's data was collected. The study was conducted in a context in which the participants were dealing with the worst economy in almost a century and with national unemployment approaching 10% and multimillion dollar budget cuts at their organization, they dealt with the issue of questionable job security, as well. To add to this, during the same week in which the study was introduced, the participants were told that they would be receiving furloughs at the organization that would decrease their annual salary by more than 1% (six mandated days off without pay). Thus, it is possible that given this demanding context, the employees may have chosen to spend their time focusing on their specific individual tasks at hand, and chosen not to engage in the task-oriented prosocial behaviors associated with knowledge sharing in teams and vocational mentoring. First, this context of uncertainty and poor economy may have dissuaded the employees from wanting to share knowledge with other organizational members, and rather encourage them to retain their information closely in order to maintain the power associated with having knowledge that other members do not have. Further, it is likely that this context of perceived uncertainty may have encouraged the employees to spend their time focused on their own personal work tasks and reduce the amount of time that they would spend teaching, providing assignments to, and otherwise helping to promote the

career of a less experienced colleague in the form of vocational mentoring support. Thus, there remains a question as to whether the context in which the study took place provided the type of environment in which the participants would participate in these dyadic- and group-referent task-oriented behaviors. Finally, with regard to the expected relationship between beliefs and knowledge sharing behaviors, my model is premised on the idea that individuals' beliefs vary from one another, and that the variance in their beliefs would allow me to test my hypothesis that beliefs impact knowledge sharing behaviors. However, the results show relatively little variance in individual beliefs among the overall sample ( $\mu = 3.53$ ,  $S.D = .57$ ), and, moreover, there is little variance among team members on this variable ( $r_{WG} = .82$ ). Thus, a further explanation for why these relationships did not emerge as predicted may be due to the relatively high degree of similarity among most participants' effort-oriented beliefs.

## **Limitations and Boundary Conditions**

### **Limitations Associated With the Use of Structural Equation Modeling Techniques**

There are a number of boundaries and limitations to the proposed study that must be considered. First, the process of eliminating items in order to achieve measurement model fit was a necessary step in ensuring that the model fit the study's data. In the case of the new individual knowledge sharing scale created for use in this study, this process proved useful to clarify the measure and to narrow it down to the four retained items. However, the process of dropping items in this manner from the existing measures of other study variables caused the model's latent variables to differ somewhat from their original validated forms. Thus, the individual scales retained in the present study should be further tested to ensure their validity across studies. Of particular interest are the psychological safety and group learning variables. In the psychological safety construct, the only items that were retained were those items that

were originally reverse-coded in the study. That is, they were the items that made the most direct statements regarding the difficulties or negative repercussions associated with certain workplace behaviors (e.g. “If you make a mistake in this organization, it is often held against you,” and “It is difficult to ask other members of my team for help”). The less direct items, (e.g. “No one on my team would deliberately act in a way that undermines my efforts”) were not retained in the present study. Although the straightforwardness associated with the reverse-coded items might offer some guidance as to whether these items worked together in the measurement model while the other items did not, it is equally possible that this finding is an aberration associated with the use of reverse-coded items in measurement instruments, as has been discussed by numerous previous researchers (e.g. Barnette, 2000; Weems & Onwuegbuzie, 2001; Weems, Onwuegbuzie, & Lustig, 2003). Further, the measurement model only retained six of the original seven items from the group learning construct. Although elimination of the seventh item was necessary to achieve measurement model fit, removal of this item decreased the scale’s reliability from  $\alpha = .71$  to  $\alpha = .65$ . It must be noted that any findings in the present study which involve the group learning variable may be suspect, as this low reliability score indicates that the group learning measure may be susceptible to measurement fluctuations, and brings into question the objectivity or repeatability of the rating procedure for this construct (Rosenthal & Rosnow, 1991). Future research is needed to determine why the removal of the only item that involved inviting others into the group rather than focusing on within-group behaviors would cause this measurement instrument to decrease its reliability to a sub-par level.

Further, a limitation associated with Mplus software is that it does not produce standardized path coefficients for interaction models. While the output of unstandardized coefficients allows me to discuss the direction and significance of the paths in my respective

models, these unstandardized outputs make it difficult to interpret the strength of the paths. Finally, this study followed the suggestion of Williams et al. (2009) to not enter control variables into the structural equation model, as “the inclusion of control variables can meaningfully change the substantive meaning of the constructs of interest” (p. 583). While this practice may allow us to remain more certain that the latent variables of interest are represented in the study, it leaves open a wide variety of opportunities for future research to determine the degree to which individual, team, and dyadic characteristics might influence the respective team and mentoring relationships discussed in this study. The correlation table (Table 5.1) provides some initial evidence of relationships that may be worthy of future investigation. For example, correlational analysis reveals that sophistication of effort-oriented beliefs is associated with older, white employees who have higher organizational tenure; high knowledge sharing behaviors (in a group context) are associated with being a young, white male; and reports of both team-referent psychological safety and high team transactive memory were reported primarily by white (as opposed to black) workers. Further, as discussed in more detail below, there appear to be a number of significant differences between the responses of individuals who work in professional versus blue-collar workgroups.

### **General Limitations of the Study**

An additional limitation of the present study involves the use of multilevel data in the teams model. As this employed multilevel data, causality among the variables cannot be proven. Thus, researchers should be cautious about making inferences regarding causality based on this study’s findings. Further, due to the relatively smaller sample sizes associated with the group level of analysis, group research tends to be susceptible to issues of moderate statistical power (Campion et al., 1993). The present study is no exception, and so researchers and practitioners

should recognize the potentially limited generalizability of the results obtained from the present study.

Further, as the objective of the mentoring section of this study is to capture how a mentor engages in mentoring behaviors, the present study collected mentoring data directly from the mentors. As the hypotheses argued that mentors' beliefs influence their intent to mentor, it would have been impossible to get at their intent through the recipient of the mentoring (i.e. the protégé). Thus, it is more suitable to capture this information directly from the mentor. However, this type of data collection, where the mentor rates his or her own behaviors, leaves the study vulnerable to potential bias that could result in systematic measurement error.

A further constraint of the present study regards the large percentage of employees who work in blue-collar service groups compared to the number of white-collar or administrative groups. With only 11.9% of the groups in this study representing professional-level or administrative teams, the present study did not capture the full-range of a total workforce population, and is thus limited in its ability to offer generalizable statements. Although there was a relatively small number of professional-level groups present in the study compared to the much larger number of blue-collar teams, a preliminary examination of the correlational data indicates some potential differences between these two subdivisions of labor in the sample. Correlational data indicates that blue-collar group members appear to report significantly less sophisticated effort-oriented beliefs, lower psychological safety (both team- and organizationally-referent), lower levels of knowledge sharing behaviors, transactive memory, and group learning, and offer less psychosocial mentoring support than their professional counterparts. Of further note, education is shown to be significantly and negatively associated with the members of the blue-collar groups (compared to their professional counterparts), and it

is possible that education level may be driving some of these relationships. Future research into the ways in which these two subdivisions of labor differ with regard to their behaviors associated with knowledge sharing could prove useful to the study and practice of applied organizational behavior. Further, although the present study may offer some rather unique insight into the processes associated with knowledge sharing in lower education, blue-collar service teams, I caution against making any generalized statements based on this study's findings until it can be determined that these findings can be replicated in additional samples of working adults from multiple contexts.

A final constraint of this study regards the surprisingly high ICC(1) values associated with the knowledge sharing and transactive memory constructs. Whereas my analysis yielded values of .616 and .709 respectively, and high ICC(1) values tend to justify aggregation of a construct to a higher order (Gonzalez-Roma, Peiro, Lloret, & Zornoza, 1999), these values appear to be outside the ordinary observed range. According to James (1982) and Ostroff and Schmitt (1993), values for ICC(1) generally range from approximately 0 to .5, with a median value of .12. Ostroff and Schmitt elaborate that ICC(1) values indicate "the extent to which individuals within the same [group] assign psychological meaning to, or agree in their perceptions of, [a group] characteristic" (p. 1349). Thus, the very high ICC(1) values (i.e. those values approaching 1.0) found with these two constructs are associated with a very small within-subject variance relative to the variance between-subjects, and indicate that participants in each group tend to agree on these variables to an extraordinarily high degree. A few possible explanations exist for why I found such similar responses among group members. First, it is possible that the high inter-group response similarity in my sample may be due to the high degree of work function similarity within each of the sample groups. Alternatively, although the

overall sample constitutes a relatively self-contained unit of 820 employees within a larger university system, it is important to note that all 820 members belong to only one division of the university. Thus, it is possible that all the members of this one division may behave similarly. A more cross-sectional or cross-divisional study across the entire university could determine whether these members' agreement about the description of their work environment is specifically related to the division to which they belong. Lastly, with regard to the knowledge-sharing construct, the items were worded in a manner that was intended to capture individual behaviors in which the members engage. By asking members to report the degree to which they proactively behave in their groups, the questions may have introduced a situation in which participants felt as though they should respond with a more socially-desirable response, thereby possibly truncating the range of responses received. Without knowing the exact cause for the extremely high levels of within-group agreement found in the present study's groups, caution should be used when comparing these groups to groups that may have greater heterogeneity or greater variance in their responses.

### **Related Topics Outside the Scope of the Present Study**

In addition, a number of relationships have previously been hypothesized or revealed as antecedents to some of the variables discussed in the present study, and it could be useful for future research to account for these variables by controlling for them or integrating them into the framework. For example, Schommer (1994) discusses how an individual's experiences influence their epistemological belief development; and therefore researchers should account for an employee's previous formal and informal learning experiences as a possible indicator of their beliefs prior to entering the group or acting as a mentor. Further, researchers who desire to continue this stream of research might consider adding related biographical data to the model,



including the organizational work domain to which team members belong, and determine whether this variable plays a role in explaining the variance of epistemologies among organizational members. This could be of particular interest to organizations that implement teams or mentoring relationships in which members come from cross-disciplinary work functions. In addition, Klein, Noe, and Wang (2006) found that motivation to learn impacts learning outcomes, and that motivation to learn in part results from a participant's learning goal orientation and whether that individual perceives environmental conditions as either enablers of or barriers to learning. These attributes of organizational members may be worth empirically investigating in conjunction with the models proposed herein. Lastly, some of this study's hypotheses (*H9c*, *H9d*) discuss mentor and protégé time spent together as a mechanism that could explain the relationship between a mentor's beliefs and the degree of mentoring he or she ultimately provides. This rationale builds on the findings of Weinberg and Lankau (in press) that time spent together affects the amount of mentoring provided, and that the relationship between these variables becomes stronger as the mentoring relationship develops over time. However, the present study did not capture the amount of time spent mentoring. It would be interesting for future research to explore the relationship between the effort-oriented epistemological beliefs of a mentor and the amount of time he or she spends with his or her protégé; further, an exploration of these two variables and the specific types of activities in which the mentor and protégé engage could potentially better illuminate our understanding of the mentoring process.

### **Boundary Conditions of the Study**

Additionally, researchers interested in building on the relationships established in the present study must recognize a number of boundaries and conditions that may impact the salience of the proposed model. First, it is possible that the relationships described herein may

be more salient in organic (as opposed to mechanistic) organizations, as organic organizations offer members more flexibility to choose the ways in which they go about accomplishing their work tasks. Therefore, in addition to perceived psychological safety, which is built into the present study's models, the organization's structure may influence the salience of the proposed relationships by influencing the degree to which individual group members are able to engage in such knowledge-sharing behaviors as collecting information from other organizational members outside the team, and working toward implementing positive changes to the way in which the team coordinates tasks. A further constraint of the present study involves the explicit assumptions that underlie much of the theoretical reasoning behind the models. First, the assumption that learning takes place socially and in a specific context (i.e. social constructivism) bounds the rationality behind the present study. Second, building on the knowledge-based perspective of the firm, the present study takes the view that organizations and team members view knowledge as an important organizational resource. Thus, an additional potential boundary condition of the present study applies to the organization's perspective – that is, the model may be more salient in an organization where decision-makers and team members are actively focused on reaping the benefits associated with learning and knowledge sharing, in accordance with the knowledge-based perspective of the firm. Future researchers who attempt to build upon or empirically validate the proposed model should bear these boundaries and limitations in mind.

### **Implications for Future Research**

#### **A New Construct of Effort-Oriented Epistemological Beliefs**

The purpose of this study was to identify the processes through which individuals' cognitions, rooted in their personal beliefs about knowledge and learning, promote knowledge sharing behaviors at work. As such, the present study represents an initial attempt to determine

the relationship between employee epistemological beliefs and knowledge sharing outcomes within the context of a work organization. I found that the five dimensions of beliefs as described by Schommer and her colleagues do not appear to manifest in a sample of working adults; that is, the study participants did not distinguish between these five anticipated dimensions. A systematic exploration of this finding exposed a potential new area worthy of investigation – the individual's specific beliefs about the effort involved in achieving knowledge or learning outcomes. This new construct of effort-oriented beliefs has the potential to improve our understanding of the cognitive processes that underlie proactive employee behaviors at work. By focusing on this specific, focused area within individuals' belief system, researchers may begin to make inferences regarding individuals' motivation to share knowledge at work. Further, an understanding of employee beliefs about the degree of effort and complexity involved in the learning and knowledge creation process allows us to better understand some of the cognitive antecedents that appear to drive knowledge sharing behaviors in interpersonal organizational situations. Further, the study of effort-oriented beliefs as a cognitive antecedent to individual knowledge sharing behaviors in dyadic and workgroup contexts is consistent with Deci and Ryan's (1985) self-determination theory, in that a study of the belief-behavior relationship focuses on the degree to which an individual's behavior is self-motivated and self-determined. However, this study of the belief-behavior relationship of individuals in dyadic and workgroup contexts may bridge the gap between individually constructed (i.e. cognitive) theories of behavior and socially constructed mechanisms consistent with Baxter Magolda's (2002) definition of social constructivism.

The present study represents a starting point from which to examine this newly emerged construct. As discussed above, effort-oriented beliefs may be less susceptible to issues that tend

to plague epistemological beliefs research, including issues of dimensionality (this new construct is about one specific, focused area of concentration), and possibly issues of context-specificity (the new construct focuses on one's perception of effort involved in the learning and knowledge construction process – a rather universal topic). Thus, the locus of effort-oriented beliefs may prove to be one area of epistemological beliefs research that has the ability to span across samples and possibly across contexts; however, the degree to which the construct generalizes outside of the present study will have to be determined by future research with different samples across industries. Given the powerful, positive relationship that exists between knowledge and performance (Alavi & Leidner, 2001; Nonaka, 1994), and given that mentoring relationships may be viewed as generators of knowledge (e.g. Boyatzis, 2007; Bryant, 2005), the present study's finding that a mentor's effort-oriented beliefs impact psychosocial mentoring reinforces the notion that further study of effort-oriented epistemological beliefs appears to be warranted.

### **Implications from the Teams Model**

The implication of relating individual cognitive processes to the study of teams is that a better understanding of the relationship between these variables could be used to design more effective organizational work groups. The teams model offers a preliminary multilevel framework that builds on Ajzen and Fishbein's (1970) theory of propositional control in an attempt to explain the process of individual beliefs and attitudes impacting the individual's behaviors as a team member, which ultimately impact team-level results. The results from the teams model highlight the importance of individual team member contributions to important group processes, as the aggregated individual behaviors of team members were found to impact both the transactive memory systems and the degree of group learning that existed in the group. Further, the study found an indirect relationship between the cognitive processes of team

members, in the form of their effort-oriented beliefs, and their reported individual behaviors. Future research could build on these findings in a twofold manner: First, by examining additional links between individual team members' cognitions and their behaviors; and second, by examining additional relationships between aggregations of individual team member behaviors and important group-level outcomes.

First, although the present study is interested specifically in the relationship between group member beliefs and their associated knowledge sharing behaviors, it is possible that individual group member behaviors other than knowledge sharing might manifest from the individual members' sophisticated beliefs. One constraint to the way in which knowledge sharing was conceptualized in the present study is that it was not described as a job-mandated responsibility, nor was it considered a specifically prosocial behavior. Future research could build on my model to determine the degrees to which team member effort-oriented beliefs relate to purely task-oriented behaviors, and alternatively, purely prosocial citizenship behaviors. Second, this framework could also be useful toward building on the front end of George's (1990) notion that affect and emotion exist as a group-level phenomenon, by understanding the cognitions of individual group members, and the relationship between those cognitions and their individual- and group-aggregate emotions. Further, while it is clear from the present study that the context of psychological safety appears to be an important condition under which an individual group member's sophisticated beliefs may manifest as positive behaviors, it is possible that other processes may also moderate the relationship between one's beliefs and their behaviors as a team member. For example, team process variables such as the degree of autonomy that the team has to make decisions, the type of reward structure in place in the team (competitive versus cooperative) (Beersma et al., 2003), or individual variables such as trust of

teammates, emotional intelligence, self-esteem/self-efficacy, self-monitoring, or locus of control might impact the strength of the relationship between a team member's personal cognitive processes and his or her behaviors as a member of the group. Lastly, although the relationships between the transactive memory and group learning constructs and group performance have been established in previous studies, future research could include this ultimate endogenous variable into the structural equation in order to gain a more complete picture of the relationship between individual cognitions and ultimate multilevel outcomes.

### **Implications from the Mentoring Model**

The implication of relating individual cognitive processes to the study of mentoring is that a better understanding of the relationship between these cognitive and behavioral variables could be used to design more effective mentoring relationships. The mentoring model builds on Ajzen and Fishbein's (1970) theory of propositional control in an attempt to explain the process by which individual beliefs and attitudes impact the degrees of vocational and psychosocial mentoring provided by a mentor. The results from the mentoring model highlight the importance of mentor beliefs as antecedents to mentoring behaviors, both directly (to psychosocial mentoring) and indirectly (to vocational mentoring, given the context of a psychologically safe workplace). As such, this study may make a practical contribution, as it focuses attention on a cognitive characteristic that management can influence through training (Nist & Holschuh, 2005).

A few constraints of the mentoring model offer opportunities for future exploration. First, the present study did not differentiate mentors who identified a current or previous subordinate as their protégé from those whose protégés were not a subordinate. As task-oriented support is often considered an in-role behavior for a supervisor, it is possible that the relationship

between a mentor's beliefs and the vocational support he or she provides may more pronounced if the protégé is or was a direct subordinate. Further, the model presented in this study did not distinguish between formal and informal mentoring relationships. Future researchers interested in further exploring the link between mentors' beliefs and the mentoring they provide may wish to distinguish between these two mentoring contexts to determine whether there is any difference with regard to the manifestation of formal and informal mentoring behaviors based on the beliefs of the mentor. Additionally, the present study is limited to capturing mentors' reports of their beliefs and mentoring behaviors. A natural progression from the present study would be to employ matched-pairs analysis (i.e. Edwards & Parry, 1993) to determine whether differences between mentor beliefs and protégés have an impact on the extent of mentoring reported by either party.

### **Toward Organizational Learning Outcomes**

Finally, one potential outcome of having organizational members who hold mature beliefs about the effort involved with regard to knowledge and learning may be the development of organizational environments conducive to learning, or a culture of learning. Whereas my models build on the backbone theory of propositional control (Ajzen & Fishbein, 1975), and suggest that organizational members who hold mature or sophisticated beliefs about knowledge and learning will act on those beliefs and engage in knowledge sharing behaviors at work, it is possible that an organization with a high number of knowledge-sharers may produce an environment conducive to learning. However, studies of organizational culture often suggest that the organization's environmental aspects may drive the attitudes and beliefs of organizational members. Adding this logic to my model, the resulting learning environment may subsequently impact the beliefs held by organizational members, resulting in a spiraling,

recursive learning cycle that continuously strengthens the learning environment at the organization, resulting in a culture of learning. Future research is needed to determine if a large number of individual knowledge sharers do, indeed, impact the learning environment of the organization, and the degree to which the epistemological beliefs of the organizations' members play a role in this process. Additionally, future researchers could examine the existing environment or cultural for learning in an organization as a potential antecedent to member epistemological beliefs about knowledge and learning.

Further, although beyond the scope of the present study, future researchers interested in more macro organizational topics may wish to consider the present study's implications on organizational learning. Fiol and Lyles (1985) define organizational learning as "the process of improving actions through better knowledge and understanding" (p. 803). An environment for learning has been described by these authors as one of four contextual factors that impact the probability that organizational learning may occur (Fiol & Lyles, 1985). Therefore, future researchers may wish to investigate the possibility that by encouraging its members to hold mature or sophisticated epistemological beliefs about knowledge and learning, an organization may be well on its way to promoting learning at the organizational level, as well.

### **Implications for Practice**

A major take-away from the present study is that mature (or sophisticated) group member beliefs about the effort involved in the processes of learning and knowledge acquisition acts as an antecedent to psychosocial mentoring. Therefore, practitioners interested in building supportive mentoring relationships at work should focus on training their members to hold mature beliefs about learning and knowledge acquisition, and the effort involved in these processes. Future research should, therefore, investigate the implementation of training



programs aimed at improving the mature epistemological beliefs of organization members, particularly those who mentor others. As discussed above, Nist and Holschuh (2005) assert that epistemological beliefs about learning are trainable. Indeed, these authors suggest that “providing instruction ... about epistemological beliefs increases ... awareness of their own beliefs and how those beliefs affect everyday decision-making and ... learning” (Nist & Holschuh, 2005, p. 88). Training organizational members to hold mature epistemological beliefs about learning may require us to consider epistemologies in terms of their developmental nature. This is in-line with Moore’s (2002) discussion of deep-level learning, which is, at its core, developmental, as it “involves qualitative changes in the complexity of students’ thinking about and conceptualizations of context-specific subject matter” (p. 26). Therefore, an attempt to train organizational members to hold mature beliefs in this developmental construct would require organizations to focus primarily on applications of and the underlying meanings behind effort-oriented epistemological beliefs; a training attempt which focuses on rote memorization of facts would be geared less toward a developmental learning outcome (Moore, 2002) and may be unlikely to garner benefit in terms of endowing members with the mature beliefs that would be helpful in producing positive outcomes from the organization’s mentors.

Additionally, a better understanding of the impact that epistemological beliefs have in organizational mentoring contexts may allow organizational decision-makers to produce more consistently effective mentoring relationships while promoting relationships among diverse members of the organization. In this regard, decision-makers involved in formal mentoring programs may be able begin to move away from trait-based mentor-protégé matching, and rather focus on identifying the epistemological beliefs of their mentoring participants in order to drive higher results. By concentrating on the learning beliefs held by the mentors, it may be possible

to reduce the potential negative impacts involved when otherwise minimally compatible individuals work together (see Weinberg & Lankau, 2007).

Another important consideration is that this relationship appears to be stronger in organizational environments perceived psychologically safe by the mentors. Further, perceptions of psychological safety in the team appear to have important implications toward individual group member knowledge sharing behaviors, as well. Of particular note is that this study differentiated member perceptions of team- and organization-referent safety. Though highly correlated with one another, these two constructs remain exclusive; this implies that organizational members' perceptions of safety in the overall organization are unique from their feelings regarding the environment for safety within their team. This study's findings that psychological safety impacts team member knowledge sharing behaviors and mentor psychosocial support stress the importance of providing psychologically safe environments – at both the organization and team levels –so that workers may complete their tasks effectively, and ultimately work to benefit their teams and the organization overall. Thus, training managers and supervisors to act in ways that promote a psychologically safe environment for their employees, such as providing climates where such aspects as training, feedback, and trust prevail, could prove valuable toward important organizational outcomes.

Of further consideration is the potential relationship that an organization member's effort-oriented epistemological beliefs may have with the amount of effort that he or she puts into everyday work tasks and prosocial behaviors. This prediction is consistent with Vroom's (1964) conception that an individual's motivation to exert a given amount of effort is a function of that person's expectation that the effort will lead to outcomes of interest and the valence of those outcomes. Mature or sophisticated effort-oriented epistemological beliefs include positive

attitudes regarding the relationships between the effort, exertion, and general ability of an individual to influence work outcomes through such actions, and as such, they are likely to influence the individual's expectation that effort can lead to positive outcomes of interest. Similarly, this rationale is consistent with the notion that an individual's self-efficacy plays a part in regulating their choices and efforts (Bandura, Adams, Hardy, & Howells, 1980), as an organization member's effort-oriented beliefs are likely to influence his or her perception of his or her capacity to perform as required to attain the desired outcomes. An additional strength that may be associated with training members to hold sophisticated effort-oriented beliefs is the potential relationship that effort-oriented beliefs may have with the member's organizational commitment. Mowday, Steers, and Porter (1979) indicate that organizational commitment involves, in part, a willingness by the individual to exert considerable effort on behalf of the organization, and this degree of willingness is likely to be tied to the sophistication of that individual's effort-oriented epistemological beliefs. The preceding rationale further supports the notion that training organizational members to hold more sophisticated beliefs about the effort associated with knowledge and learning could prove useful toward driving greater levels of effort and possibly commitment from these members in their day-to-day behaviors.

Finally, managers could benefit by recognizing that the individual contributions of team members are important factors in contributing to the important group outcomes of having an intact transactive memory system and engaging in a group learning process. These results suggest that organizational decision-makers should encourage all of their members to take on proactive knowledge sharing behaviors when engaged in teamwork so that these objectives may be reached. Thus, organizations that wish to implement work teams as a means toward accomplishing tasks should recognize the importance of individual contributions to these

important team-level outcomes. Future research should, therefore, investigate the possible implementation of training programs aimed at improving the individual knowledge sharing behaviors of organization members, particularly those who work in teams to achieve their work objectives. Further research could also investigate the impact that such individual-behavior focused training has on group outcomes compared to training programs aimed at improving the group-level processes themselves.

Finally, Gibson and Papa (2000) have expressed the need for more research to explore communication practices that uniquely manifest among blue-collar workers, and to this end, the present study contributes to this sparse literature by presenting implications that offer specific guidance with regard to the management of a primarily blue-collar workforce. First, blue-collar workers, such as the majority of the participants in the present study, tend to work in fields that traditionally learn through apprenticeship-type experiences. As such, the practical importance of providing supportive mentors to blue-collar workers has been relatively well established over the years. Thus, given the importance of mentoring in a blue-collar workplace context, this study provides managers of blue-collar workers with a starting place from which to begin building supportive mentoring relationships among their employees. Specifically, the finding that mentor beliefs about the effort involved in knowledge and learning processes impacts the degree of mentoring support they provide indicates that organizations may benefit from placing their less experienced workers (potential protégés) in work groups that consist of existing experienced members (potential mentors) who tend to hold more sophisticated effort-oriented epistemological beliefs.

Of further note, this study brought attention to the important role that employees' perceptions of psychological safety play toward important outcomes within the study's primarily

blue-collar work context. Specifically, the findings indicated that member beliefs did not have an impact on vocational mentoring or team member knowledge sharing behaviors except under the condition of perceived psychological safety by the member. It is possible, however, that the finding of a significant psychological safety moderation effect following the finding of these two nonsignificant direct relationships might indicate a particularly distinctive impact of psychological safety pertaining to a blue-collar work setting. Generally, blue-collar workers employed in industrial settings are often assigned specific hands-on tasks that they must complete. As such, the type of hands-on work often associated with blue-collar professions may tend to have a more task-specific connotation, as opposed to the more flexible ways in which white-collar workers may be allowed or expected to perform their jobs. Thus, it is possible that the task-specific nature of blue-collar work may exclude such behaviors as knowledge sharing in teams and exhibiting behaviors associated with mentoring from a blue-collar worker's in-role expectations. In such an instance, the workers would assume that these behaviors are extra-role in nature (outside of their specific job expectation), and so motivational factors such as their perceptions of psychological safety may become increasingly important toward their exhibition of such behaviors. Therefore, if managers of blue-collar workers are interested in obtaining knowledge-sharing behaviors from their employees, and achieving the positive outcomes associated with such behaviors, it appears essential that these managers work to build and ensure psychologically safe environments at both the team and organizational levels.

## **Conclusion**

The present study proposes a social-constructivist outlook on the way in which a unique subset of epistemological beliefs about knowledge and learning held by organizational team members fundamentally impacts the degree of knowledge sharing that takes place in both team

and mentoring contexts. Although the teams model did not appear to be directly affected by an individual's effort-oriented epistemological beliefs, the mentoring model shows that one's beliefs may play an important role in determining the degree of psychosocial support a mentor provides to his or her protégé. Further, this study revealed that a team's transactive memory system appears to be stronger when members engage in aggregately greater levels of knowledge sharing behaviors. However, this relationship is enhanced in teams in which the members report dissimilar behaviors from one another. Essentially, the findings herein offer a preliminary indication that organizations may gain insight into the processes through which knowledge sharing in workgroups and mentoring relationships come about by understanding the individual cognitive processes engaged in by the individual team members. It is hoped that the ideas presented and organized in the present study will stimulate further discussion regarding the usefulness for organizational decision-makers to understand and foster an environment in which the unique attributes of their members, including the members' personal epistemologies and their individual contributions to aggregate knowledge sharing outcomes, are valued and enhanced so as to ultimately achieve higher-level organizational objectives.

## NOTES

- <sup>1.</sup> Although some researchers distinguish between the terms “group” and “team,” the present study takes an approach similar to Ancona (1990), Guzzo and Dickson (1996), and Webber and Donahue’s (2001) meta-analysis, where these terms are used interchangeably.
- <sup>2.</sup>  $\chi^2/df$  = normed chi-square ( $\chi^2$  divided by degrees of freedom); CFI = Comparative Fit Index  
RMSEA = Root Mean Square Error of Approximation, and SRMR = Standardized Root Mean Square Residual
- <sup>3.</sup> A constraint of the Mplus program is that it does not produce standardized path coefficients for interaction models, as Mplus cannot run models with interaction effects without specifying a random analysis type, yet when random effects are specified, the program will not calculate standardized path coefficients. Further, the variance for the interaction terms are not included in the Mplus output; thus disallowing me to calculate the standardized path coefficients using the formula  $\text{StdYX}(b) = b * (\text{SD}_X / \text{SD}_Y)$ ; where  $\text{StdYX}(b)$  is the standardized path coefficient,  $b$  is the unstandardized path coefficient, and  $\text{SD}_X$  and  $\text{SD}_Y$  represent the standard deviations of variables  $x$  and  $y$  respectively. Thus, any reports of path coefficients in models in which an interaction term represents a moderation path will report unstandardized path coefficients. Constraints associated with reporting unstandardized path coefficients are discussed in the Discussion section.
  - <sup>a.</sup> Items expected to represent the following constructs: KS = individual knowledge sharing behavior in a team setting. GP = group process construct (Campion et al., 1993), including the following four dimensions: P = potency; SS = social support; WS = workload sharing; CC = communication and cooperation
  - <sup>b.</sup> Two-tailed tests of significance are reported.  
Pearson’s  $r$  was reported for the pairs of continuous variables, and the nonparametric Spearman Rho was reported for pairs with at least one categorical variable.  
These coefficients represent the modified measurement instruments for the constructs of Psychological Safety (team and organization), Group Learning, and Vocational and Psychosocial Mentoring, as required to fit the measurement model (see details below).  
\*  $p < .05$   
\*\*  $p < .01$   
\*\*\*  $p < .001$
  - <sup>c.</sup> Asterisks (\*) indicates an item that has been retained in the Effort-Oriented Beliefs Construct

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## APPENDIX A

### MEASURES USED FOR EMPIRICAL ANALYSIS

#### Schraw, Dunkle, & Bendixen (1995)<sup>c</sup>

##### Epistemic Belief Inventory

(1-5: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

(Modified for Businesspeople)

The letters following each statement represents the factor to which the item belongs.

IA = Fixed (innate) ability; CK = Certain knowledge; OA = Omniscient authority; SK = Simple knowledge; QL = Speed of (Quick) Learning.

® = *Reverse-scored. Except in the case of reverse-scored items, strong agreement with these statements represents less sophisticated beliefs, whereas strong disagreement with these statements represents mature or sophisticated beliefs.*

1. It bothers me when supervisors don't tell subordinates the answers to complicated problems (SK)
2. Truth means different things to different people (CK)
3. Employees who learn things quickly are the most successful (IA)
4. People should always obey the law (OA)
5. Some people will never be smart no matter how hard they work (IA)
6. Absolute moral truth does not exist (CK) ®
7. Parents should teach their children all there is to know about life (OA)
8. \*Really smart employees don't have to work as hard to do as well (IA)
9. \*A person who tries too hard to understand a problem will just end up being confused (QL)
10. \*Too many theories just complicate things (SK)
11. The best ideas are often the most simple (SK)
12. \*People can't do very much about their ability to perform any given task (IA)
13. Managers should focus on facts instead of theories (SK)
14. I like managers who present several competing theories and let their employees decide which is best (CK)
15. \*How well you do at work depends on how smart you are (IA)
16. \*If you don't learn something quickly, you won't ever learn it (QL)
17. Some people just have a knack for learning and others don't (IA)
18. Things are simpler than most managers claim they are (SK)
19. If two people are arguing about something, at least one of them must be wrong (CK)
20. Children should be allowed to question their parents' authority (OA) ®
21. \*If you haven't understood project instructions the first time through, going back over them won't help (QL)
22. \*Science is easy to understand because it contains so many facts (QL)
23. The moral rules I live by apply to everyone (CK)
24. The more you know about a topic, the more there is to know (SK)
25. What is true today will be true tomorrow (CK)

26. Smart people are born that way (IA)
27. When someone in authority tells me what to do, I usually do it (OA)
28. People who question authority are trouble makers (OA) ®
29. \*Working on a problem with no quick solution is a waste of time (QL)
30. You can understand something for years and still not really understand it (QL) ®
31. Sometimes there are no right answers to life's big problems (CK) ®
32. Some people are born with special gifts and talents (IA)

### **Individual Knowledge-Sharing Behaviors**

#### **Original Scale**

(1-5: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. In my current work group, I have shared my own specialized knowledge with my coworkers.
2. I often listen to ideas expressed by other members of my group.
3. I often encourage and/or participate in brainstorming activities.
4. I often attempt to improve team work processes.
5. I often contribute to group discussions.
6. I encourage coworkers to share their ideas.

### **Lewis, 2003**

#### **Transactive Memory System Scale**

(1-5: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

#### *Specialization*

1. Each team member has specialized knowledge of some aspect of our project
2. I have knowledge about an aspect of the project that no other member has
3. Different team members are responsible for expertise in different areas
4. The specialized knowledge of several different team members was needed to complete the project deliverables
5. I know which team members have expertise in specific areas

#### *Credibility*

1. I was comfortable accepting procedural suggestions from other team members
2. I trusted that other members' knowledge about the project was credible
3. I was confident relying on the information that other team members brought to the discussion
4. When other members gave information, I wanted to double-check it for myself ®
5. I did not have much faith in other members' "expertise" ®

#### *Coordination*

1. Our team worked together in a well-coordinated fashion
2. Our team had very few misunderstandings about what to do
3. Our team needed to backtrack and start over a lot ®
4. We accomplished the task smoothly and efficiently
5. There was much confusion about how we would accomplish the task ®



**Edmondson, 1999**

**Team Learning Behavior Scale**

(1-7 from “very inaccurate” to “very accurate”)

1. We regularly take time to figure out ways to improve our team’s work processes
2. This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group
3. Team members go out and get all the information they possibly can from others – such as customers, or other parts of the organization
4. This team frequently seeks new information that leads us to make important changes
5. In this team, someone always makes sure that we stop to reflect on the team’s work process
6. People in this team often speak up to test assumptions about issues under discussion
7. We invite people from outside the team to present information or have discussions with us

**Edmondson (1999)**

**Team Psychological Safety Scale**

(1-7 from “very inaccurate” to “very accurate”)

1. If you make a mistake on this team, it is often held against you ®
2. Members of this team are able to bring up problems and tough issues
3. People on this team sometimes reject others for being different ®
4. It is safe to take a risk on this team
5. It is difficult to ask other members of this team for help ®
6. No one on this team would deliberately act in a way that undermines my efforts
7. Working with members of this team, my unique skills and talents are valued and utilized

**Noe (1988), adapted by Allen (2003) for mentor perspective and worded for an organizational, rather than academic context**

**Mentoring Functions Scale**

(1-5, where 1 = to a very slight extent, and 5 = to a very large extent)

Please indicate the extent that you engaged in the following behaviors:

*Career/Vocational*

1. Reduced unnecessary risks that could threaten the possibility of this person receiving a promotion.
2. Helped this person finish assignments/tasks or meet deadlines that otherwise would have been difficult to complete.
3. Helped this person meet new colleagues.
4. Gave this person assignments that increased written and personal contact with senior management.

5. Assigned responsibilities to this person that increased his or her contact with people in the organization who could judge his or her potential for future advancement.
6. Gave this person assignments or tasks that prepared him/her for promotion.
7. Gave this person assignments that presented opportunities to learn new skills.

*Psychosocial*

1. Shared history of your own career with him or her.
2. Encouraged this person to prepare for advancement.
3. Encouraged this person to try new behaviors in his/her job.
4. Demonstrated good listening skills in conversations with this person.
5. Discussed questions or concerns this person may have had regarding feelings of competence, commitment to advancement, relationships with peers and supervisors, or work/family conflicts.
6. Shared your personal experiences as an alternative perspective to this person's problems.
7. Encouraged him or her to talk openly about anxiety and fears that distract from his/her work.
8. Conveyed empathy for the concerns and feelings that he or she discussed with you.
9. Kept feelings and doubts this person shared with you in strict confidence.
10. Conveyed feelings of respect for this person as an individual.

## APPENDIX B

### CONTENT ADEQUACY ASSESSMENT QUESTIONNAIRE

#### **Knowledge Sharing**

Members of teams may hold different beliefs about the nature of knowledge. It is possible that these members' beliefs may impact their own individual knowledge-sharing behaviors and, ultimately the outcomes to the team as a whole. This idea implies that knowledge sharing in groups occurs as behaviors by individual team members and as processes by the group as a whole.

*Please make note of the distinct definitions below:*

#### **Individual Knowledge Sharing Behaviors (in a team context) —**

Behaviors in which a person engages which should enhance knowledge exchange among team members.

**Potency (Spirit)** — The belief by a group that it can be effective; similar to “team spirit”

**Social Support** — Members help each other and have positive social interactions

**Workload Sharing** — Team members share the work so that social loafing, or free-riding, are prevented

**Communication/Cooperation within the Work Group** — Group members communicate and cooperate with one another

**Other** — If you believe that the response cannot be easily coded using the existing categories, indicate the extent to which you believe the following statements are characteristic of another category not captured by the categories provided above.

Below is a list of processes and behaviors in which team members engage. Using the scale below, please rate each response in terms of how characteristic it is of the identified categories. (Note: Please refer to the descriptions provided for each of these categories). Further, please note that some of the statements are written negatively (i.e. “this member does not share knowledge) — for these items, please indicate how characteristic it is of negatively representing the given category.

Using the following scale, please indicate the extent to which you feel the following statements are characteristic of individual knowledge sharing.

1 Not at all Characteristic	2 Slightly Characteristic	3 Somewhat Characteristic	4 Moderately Characteristic	5 Very Characteristic
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### **Individual Knowledge Sharing Behaviors (in a team context) —**

Behaviors in which a person engages which should enhance knowledge exchange among team members.

*Individual  
Knowledge-  
Sharing  
Behaviors i(n a  
Team Context)*

Everyone on my team does their fair share of the work	
This team member shares his or her own specialized knowledge with teammates	
Members of my team have great confidence that the team can perform effectively	
This team member encourages and/or participates in brainstorming activities	
Members of my team are very willing to share information with other team members about our work	
No one in my team depends on other team members to do the work for them	
This team member often does not listen to ideas expressed by others	
Being in my team gives me the opportunity to work in a team and provide support to other team members	
This team member often distrusts the credibility of other members' knowledge	
My team can take on nearly any task and complete it	
My team increases my opportunities for positive social interaction	
Teams enhance the communication among people working on the same product	
This team member works toward effectively coordinating team interactions	
This team member attempts to improve team work processes	
This team member collects all the information he/she can from others – such as from customers or from other parts of the organization	
Members of my team help each other out at work when needed	
This team member seeks new information that may lead to important changes	
My team has a lot of spirit	
This team member contributes to group discussions	
Members of my team cooperate to get the work done	
This group member comes up with a lot of ideas	
This group member encourages others to share ideas	
Nearly all members on my team contribute equally to the work	

Using the following scale, please indicate the extent to which you feel the following statements are characteristic of team potency (spirit).

1 Not at all Characteristic	2 Slightly Characteristic	3 Somewhat Characteristic	4 Moderately Characteristic	5 Very Characteristic
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Potency (Spirit) – The belief by a group that it can be effective; similar to “team spirit”	Team Potency (Spirit)
Everyone on my team does their fair share of the work	
This team member shares his or her own specialized knowledge with teammates	
Members of my team have great confidence that the team can perform effectively	
This team member encourages and/or participates in brainstorming activities	
Members of my team are very willing to share information with other team members about our work	
No one in my team depends on other team members to do the work for them	
This team member often does not listen to ideas expressed by others	
Being in my team gives me the opportunity to work in a team and provide support to other team members	
This team member often distrusts the credibility of other members’ knowledge	
My team can take on nearly any task and complete it	
My team increases my opportunities for positive social interaction	
Teams enhance the communication among people working on the same product	
This team member works toward effectively coordinating team interactions	
This team member attempts to improve team work processes	
This team member collects all the information he/she can from others – such as from customers or from other parts of the organization	
Members of my team help each other out at work when needed	
This team member seeks new information that may lead to important changes	
My team has a lot of spirit	
This team member contributes to group discussions	
Members of my team cooperate to get the work done	
This group member comes up with a lot of ideas	
This group member encourages others to share ideas	
Nearly all members on my team contribute equally to the work	

Using the following scale, please indicate the extent to which you feel the following statements are characteristic of social support.

1 Not at all Characteristic	2 Slightly Characteristic	3 Somewhat Characteristic	4 Moderately Characteristic	5 Very Characteristic
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Social Support – Members help each other and have positive social interactions		Social Support
Everyone on my team does their fair share of the work		
This team member shares his or her own specialized knowledge with teammates		
Members of my team have great confidence that the team can perform effectively		
This team member encourages and/or participates in brainstorming activities		
Members of my team are very willing to share information with other team members about our work		
No one in my team depends on other team members to do the work for them		
This team member often does not listen to ideas expressed by others		
Being in my team gives me the opportunity to work in a team and provide support to other team members		
This team member often distrusts the credibility of other members’ knowledge		
My team can take on nearly any task and complete it		
My team increases my opportunities for positive social interaction		
Teams enhance the communication among people working on the same product		
This team member works toward effectively coordinating team interactions		
This team member attempts to improve team work processes		
This team member collects all the information he/she can from others – such as from customers or from other parts of the organization		
Members of my team help each other out at work when needed		
This team member seeks new information that may lead to important changes		
My team has a lot of spirit		
This team member contributes to group discussions		
Members of my team cooperate to get the work done		
This group member comes up with a lot of ideas		
This group member encourages others to share ideas		
Nearly all members on my team contribute equally to the work		

Using the following scale, please indicate the extent to which you feel the following statements are characteristic of workload sharing (sharing the work).

1 Not at all Characteristic	2 Slightly Characteristic	3 Somewhat Characteristic	4 Moderately Characteristic	5 Very Characteristic
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<b>Workload Sharing</b> – Team members share the work so that social loafing, or free-riding, are prevented		Workload Sharing (Sharing the work)
Everyone on my team does their fair share of the work		
This team member shares his or her own specialized knowledge with teammates		
Members of my team have great confidence that the team can perform effectively		
This team member encourages and/or participates in brainstorming activities		
Members of my team are very willing to share information with other team members about our work		
No one in my team depends on other team members to do the work for them		
This team member often does not listen to ideas expressed by others		
Being in my team gives me the opportunity to work in a team and provide support to other team members		
This team member often distrusts the credibility of other members' knowledge		
My team can take on nearly any task and complete it		
My team increases my opportunities for positive social interaction		
Teams enhance the communication among people working on the same product		
This team member works toward effectively coordinating team interactions		
This team member attempts to improve team work processes		
This team member collects all the information he/she can from others – such as from customers or from other parts of the organization		
Members of my team help each other out at work when needed		
This team member seeks new information that may lead to important changes		
My team has a lot of spirit		
This team member contributes to group discussions		
Members of my team cooperate to get the work done		
This group member comes up with a lot of ideas		
This group member encourages others to share ideas		
Nearly all members on my team contribute equally to the work		

Using the following scale, please indicate the extent to which you feel the following statements are characteristic of communication/cooperation within the work group.

1 Not at all Characteristic	2 Slightly Characteristic	3 Somewhat Characteristic	4 Moderately Characteristic	5 Very Characteristic
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<b>Communication/Cooperation within the Work Group –</b> Group members communicate and cooperate with one another		Communication /Cooperation within the Work Group
Everyone on my team does their fair share of the work		
This team member shares his or her own specialized knowledge with teammates		
Members of my team have great confidence that the team can perform effectively		
This team member encourages and/or participates in brainstorming activities		
Members of my team are very willing to share information with other team members about our work		
No one in my team depends on other team members to do the work for them		
This team member often does not listen to ideas expressed by others		
Being in my team gives me the opportunity to work in a team and provide support to other team members		
This team member often distrusts the credibility of other members' knowledge		
My team can take on nearly any task and complete it		
My team increases my opportunities for positive social interaction		
Teams enhance the communication among people working on the same product		
This team member works toward effectively coordinating team interactions		
This team member attempts to improve team work processes		
This team member collects all the information he/she can from others – such as from customers or from other parts of the organization		
Members of my team help each other out at work when needed		
This team member seeks new information that may lead to important changes		
My team has a lot of spirit		
This team member contributes to group discussions		
Members of my team cooperate to get the work done		
This group member comes up with a lot of ideas		
This group member encourages others to share ideas		
Nearly all members on my team contribute equally to the work		



Using the following scale, please indicate the extent to which you feel the following statements are characteristic of another category.

1 Not at all Characteristic	2 Slightly Characteristic	3 Somewhat Characteristic	4 Moderately Characteristic	5 Very Characteristic
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**Other** – If you believe that the response cannot be easily coded using the existing categories, indicate the extent to which you believe the following statements are characteristic of another category not captured by the categories provided above.

*Other*

Everyone on my team does their fair share of the work	
This team member shares his or her own specialized knowledge with teammates	
Members of my team have great confidence that the team can perform effectively	
This team member encourages and/or participates in brainstorming activities	
Members of my team are very willing to share information with other team members about our work	
No one in my team depends on other team members to do the work for them	
This team member often does not listen to ideas expressed by others	
Being in my team gives me the opportunity to work in a team and provide support to other team members	
This team member often distrusts the credibility of other members' knowledge	
My team can take on nearly any task and complete it	
My team increases my opportunities for positive social interaction	
Teams enhance the communication among people working on the same product	
This team member works toward effectively coordinating team interactions	
This team member attempts to improve team work processes	
This team member collects all the information he/she can from others – such as from customers or from other parts of the organization	
Members of my team help each other out at work when needed	
This team member seeks new information that may lead to important changes	
My team has a lot of spirit	
This team member contributes to group discussions	
Members of my team cooperate to get the work done	
This group member comes up with a lot of ideas	
This group member encourages others to share ideas	
Nearly all members on my team contribute equally to the work	

*Thank you for your participation!*

**Please provide your e-mail below if you are interested in learning about the results of the final study after it's conducted:**

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APPENDIX C:  
SURVEY INSTRUMENT

**Survey**

*A joint project between* [REDACTED]  
[REDACTED]  
and the  
**Terry College of Business**



**UNIVERSITY OF GEORGIA SURVEY: KNOWLEDGE SHARING  
AMONG [REDACTED] EMPLOYEES**

**FALL 2009**

**PLEASE READ THE FOLLOWING CONSENT FORM,  
AND ACKNOWLEDGE THAT YOU AGREE TO PARTICIPATE IN THIS SURVEY**

Thank you for taking the time to assist with my dissertation research. This study is run in conjunction with the Human Resources office of the [REDACTED]. The purpose of this study is to investigate the factors that influence knowledge sharing in the [REDACTED]. It should take approximately 20 minutes to complete.

Please be assured that responses to survey questions will remain confidential and be reported only in summary form for research purposes. Once the completed surveys are received, any information that is obtained in connection with this study and that can be identified with you will remain confidential except as required by law. All records pertaining to your participation will be kept in a password-protected computer. It should be noted that Internet communications are insecure. There is a limit to the confidentiality that can be guaranteed due to the technology itself. If you are not comfortable with the level of confidentiality provided by the Internet, please feel free to print out a copy of the survey, fill it out by hand, and mail it to me at the address given below, with no return address on the envelope.

Your participation is voluntary and by completing the survey you are indicating your informed consent to participate in this research and that you are 18 years old or over. No discomfort or risks are foreseen by participating in this study. You may skip any questions you are uncomfortable answering, and closing the survey window at any time will discard all responses to survey questions. You may refuse to participate or stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

It is hoped that this study will allow organizations to gain a better understanding of some antecedents that bring about knowledge-sharing behaviors in the workplace, thus revealing potential guidelines for the selection and training of members for participation in activities where knowledge sharing is crucial. You will have the opportunity to provide an e-mail address if you are interested in having the researchers provide you with the results of the final study after it has been analyzed.

Please contact the researchers with any questions you may have about the project (contact information is below). Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 612 Boyd GSRC, Athens, Georgia 30602-7411; telephone (706) 542-3199; email address irb@uga.edu.

Thank you for your consideration! Please print and keep this letter for your records.

Sincerely,  
Frankie J. Weinberg

Frankie J. Weinberg  
University of Georgia  
Department of Management  
Brooks Hall, Room 419  
Athens, Georgia 30602  
Phone: 716-359-0026  
Email: obphd@uga.edu

Faculty Advisor  
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Athens, Georgia 30602  
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**PLEASE CHECK THE BOX BELOW TO AGREE TO PARTICIPATE IN THE SURVEY.**

☐ I agree to participate in the above described research project.

**Name** \_\_\_\_\_  \_\_\_\_\_

**We will begin by collecting some background data about you and your work group.**

**Please enter your age (in years)**

\_\_\_\_\_

**Please indicate your gender**

- ☐ Male  
☐ Female

**What is your race?**

- |   |   |
|---|---|
| <input type="checkbox"/> White/Caucasian  | <input type="checkbox"/> Native American  |
| <input type="checkbox"/> African American | <input type="checkbox"/> Pacific Islander |
| <input type="checkbox"/> Hispanic         | <input type="checkbox"/> Other            |
| <input type="checkbox"/> Asian            |   |

**What is the highest level of education you have completed?**

- ☐ Less than High School  
☐ High School / GED  
☐ Some College  
☐ 2-year College Degree  
☐ 4-year College Degree  
☐ Master's Degree  
☐ Doctoral Degree  
☐ Professional Degree (JD, MD)

**Please indicate your total amount of work experience in years (any work experience counts):**

---

**How many total years have you worked at the [REDACTED]?**

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**How long have you been a member of your current work group? (in years)**

---

**Which of the following selections best describes your current work group?**

- ☐ A relatively permanent team in which the same members tend to work continuously together on multiple different projects
- ☐ A temporary project team (you do not expect to have a long-term continuous working relationship with your current teammates)
- ☐ A hybrid team which includes some permanent members and some temporary members

**In this section (this page and the next page), you will be asked a series of questions about your own personal general beliefs about knowledge and learning. THERE ARE NO RIGHT OR WRONG ANSWERS. Please just indicate how much you generally agree with each statement.**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
It bothers me when supervisors don't tell employees the answers to complicated problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Truth means different things to different people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employees who learn things quickly are the most successful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People should always obey the law.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some people will never be smart, no matter how hard they work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Absolute moral truth does not exist. (Nothing is universally true for all time and in all societies)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parents should teach their children all there is to know about life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Really smart employees don't have to work as hard to do well at work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If a person tries too hard to understand a problem, they will most likely end up being confused.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many ideas just complicate things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The best ideas are often the most simple.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People can't do very much about how smart they are.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supervisors should focus on facts instead of theories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like supervisors who present several competing ideas and let their employees decide which is best.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How well you do at work depends on how smart you are.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you don't learn something quickly, you won't ever learn it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(Continued from the previous page)

Again, please indicate how much you generally agree with each of the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Some people just have a knack for learning, and others don't.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Things are simpler than most supervisors would have you believe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If two people are arguing about something, at least one of them must be wrong.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Children should be allowed to question their parents' authority.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you haven't understood instructions the first time through, going back over them won't help.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Science is easy to understand because it contains so many facts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The moral rules I live by apply to everyone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more you know about a topic, the more there is to know.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What is true today will be true tomorrow.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smart people are born that way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When someone in authority tells me what to do, I usually do it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People who question authority are trouble makers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working on a problem with no quick solution is a waste of time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
You can study something for years and still not really understand it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes there are no right answers to life's big problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some people are born with special gifts and talents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**This next set of questions asks about the opportunities that you have had to share knowledge with your coworkers in your current work group. Please indicate how much you agree with each of the following statements.**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
In my current work group, I have shared my own specialized knowledge with my coworkers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often listen to ideas expressed by other members of my group.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often encourage and/or participate in brainstorming activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often attempt to improve team work processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often contribute to group discussions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I encourage coworkers to share their ideas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**This next section asks questions regarding the overall learning and knowledge sharing that occur within your work group. So, as you answer these next questions, consider what goes on in your work group as a whole. Please indicate the extent to which you believe the following statements are true regarding the work group that you are currently a part of.**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Each team member has specialized knowledge of some aspect of our project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have knowledge about an aspect of team projects that no other member has.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Different team members are responsible for expertise in different areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The specialized knowledge of several different team members is needed to complete project deliverables.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know which team members have expertise in specific areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am comfortable accepting procedural suggestions from other team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I trust that other members' knowledge about a project is credible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am confident relying on the information that other team members bring to the discussion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When other members give information, I do not feel that I have to double-check it for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have a great deal of faith in other members' expertise.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our team works together in a well-coordinated fashion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our team has very few misunderstandings about what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our team does not need to backtrack and start over much.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We accomplish our tasks smoothly and efficiently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is often very little confusion about how we will accomplish a task.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Again, please indicate the extent to which you believe the following statements are accurate regarding the work group that you are currently a part of.**

	Very Inaccurate	Mostly Inaccurate	Somewhat Inaccurate	Neither Accurate nor Inaccurate	Somewhat Accurate	Mostly Accurate	Very Accurate
We regularly take time to figure out ways to improve our team's work processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members go out and get all the information they possibly can from others - such as customers, or other parts of the organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This team frequently seeks new information that leads us to make important changes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In this team, someone always makes sure that we stop to reflect on the team's work process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People in this team often speak up to test assumptions about issues under discussion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We invite people from outside the team to present information or have discussions with us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The following sets of questions ask you to consider how comfortable you feel speaking out in the workplace. First, you will be asked to consider factors of your current work group that impact how safe you feel to speak out without the fear of negative consequences to your self-image, status, or career. Then, you will be asked to answer the same questions, but considering the organization as a whole, not just your group. PLEASE REMEMBER THAT YOUR ANSWERS WILL BE KEPT STRICTLY CONFIDENTIAL - only a summary report of the overall findings will be shared.

**CONSIDER YOUR CURRENT WORK GROUP:** Please indicate the degree to which the following statements accurately depict your perceptions of your current work group.

	Very Inaccurate	Mostly Inaccurate	Somewhat Inaccurate	Neither Accurate nor Inaccurate	Somewhat Accurate	Mostly Accurate	Very Accurate
If you make a mistake on this team, it is often held against you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of my team are able to bring up problems and tough issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People on my team sometimes reject others for being different.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is safe to take a risk on this team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult to ask other members of my team for help.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No one on my team would deliberately act in a way that undermines my efforts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working with members of this team, my unique skills and talents are valued and utilized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**NOW CONSIDER THE ORGANIZATION AS A WHOLE: Please indicate how much you agree that following statements accurately depict your perception of the organization as a whole.**

	Very Inaccurate	Mostly Inaccurate	Somewhat Inaccurate	Neither Accurate nor Inaccurate	Somewhat Accurate	Mostly Accurate	Very Accurate
If you make a mistake in this organization, it is often held against you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Members of this organization are able to bring up problems and tough issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People in this organization sometimes reject others for being different.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is safe to take a risk in this organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult to ask other members of this organization for help.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No one in this organization would deliberately act in a way that undermines my efforts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working with members of this organization, my unique skills and talents are valued and utilized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**For this final section of the survey, consider all the people less experienced than yourself whose careers you have influenced in a positive way over the last few years, even those individuals who have never directly reported to you. Choose one individual with whom you have shared an especially close relationship and whose career you have influenced the most. Remember – this could be someone you presently supervise, someone you have supervised in the past, or even someone you have never supervised directly. Please answer the following questions with this individual and relationship in mind. If you are not currently active in this individual's career, describe the relationship you had with this person at that point in time when you were actively involved in his or her career.**

**Please indicate the extent that you engaged in the following behaviors toward this less experienced person.**

	To No Extent	To a Slight Extent	To Some Extent	To a Large Extent	To a Great Extent
Reduced unnecessary risks that could threaten the possibility of this person receiving a promotion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helped this person finish assignments/tasks or meet deadlines that otherwise would have been difficult to complete.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helped this person meet new colleagues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gave this person assignments that increased written and personal contact with senior management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assigned responsibilities to this person that increased his or her contact with people in the organization who could judge his or her potential for future advancement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gave this person assignments or tasks that prepared him/her for promotion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gave this person assignments that presented opportunities to learn new skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shared history of your own career with him or her.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encouraged this person to prepare for advancement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encouraged this person to try new behaviors in his/her job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrated good listening skills in conversations with this person.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discussed questions or concerns this person may have had regarding feelings of competence, commitment to advancement, relationships with peers and supervisors, or work/family conflicts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shared your personal experiences as an alternative perspective to this person's problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encouraged him or her to talk openly about anxiety and fears that distract from his/her work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conveyed empathy for the concerns and feelings that he or she discussed with you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kept feelings and doubts this person shared with you in strict confidence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conveyed feelings of respect for this person as an individual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

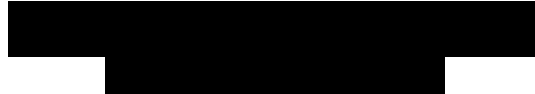
If you are interested in having the researchers provide you with the results of the final study after it has been analyzed, please type your e-mail into the blank space below. If you are not interested, please leave this question blank. *(Please note that any e-mail information provided will be recorded separately from your previous responses to assure the confidentiality of your survey responses).*

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Thank you very much for your participation!



Your participation in this study is greatly appreciated, as it will jointly benefit the



and  
the Terry College of Business