EMERGENT PHENOMENA IN MULTITEAM SYSTEMS: AN EXAMINATION OF BETWEEN-TEAM COHESION

by

Gia Adele DiRosa
A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Psychology

Committee:

______________________________ Director

____

____

____

______________________________ Department Chair

______________________________ Program Director

______________________________ Dean, College of Humanities and Social Sciences

Date: __________________________ Spring Semester 2013
George Mason University
Fairfax, VA

Emergent Phenomena in Multiteam Systems: An Examination of Between-Team Cohesion

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason University

by

Gia Adele DiRosa
Master of Arts
George Mason University, 2009

Director: Stephen J. Zaccaro, Professor
Department of Psychology

Spring Semester 2013
George Mason University
Fairfax, VA

DEDICATION

I dedicate this achievement to my parents. This, and everything I do, is because of you.

ACKNOWLEDGEMENTS

I would like to thank the many people that made this dissertation possible. First, a heartfelt thank you to my advisor, Dr. Steve Zaccaro, for all he has taught me over the past few years. Steve, the lessons I have learned from working with you are invaluable, and I know that they will continue to serve me throughout my career. Thank you for all of your hard work in helping me to accomplish this goal.

I am so grateful to Dr. Jay Goodwin for giving me the opportunity to grow as a researcher and pursue this dissertation in such a supportive and collaborative environment. Jay, you have taught me how to think for myself, and instilled in me a desire for the pursuit of ‘good science’. I would also like to thank my ARI colleagues for all of their support, advice, and encouragement throughout this process.

Thank you to my committee members, Drs. Seth Kaplan and Michelle Marks, as well as Dr. Leslie DeChurch, for your insights and contributions. Your input into this work has been immeasurable, and I am grateful to all of you for helping me create something of which I am very proud.

To the friends I have made on this journey: Thank you for making the past few years some of the best in my life. When I look back on graduate school, memories of deadlines and exams will be overshadowed by the amazing times we shared. Jimmy, thank you for providing me with laughter, encouragement, and motivation while I completed this work. Your patience and positive attitude kept me going through this entire process.

Finally, thank you to my parents, Joe and Dawn. Your unwavering belief in me and my abilities has sustained me in everything that I have set out to achieve. As you both know, I was captivated early on by a young girl in a fabulous pair of shoes who told me, “There is no place like home.” Now that I have been away from home for many years, I understand that her sentiment does not lie in a house or a city, but in the people residing therein. If that’s home, then it feels like I never left.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

EMERGENT PHENOMENA IN MULTITEAM SYSTEMS: AN EXAMINATION OF BETWEEN-TEAM COHESION

Gia Adele DiRosa, Ph.D.

George Mason University, 2013

Dissertation Director: Dr. Stephen J. Zaccaro

The current dissertation explored the emergent state of cohesion through the lens of multiteam system (MTS) functioning. Although MTSs are prevalent in today's organizational force, we know little about how interactions between their component teams create emergent phenomena within these systems. Because cohesion plays a critical role in functioning at the team-level, its manifestation between teams will be vital for a more nuanced understanding of the cross-team processes that occur within MTSs. In the current study, surveys were administered to active duty Soldiers and leaders in U.S. Army platoons in order to investigate the development and consequences of cohesion among component teams (i.e., squads) in a MTS (i.e., platoon). Findings indicate that (1) perceptions of between-team cohesion are associated with a distinct pattern among between-team interdependence, goal alignment, and leader boundary spanning; (2) perceptions of within-squad cohesion demonstrate a curvilinear association with

perceptions of the cohesion between squads; and (3) perceptions of between-squad cohesion were not significantly associated with the platoon's level of combat readiness. Limitations of the study, as well as theoretical and practical implications are discussed in the conclusion of the work.

CHAPTER ONE: INTRODUCTION

Given the complexity of the current work environment, multiteam systems (MTSs) are becoming more prevalent in modern organizations (Williams & Mahan, 2006). MTSs represent a network of distinct yet interdependent component teams whose goals and efforts combine to achieve a superordinate objective (DeChurch & Mathieu, 2009; Mathieu, Marks & Zaccaro, 2001; Zaccaro, Marks, & DeChurch, 2012). This structure allows organizations to accomplish goals that could not be achieved by a solitary team, while avoiding the pitfalls associated with employing a single large and unwieldy unit (Davison, Hollenbeck, Barnes, Sleesman, & Ilgen, 2012; Hackman, 2002). Despite their proliferation in the workplace, MTSs are rarely the focal level of analysis in theory or research (DeChurch & Mathieu, 2009; DeChurch & Zaccaro, 2010). As a result, much of what we know regarding MTSs stems from analysis of small groups and teams (Hackman, 2003; DeChurch & Zaccaro, 2010). While the teams literature can provide a foundation for MTS research (DeChurch & Marks, 2006; DeChurch & Zaccaro, 2010), the simultaneous within- and between-team functioning inherent in MTSs creates more complex dynamics than those observed at the team level. This added layer of complexity precludes us from isomorphically applying theories and findings from the team literature to the MTS domain. Instead, it requires that many familiar team constructs be systematically re-conceptualized and empirically examined through the lens of MTS theory (DeChurch & Zaccaro, 2010; Hackman, 2003).

Researchers have extended certain processes (e.g., boundary spanning; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005) and inputs (e.g., leadership; DeChurch & Marks, 2006; DeChurch, Burke, Shuffler, Lyons, Doty, & Salas, 2011) to the MTS-level; however, less work exists on the emergent states that can take shape between teams within a MTS. While team-level emergent states result from interactions among individuals (Kozlowski & Klein, 2000; Marks, Mathieu, & Zaccaro, 2001), MTS emergent states will arise from the interactions among intact component teams. Similar to their team-level counterparts, these emergent states will capture the synergy exhibited by the overall system, and as such will play an important role in MTS functions and outcomes (DeChurch & Zaccaro, 2010). Research that systematically examines the emergence of these phenomena among teams in a system will consequently contribute to our understanding of complex organizational systems.

To this end, the current work investigates the emergent state of cohesion within MTSs. Cohesion refers to the bonds that allow a unit to resist disruption and continue to function as an intact entity (Festinger, 1950; French, 1941; Gross & Martin, 1952; Schachter et al., 1951). Although cohesion is typically applied to the bonds among members within a team, this state can be extended to refer to bonds among teams in a MTS. Existing studies of cohesion chiefly exist at the team-level, and consequently we know little about its manifestation among teams. The present research addresses this gap in the MTS literature in three ways. First, the conceptualization of cohesion is extended to encapsulate the bonds that exist among intact teams within a complex system. Second, the antecedents of between-team cohesion are empirically investigated to better understand how shared perceptions of between-team cohesion emerge within a MTS. Finally, the functioning of shared perceptions of between-team cohesion is explored through its effect on a system-level performance outcome. Together, these contributions augment MTS theory by identifying how the emergent state of cohesion forms and functions within a complex system of teams.

CHAPTER TWO: BETWEEN-TEAM COHESION

Emergent States Among MTS Component Teams

Emergent states are conceptualized as dynamic constructs that develop over time through group interactions (Marks et al., 2001). As noted previously, MTS are characterized by within- and between-team dynamics; therefore the interactions that engender emergent states will exist across levels in the system. This will yield a configuration of team and between-team emergent states. While a wealth of literature exists on within-team emergent states, we know little about the between-team emergent states that play a significant role in emergent processes of the MTS. These between-team interactions merit a careful examination, as they have been shown to play a more pivotal role in MTS outcomes compared to within-team interactions (Marks et al., 2005). Moreover, the inherent complexities arising from interteam interactions suggest that their emergent states will likely follow more nuanced models of emergence compared to their team-level analogs (Aiken & Hanges, 2012; DeChurch & Zaccaro, 2010). Specifically, where teams typically demonstrate relatively simple compositional models of emergence, emergent states in MTSs will tend toward more complex compilational models (DeChurch & Zaccaro, 2010; Kozlowski & Klein, 2000). In a compositional model, lower-level constructs converge in a relatively simple (i.e., linear) fashion to form an isomorphic higher-level construct (Kozlowski & Klein, 2000). Conversely, in a compilational model higher-level phenomena result from a precise configuration of lower-level units (Kozlowski & Klein, 2000). The possibility for compilational patterns of emergence in MTSs warrants theories and research that explicitly examine emergent states in MTSs, as opposed to an isomorphic application of extant team-level notions. Nevertheless, teams are the foundational elements of MTSs, therefore team-level theory and research can still inform MTS research (DeChurch & Zaccaro, 2010). Due to its widely confirmed importance at the team-level (e.g., Beal, Cohen, Burke, & McLendon, 2003; Carron, Colman, Wheeler, & Stevens, 2002; Evans & Dion, 1991; Mullen & Cooper, 1994; Gully, Devine & Whitney, 1995), and its potential to heavily influence the quality of between-team interactions (DeChurch & Zaccaro, 2010), cohesion among component teams is a prime avenue for investigating the manifestation and consequences of cross-team emergent states.

Between-Team Cohesion

Between-team cohesion encapsulates the cross-team bonds that allow component teams to function together as an intact entity. As an emergent state, between-team cohesion will form as a result of interactions among lower-level units – i.e., MTS component teams. Similar to their lower-level counterparts in teams, cross-team cohesive ties will form as a result of interactions among component teams. The way in which these interactions converge will be critical to understanding the emergence and the very nature of between-team cohesion. While the tendency is often to classify emergent states as either compositionally- or compilationally-based, it is important to treat these models as ends of a spectrum, rather than categories (Kozlowski & Klein, 2000). Therefore, while the emergence of between-team cohesion will likely be more complex than within-team cohesion (DeChurch & Zaccaro, 2010), it will also demonstrate properties of both a compositional and compilational emergent state.

The development of between-team cohesion will demonstrate a compositional model of emergence insofar as it will arise from a homogeneity of member perceptions (Kozlowski & Klein, 2000). At the team-level, this homogeneity refers to members' shared desire to remain in the group (Festinger, 1950); similarly, at the between-team level this homogeneity stems from a shared commitment across teams to work collaboratively as part of the system. Drawing on this symmetry, within- and between-team cohesion can be described as isomorphic in that they are comparatively equivalent in terms of both structure and function (Kozlowski & Klein, 2000; Morgeson & Hoffmann, 1999; Rousseau, 1985). At the team-level, cohesion derives its structure from the shared attitudes and cognitions across teams to remain a part of the group. Between-team cohesion has a parallel structure, derived from homogenous perceptions and attitudes across the teams to not only remain part of the overall system, but continue to contribute to it through cross-team interactions. In terms of function, cohesion at the team- and between-team-levels results in the entities (e.g., individuals or component teams) maintaining their role(s) in the higher-level unit (e.g., team or MTS), thus rendering the higher-level unit more robust.

Between-team cohesion will also exhibit properties of a compilational model in that it will be 'related but different' from its lower-level properties (Kozlowski & Klein, 2000, p. 16). Namely, between-team cohesion will not necessarily arise from a proliferation of cohesive component teams. Instead, between-team cohesion will emerge from a common perception among intact units, not just among individuals (DeChurch & Zaccaro, 2010). Each of these intact units will possess their own internal dynamics, interdependencies, and member demands, all of which will influence the interteam cohesive ties that develop. As a result, the emergence of between-team cohesion will be dictated by a distinct pattern of the interactions within and across component teams. The fact that between-team cohesion demonstrates properties of both a compositional and compilational model of emergence suggests that while theory and research can be drawn from the compositionally-based formation of team cohesion, additional complexities associated with compilational models will need to be considered and explicitly investigated in multilevel research. Based on Kozlowski and Klein's (2000) recommendations for multilevel research, the current work makes the first step in understanding between-team cohesion by systematically examining its antecedents. The effect of homogenous perceptions of between-team cohesion on system-level readiness is also investigated in order to assess the importance of between-team cohesion in determining higher-level outcomes.

Interdependence Among Component Teams

Interdependence is defined as "a state by which entities have mutual reliance, determination, influence, and shared vested interest in processes they use to accomplish work activities" (Mathieu et al., 2001, p. 293), and characterizes any collective in which constituents demonstrate a mutual reliance on one another (Saavedra, Earley, & Van Dyne, 1993). MTSs are characterized by the presence of within- and between-team interdependence, both of which contribute to MTS-level outcomes (DeChurch &

Zaccaro, 2010; Marks et al., 2005; Mathieu et al., 2001). While within-team interdependence creates the sub-group boundaries around component teams (Arrow & McGrath, 1995; Mathieu et al., 2001; Marks et al., 2005), between-team interdependence creates the collaboration requirements that unite the teams in a system (DeChurch & Mathieu, 2009; Mathieu et al., 2001; Marks et al., 2005). Research shows that these between-team interactions provide incremental validity over within-team processes in explaining system-level outcomes, and demonstrate a stronger impact on MTS successes (DeChurch et al., 2011; DeChurch & Marks, 2006; Marks et al., 2005).

The importance of between-team interdependence extends to the emergence of between-team cohesion, as the cross-team collaborations required by interdependence can foster the cohesive ties that allow component teams to work together. In interdependent collectives, constituents must develop strategies for interacting with one another in order to operate as a unit and accomplish their goals (Chen et al., 2009; Saavedra et al., 1993; Wageman, 1995). As a result of working interdependently, members of collectives develop the camaraderie and mutual liking that lead to group cohesion (Campion et al., 1993, 1996; Johnson & Johnson, 1989; Stokes, 1983; Turner et al., 1987; Wageman, 1995; Wright & Duncan, 1986). The common goals created by interdependence also foster cohesion, as the presence of a superordinate goal fosters group solidarity (Budman et al., 1993) and cooperative norms (Mitchell & Silver, 1990; Weingart & Weldon, 1991). In teams research, interdependence has been shown to engender several covariates of cohesion, including communication, helping, cooperation, and quality interpersonal interactions (Wageman, 1995), as well as the development of cohesion itself (Chen et al., 2009). Similar to its function at the team-level, task interdependence among teams in an MTS will require and motivate members to form cohesive ties across team boundaries, in order to effectively collaborate and perform interdependent tasks. Additionally, the interdependence of goals exhibited by MTSs component teams can invoke the same solidarity and shared purpose that they do at the team level; however, in MTS, these will foster cohesion between intact teams, as opposed to individuals within the same team. Based on the extant findings in the team literature and the parallel functioning of interdependence at the MTS-level, it is hypothesized that:

Hypothesis 1: The level of interdependence among teams will be positively associated with between-team cohesion.

Leader Boundary Spanning and Goal Alignment

Leaders within MTSs play an important role in managing interdependence, interactions, and processes between teams in a system (Cobb & Mathieu, 2003; DeChurch et al., 2011; DeChurch & Marks, 2006; Zaccaro & DeChurch, 2012). To fulfill this function, leaders must engage in "sophisticated boundary management" (Kozlowski, Gully, McHugh, Salas, & Canon-Bowers, 1996; p. 971). Specifically, leaders need to perform external communication, in which they simultaneously gather information from the system and disseminate their own information (Davison & Hollenbeck, 2012; DeChurch et al., 2011; Zaccaro & DeChurch, 2012). Additionally, through internal communication leaders translate and filter information gleaned from external sources to their respective teams (Davison & Hollenbeck, 2012; DeChurch et al., 2011; Zaccaro & DeChurch, 2012). Together, these leader boundary spanning (LBS) behaviors foster between-team cohesion in two ways. First, leaders act as a conduit through which component teams can communicate with each other (Ancona & Caldwell, 1988; DeChurch & Zaccaro, 2012). Without this communication teams will be less capable of syncing their actions and coordinating effectively (Hardy, Lawrence, & Grant, 2005; Keyton et al., 2008; Marks et al., 2002; Robichaud, Giroux, & Taylor, 2004; Williams & Mahan, 2006), making the emergence of cross-team cohesive ties far less likely. Second, by transmitting complementary information to component teams leaders aid in the development of a shared understanding of the coordinated actions needed to accomplish higher-level goals (Davison & Hollenbeck, 2012; DeChurch et al., 2011; DeChurch & Marks, 2006; Zaccaro & DeChurch, 2012). Component teams that share this understanding will be more inclined to develop the cross-boundary cohesive bonds that facilitate the necessary collaborative processes. Therefore, it is hypothesized that:

Hypothesis 2a: LBS behaviors will be positively associated with between-team cohesion.

LBS behaviors, while pivotal to its development, may also foster between-team cohesion through the alignment of team goals. Goal alignment refers to a "compatibility between all of the goals in the goal hierarchy" (Williams & Mahan, 2006, p. 11), and is one of the chief responsibilities of MTS leaders (Mathieu et al., 2001; Williams & Mahan, 2006). Leaders achieve goal alignment primarily through boundary spanning behaviors aimed at gathering and communicating information within the system that pertains to the pattern of goals in the goal hierarchy. This enables leaders to link their team's proximal goals to those of other teams and the larger distal goals (Bartone et al., 2002; DeChurch & Marks, 2006; Henderson, 1985). In addition, leaders need to transmit this information to their respective teams so that members also possess a common understanding of their own proximal goals and their role in distal goal(s) accomplishment (DeChurch & Marks, 2006; Henderson, 1985; Williams & Mahan, 2006). As a result, LBS behaviors ensure that member cognitions and efforts are properly aligned around proximal and distal goals. This relationship is summarized in Hypothesis 2b, which states:

Hypothesis 2b: LBS behaviors will be positively associated with goal alignment between leaders.

The development of goal alignment on the part of leaders will also be a crucial determinant of the between-team cohesion that emerges in a MTS. Across a system, component teams will be more inclined to cooperate and collaborate with one another when they are united by common goals within the goal hierarchy (Williams & Mahan, 2006). Because cohesion is an important ingredient for cooperation and collaboration (Kidwell et al., 1997; Sanders, 2004; Sanders & Van Emmerik, 2004), cross-team ties are also more likely to develop among component teams that possess goal alignment. The result is a robust system characterized by functional cohesive relationships across component teams. The teams literature also provides insight into the relationship between goal alignment and cohesion. Small group theorists proposed that cohesion can *only* improve performance when group and organizational goals are aligned (e.g., Griffin & Morehead, 1986; Schermerhorn, Hunt, & Osborn, 1988), and empirical findings show that a distinct and purposeful goal enhances team cohesion (Cartwright, 1967; Brawley, Carron, & Widmeyer, 1993). When this theory and research is considered in the context of MTS theory, it suggests that goal alignment between teams will assist in the emergence of between-team cohesion. As described in Hypothesis 2b, leaders create goal alignment through boundary spanning behaviors, which suggests that goal alignment will serve as one mediator in the relationship between LBS behaviors and between-team cohesion. However LBS behaviors can also influence between-team cohesion directly, as outlined in Hypothesis 2a. This suggests a partial mediation, in which goal alignment transmits some (but not all) of the effect of LBS behaviors onto between-team cohesion. This mechanism is proposed in Hypothesis 2c, which states:

Hypothesis 2c: Goal alignment will partially mediate the relationship between LBS behaviors and between-team cohesion.

Within- and Between-Team Cohesion

As individuals and component teams interact and coordinate within a MTS, cohesion will emerge at both the within- and between-team level. However, within- and between-team cohesion will likely share a significant yet complex relationship. On the one hand, team-level cohesion can foster the cohesion that develops between component teams. Members of cohesive teams demonstrate higher levels of motivation (Shaw, 1981; Stogdill, 1972), satisfaction (Ahronson & Cameron, 2009; Dobbins & Zaccaro, 1986; Oliver et al., 1999; Tekleab et al., 2009; Walsh et al., 2010; Williams & Hacker, 1982), and commitment (Festinger, 1950; Lott & Lott, 1965), and these positive affects can extend to the overall system (Williams & Mahan, 2006). Because a functional system requires cross-team collaboration (Marks et al., 2005), members of cohesive teams may be more motivated and committed to cultivating quality cross-team relationships in order to ensure that their component team contributes to MTS success. Moreover, poor within-team cohesion can preclude the establishment of between-team cohesion. To wit, component teams are unlikely to benefit from collaborating with a team that is characterized by internal discord and low member motivation, as these low-cohesive teams would be less effective overall (Beal et al., 2003; Gully et al., 1995; Oliver et al., 1999). Consequently, teams in the system will be less inclined to develop cross-team cohesive ties with poorly cohesive teams. On the whole, these propositions imply a positive relationship, whereby within- and between-team cohesion develop in tandem with one another.

Conversely, research and theory also suggest that within-team cohesion can deter the emergence of between-team cohesion (DeChurch & Zaccaro, 2010). The "mixed motive structure" of complex systems requires individuals to attend to both intra- and inter-team processes (Zaccaro et al., 2012, p. 17). However, resource allocation theory (Kanfer, Ackerman, Murtha, Dugdale, & Nelson, 1994) states that individuals have finite resources (e.g., time, effort, cognition) to devote to these processes. This can create a tradeoff in which team members must attend to processes at one level or the other. In the case of cohesion, members may devote effort to cultivating cohesion among their immediate team at the expense of forming cross-team ties across the MTS. Social identity theory (Tajfel, 1982) also illustrates how within- and between-team cohesion may be in competition. Emergent states that create unity within a group (e.g., cohesion) can make ingroup-outgroup boundaries more salient and invoke negative outgroup perceptions (Brown & Pierce, 2005; Tajfel, 1982). Therefore, team-level cohesion can inhibit the emergence of between-team cohesion due to the strong ingroup identities and outgroup hostilities these intrateam ties create. This is particularly pertinent to MTSs, where members experience dual (and possibly competing) identities of their component team and the larger system (Connaughton, Williams, & Shuffler, 2012). The presence of competing motives, resources, and identities all suggest a negative relationship in which within-team cohesion obstructs the development of between-team cohesion. The mixed messages presented by the literature do not necessarily imply competing or contradictory theories. It is more likely that any or all of the assumptions put forth can play out in multiteam functioning. Specifically, the opposing relationships described above can typify an inverted-U relationship in which too much or too little within-team cohesion is detrimental to the formation of cohesive ties across teams in a system. Therefore, it is hypothesized that:

Hypothesis 3: Within-team cohesion will demonstrate an inverted-U relationship with between-team cohesion, such that high and low levels of within-team cohesion will be associated with low between-team cohesion.

Between-Team Cohesion and System Readiness

At the small-group level, cohesion demonstrates a robust relationship with group effectiveness in both civilian and military teams (e.g., Beal, Burke, & McLendon, 2003; Carron, Colman, Wheeler, & Stevens, 2002; Evans & Dion, 1991; Gal, 1986; Griffith, 1988, 2002; Gully et al., 1995; Mullen & Cooper, 1994; Oliver, Harman, Hoover, Hayes,

& Pandhi, 1999; Shamir, Brainin, Zakay, & Popper, 2000). Research in the military domain typically conceptualizes and measures effectiveness as unit readiness, or the degree to which a unit demonstrates preparedness and proficiency during pre-deployment training (Griffith, 2002; Oliver et al., 1999). Within military units, the shared commitment, motivation, and effort characteristic of cohesive teams produces a unit that is capable of performing successfully in combat (Shils & Janowitz, 1948; Siebold, 2006). In MTSs, however, higher-level outcomes such as performance and readiness will largely stem from interactions between the component teams, as opposed to interactions within teams (DeChurch et al., 2011; Marks et al., 2005). Cross-team cohesive ties can facilitate this interteam functioning by creating a commitment and motivation to collaborate across boundaries in order to achieve larger goals and perform as an effective system. Therefore, the cohesion that develops among teams in a larger unit will be integral to unit readiness. Based on this notion, it is hypothesized that:

Hypothesis 4: Between-team cohesion will be positively associated with system readiness.

CHAPTER THREE: METHOD

Sample

Data was collected from 637 active duty U.S. Army Soldiers, ranging in rank from Private to Captain. The sample was composed of 480 enlisted Soldiers, 86 squad leaders, 47 platoon leaders (PLs) and platoon Sergeants (PSGs), and 24 company leaders (e.g., Commander and/or First Sergeant). On average, respondents had spent 4 years in the active Army, 18 months in their current rank, and 9 months in their current position. The sample consisted of 69.1% Caucasians, 22.5% Hispanics, 7.5% African-Americans, 5.2% Asian-Americans, and 8.9% listed as ‘other’; 10.5% of participants did not report their race[1]. The sample was 100% male[2].

Platoons from Combat Arms companies were sampled across five Army installations. Combat Arms units were sampled, as they most commonly operate as intact, interdependent units compared to other types of formations (e.g., Support, Sustainment, Special Forces). Participants were nested within 128 squads and 38 platoons. The average squad size was approximately 4.5 individuals. The average platoon had approximately 16 individuals and three squads.

[1] The percentages reported sum to over 100% because participants were allowed to list more than one race. 6.33% identified themselves as bi-racial or multi-racial.
[2] The Army currently excludes female Soldiers from serving in Line Companies within Combat Arms Battalions.

Within a typical Army platoon, squads each have their own leader, tasks, and goals, yet they must still coordinate with one another to accomplish the mission(s) of the overall platoon. Although a squad nominally contains two fire teams, the squad is the smallest and most immediate collective within which individual Soldiers identify and form immediate bonds. As such, the squad is arguably the first level of entitativity (Campbell, 1958) that individuals experience within a military setting. Accordingly, the current research treated squads in the sample as component teams, with the platoon acting as the overall MTS. However, the current research focuses on emergent states and processes *between* component teams, rather than individual component teams or the system as a whole. Therefore, analyses were conducted at both the squad- and squad-dyad level. To capture the between-team level of theory and analysis, pairs of squads were aggregated to create squad-dyads. The final sample consisted of 162 squad-dyads, with an average dyad size of nine individuals. This method of aggregation was done to effectively conceptualize and analyze MTSs in terms of their linkages among elements, as opposed to treating the system as a single unit or merely a composite of teams. Analyses at the squad- and squad-dyad level were conducted to test Hypotheses 1-3. Squad and squad-dyads were also aggregated to the platoon-level in order to analyze Hypothesis 4, as the outcome variable in this hypothesis (i.e., readiness) exists at the highest (i.e., platoon) level of measurement.

Procedure

A cross-sectional field study was conducted in which active duty U.S. Army Soldiers were administered paper-and-pencil surveys. Information gathered through the surveys included self-report responses, leader ratings, and qualitative information used for content coding. Surveys varied slightly for enlisted Soldiers, and leaders at the squad-, platoon-, and company-level. This was done to ensure that the most qualified personnel provided information on various aspects of the unit[3]. For example, an enlisted Soldier would be less qualified to objectively assess the overall readiness of his platoon, while a company Commander might not be able to appropriately gauge the cohesion within each individual squad. Participation in the study was voluntary, and participants were not compensated. The survey took approximately 30 minutes to complete.

Measures

Between-Squad Interdependence

Perceptions of interdependence between squads in the platoon were assessed using five items from a previously-validated measure (Campion et al., 1993). [4] Items were modified to reference interdependence among *squads* in a *platoon,* rather than individuals in a team. A sample items includes, "*Within my platoon, jobs performed by different squads are related to one another."* Items were rated on a 7-point Likert-type scale[5], and were shown to have high reliability among respondents (α = .86). The measure was completed by squad leaders, who were deemed to have the most accurate

---

[3] I would like to thank Dr. Jeffrey Fite for providing insight on this information.

[4] Between-team interdependence, as well as between-team cohesion, was also measured using a sociometric response scale in which respondents were asked to indicate their degree of interdependence (or cohesion) with each of the other squads in the platoon. However, despite vetting these measures on enlisted Soldiers and leaders and gaining favorable feedback prior to data collection, a significant portion of respondents in the data collection either did not complete the sociometric measures, or filled them out incorrectly. The minimal amount of usable data for these measures resulted in low power, and made attempts at sociometric analyses impractical. Unfortunately, analyses utilizing sociometric response formats are especially sensitive to missing data (Knoke & Yang, 2008), and techniques for treating missing data in networks are not yet sophisticated enough to offset their negative effects (Huisman, 2009). Therefore, hypotheses were tested using psychometric measures, as opposed to sociometric ones.

[5] All 7-point Likert-type scales used herein ranged from "to no extent" (1) to "to a very great extent" (7).

knowledge regarding the collaboration that their squad engaged in with other squads of the platoon. The construct was operationalized by the mean of item responses, with the composite of each squad leader serving as the team-level perceptions of between-squad interdependence within their platoon. At the dyad-level, it was operationalized by the mean of composites for both squads (i.e., both squad leaders) in the dyad in order to capture the average level of between-team interdependence that the dyad perceived within their respective platoon.

Leader Boundary Spanning (LBS)

LBS was measured by asking squad leaders, PLs, and PSGs to use a 7-point Likert-type rating scale to report the degree to which they communicated with one another in order to accomplish their goals. All leaders rated their level of communication with each of the other leaders in the platoon. Each leader's responses were then averaged to operationalize the degree to which that leader engaged in boundary spanning. For squad leaders, their ratings of each of the other squad leaders, and the PL and PSG were averaged to capture horizontal and vertical LBS, respectively. Horizontal and vertical LBS were explored separately, as they can have differential effects on MTS functioning (Davison et al., 2012). Because the responses and their composites were derived from a case-by-case sociomatrix, traditional reliability analyses (i.e., Cronbach's alpha) are not appropriate. While investigations and techniques of assessing sociomatrix data reliability are severely limited (Ferligoj & Hlebec, 1999; Zwijze-Koning & de Jong, 2005), the few studies that do exist show that measures similar to the one used in the current study are reliable tools for assessment (Ferligoj & Hlebec, 1995, 1998, 1999). Additionally, descriptive statistics of the LBS composites are comparable to other psychometrically measured variables used in the study that demonstrated high reliability, as shown in Tables 2 and 3.

Goal Alignment

Goal alignment was measured by having squad leaders, PLs, and PSGs list their company's top five priorities for the upcoming month. Responses were then content coded to quantify the agreement between leaders. For each goal that a leader listed, a count was made for how many other leaders in the platoon listed that same goal. For example, if Squad A leader listed "OPNET Training" as a goal, and Squad B leader and the PSG also listed "OPNET Training," Squad A leader was given a score of '2' for that goal. This procedure was repeated for each goal that Squad A leader listed, and a total score was created by summing the count for all of Squad A leader's goals. For each dyad, each Squad leader's total scores were averaged to reflect the mean level of goal alignment the dyad possessed with the rest of the platoon.

Within-Squad Cohesion

All squad members rated within-squad cohesion on six items, using a 7-point Likert-type scale. Items were taken from various measures in the cohesion literature (Carron et al., 1985; Griffith, 1988; Siebold & Kelly, 1988a; Stokes, 1983; Zaccaro & McCoy, 1985), and modified for a military context when necessary. A sample item includes, "*Soldiers in my squad pull together to perform as a unit.*" A Cronbach's alpha of $\alpha = .94$ indicates high measurement reliability. A composite score for each individual was computed by averaging item responses, and a composite score for each squad was computed by averaging member composites. This squad-level score represents the team's shared perceptions of their unit's cohesion. Squad-level scores were also aggregated to the dyad level by taking the mean of both squad-level cohesion scores. These dyad-level scores represent the average amount of within-team cohesion that the dyad's respective teams possessed.

Between-Squad Cohesion

Shared perceptions of between-squad cohesion were measured by having all squad members complete five items using a 7-point Likert-type scale. The measure was developed for this study by modifying existing measures of cohesion (Griffith, 1988; Siebold & Kelly, 1988a; Stokes, 1983; Zaccaro & McCoy, 1985). When appropriate, measures were modified to a military context. Importantly, items were also modified to reference the cohesion that exists among *intact teams* (i.e., squads) within a larger system (i.e., platoon). For example, the item, "*There is a lot of cooperation and teamwork among the members of my platoon"* was changed to "*There is a lot of cooperation and teamwork among the* <u>squads</u> *in my platoon."* This differs from previous measures that assess cohesion at the small group level (e.g., Zaccaro & McCoy, 1988) or those that treat the platoon as a single entity rather than a complex system with individual subunits (e.g., Siebold & Kelly, 1988a). For the current study, this is an important distinction to make, as the focus of the work is on the cohesion that develops between teams in a system, and not solely the cohesion that develops within component teams or across the system as a whole. Reliability analyses reveal a high Cronbach's alpha of α = .94. Similar to within-squad cohesion, composite scores at the individual-, squad-, and dyad-level were created using means.

Platoon Readiness

Readiness of the overall system was assessed by having members of the company Command team (i.e., CDRs and/or 1SGs) rate each platoon in the company in terms of its ability to perform necessary tasks and accomplish its missions. These individuals were deemed the most appropriate raters of platoon readiness, as Company-level leaders provide readiness assessments in actual unit evaluations conducted by the Army. Furthermore several empirical assessments of military cohesion have utilized Company level leaders as raters of unit readiness (e.g., Siebold & Kelly, 1988a, 1988b). Items were used from previous studies that assessed readiness in military units (Department of Defense, 2010; Griffith, 1988). Company leaders completed seven items for each platoon within the company, using a 7-point Likert-type scale. A sample item includes, "*The squads in platoon [X] demonstrate a readiness to fight.*" Reliability analyses reveal a high Cronbach's alpha of $\alpha = .93$.

CHAPTER FOUR: RESULTS

Preliminary Analyses

Aggregation

Rwg assesses the agreement among members of a collective, and is generally accepted as a criterion for aggregation of individual data to reflect emergent states (Chan, 1998; Kozlowski & Klein, 2000). $Rwg_{(J)}$ in particular is used when respondents rate a construct using multiple parallel items (e.g., perceptions of between-team cohesion were rated using five items) (James, Demaree, & Wolfe, 1984, 1993). Accordingly, $Rwg_{(J)}$ estimates were computed for each squad and platoon to assess the degree to which members converged in their perceptions of both between- and within-team cohesion. These estimates were derived using a slightly skewed null distribution, as member responses were somewhat inflated (LeBreton & Senter, 2008). For between-team cohesion, the average value of $Rwg_{(J)}$ among squads and platoons was .43 and .50, respectively. For within-team cohesion, $Rwg_{(J)}$ was .46 among squads and .48 across platoons. ICC(1) values were also calculated to assess the degree of variance associated with between-squad and between-platoon differences (Edmonson, 1999; Kenny & LaVoie, 1985). ICC(1) values for between-team cohesion were .11 for squads and .07 for platoons. This indicates that between-squad and between-platoon differences account for approximate 11% and 7% of the variance in between-team cohesion, respectively. ICC(1) values for within-team cohesion reveal that 13% of the variance is attributed to between-squad differences, while only 2.4% of the variance is attributed to between-platoon differences. Given that $Rwg_{(J)}$ and ICC(1) estimates fall below their respective acceptable levels of .70 and .12 (James, 1982; Klein et al., 2000; Lance, Butts, & Michels, 2006; LeBreton et al., 2003; LeBreton & Senter, 2008), the data do not provide a clear level of analysis at which to aggregate the data. Accordingly, hypotheses were tested using several approaches that differed in terms of their (a) level of analysis and (b) conceptualization and operationalization of between-team cohesion. The following section outlines these approaches in more detail.

Analytical Approaches

Three separate approaches were used to test Hypotheses 1-3. Because the conceptual level of analysis was at the between-team level, data was aggregated to both the squad- and squad-dyad level. Approach #1 used squad-dyads, in which squad-level perceptions were averaged across pairs of squads within the platoons. OLS regression analyses were then conducted to assess the hypothesized relationships. This approach attempts to capture and analyze MTSs in terms of the linkages among elements, as opposed to merely a composite of the elements themselves. In doing so, Approach #1 represents between-team cohesion as the perception of cohesion among squads in the platoon, as shared by the squad-dyads. Approach #2 analyzed Hypotheses 1-3 at the squad-level using mean-aggregates of squad member responses. Hypotheses were tested using hierarchical linear modeling (HLM) software (Raudenbush & Bryk, 2002) in which squad-level (i.e., Level 1) effects were analyzed while controlling for the nested structure of the data. Using Approach #2, between-team cohesion was conceptualized as each squad's shared understanding of the between-team cohesion within the platoon. Approach #3 also tested Hypotheses 1-3 at the squad-level, however between-team cohesion was operationalized as the agreement (i.e., $Rwg_{(J)}$) among squad members. With this approach, hypothesis tests examined the extent to which the proposed predictors (e.g., interdependence, LBS) fostered a uniformity of squad member perceptions regarding the between-team cohesion of their platoon. Approach #3 also used HLM (Raudenbush & Bryk, 2002) to test Hypotheses 1-3. A summary of the results from these three analytical approaches is presented in Table 1.

Hypothesis 4 addressed the effects of cohesion on platoon-level readiness; therefore Hypothesis 4 was tested by aggregating perceptions of between-team cohesion to the platoon-level. Means were used as the method for aggregation in order to capture the average perceptions of between-team cohesion across the platoon. OLS regression analyses were then conducted to assess the effects of shared perceptions of between-team cohesion on platoon-level readiness. These analyses controlled for platoon size (in terms of individuals), as the amount of available personnel can also contribute to a unit's readiness (Schank, Harrell, Thie, Pinto, & Sollinger, 1997).

Descriptives and Intercorrelations

Tables 2 and 3 list the descriptives and correlations of study variables at the dyad- and squad-levels, respectively. Because hypotheses were directional, correlations were calculated using one-tailed significance tests. At both levels, means reveal a slightly inflated response bias, which is typical among military samples. Correlations reveal significant relationships among several variables, although it is notable that not all relationships confirmed in small group research (e.g., cohesion and interdependence) were significant at the team- or between-team level in the current sample. Moreover, relationships at different levels of analysis were relatively homologous within the sample. The functioning of these variables and their respective levels of analysis were examined in hypothesis significance tests and follow-up analyses. Additionally, because several relationships were counter to what was hypothesized (e.g., the negative relationship between LBS behaviors and goal alignment), hypothesis tests and follow-up analyses were conducted using methods that utilize two-tailed significance tests.

The Effects of Between-Team Interdependence, LBS Behaviors, and Goal Alignment on Between-Team Cohesion

The correlations presented in Tables 2 and 3 indicate that interdependence, LBS behaviors, and goal alignment were not significantly associated with perceptions of between-team cohesion. This was true for all three analytical approaches, indicating that the variables of interest did not significantly predict the perceptions of between-team cohesion that were shared by squad-dyads (Approach #1), the perceptions of between-team cohesion shared by individual squads (Approach #2), or the uniformity of squad perceptions of between-team cohesion (Approach #3). Collectively, the results provide no support for Hypotheses 1 and 2. However, two surprising elements can be derived from the pattern of intercorrelations. First, the non-significant relationship of between-team interdependence and between-team cohesion contradicts findings from the small-group literature (e.g., Campion et al., 1993; Chen et al., 2009; Wageman, 1995). It also echoes other recent findings in which team-level relationships were not confirmed in MTSs, presumably because the size, complexity, and cross-team functioning inherent in MTSs creates an array of dynamics not observed in small groups (Davison et al., 2012; Lanaj et al., in press). In research on MTSs (e.g., Marks et al., 2005), interdependence has been examined as an important moderator (rather than predictor) of between-team functioning. Because interdependence among component teams is a defining characteristic of MTSs (Mathieu et al., 2001), component teams that demonstrate low interdependence may not be acting as true MTSs, and therefore many of the between-team processes and relationships may not manifest. Accordingly, the current study examined the degree to which perceptions of interdependence moderated the effects of both LBS behaviors and goal alignment on member evaluations of between-team cohesion. Approach #1 tested moderating role of dyad-shared perceptions of between-team interdependence on the effects of LBS and goal alignment within the dyad, in predicting dyad perceptions of between-team cohesion. Approaches #2 and #3 assessed the degree to which team perceptions of between-interdependence interacted with boundary spanning and goal alignment to predict team perceptions of, and agreement about, between-team cohesion. Results from Approach #1, presented in Table 4, show that the overall model explained a significant amount of variance in squad-dyads' shared perceptions of between-team cohesion ($R^2 = .111$, $\Delta R^2 = .086$, $p < .01$). However, the interaction effect was only significant for horizontal LBS, which indicates that communication among component team members is more crucial for dyad perceptions of between-team cohesion than communication with higher-level leaders. While main effects were not significant, both interaction terms were significant, confirming that dyad perceptions of interdependence enhanced the respective effects of horizontal LBS behaviors ($\beta = .237$, $p < .05$) and goal alignment ($\beta = .275$, $p < .01$) on the shared dyad perceptions of between-team cohesion. Graphical representations of these interactions are presented in Figures 1 and 2, respectively.

Contrary to results from Approach #1, Approaches #2 and #3 yielded no significant results. Findings indicate that the importance of LBS and goal alignment, as well as the moderating role of interdependence, did not foster team-level perceptions about the between-team cohesion within the MTS. The differential results of these approaches reveal that the interactions among interdependence, LBS, and goal alignment foster the perceptions of between-team cohesion that are shared across team dyads, but not the perceptions within the individual component teams. Furthermore, this suggests that the relationships among these variables are most evident when the conceptual and analytical approach addresses the cross-team linkages within a MTS rather than the elements (i.e., component teams) that make up the system.

A second interesting result demonstrated by the correlations in Tables 2 and 3 is the significant negative relationship between LBS behaviors and goal alignment. The negative effects of horizontal LBS were significant at both the dyad- and squad-level. The negative effects of vertical LBS on goal alignment however, were only significant at the dyad-level. The negative relationship found in these results is contrary to what was outlined in Hypothesis 2b, and could imply that LBS behaviors reduce goal alignment between teams. A more plausible explanation, however, is that when there is an absence of goal alignment, leaders communicate with one another in order to achieve proper goal alignment among their respective teams. While the original conceptual framework posited LBS behaviors as a predictor of goal alignment, results imply a more complex temporal pattern whereby a misalignment of component team goals serves as a precursor to LBS behaviors, which are then enacted in order to achieve goal *re*alignment. Due to the fact that units sampled in the study were either returning from combat duty or training for upcoming deployment, they most likely demonstrated the goal misalignment and subsequent LBS behaviors that characterize the first half of this sequential model.

Based on its important moderating role in previous research (e.g., Marks et al., 2005) and the analyses described above, interdependence may also increase the need for LBS behaviors aimed at re-establishing goal alignment. As noted previously, teams that are not interdependent may not require goal alignment or LBS behaviors that achieve goal alignment, as component team goals are only loosely structured around one another (Mathieu et al., 2001). Accordingly, the interaction between LBS and interdependence in predicting goal alignment was tested in follow-up analyses. As shown in Table 5, results from Approach #1 demonstrate that the negative relationship between LBS and goal alignment is stronger when squad-dyads perceive that interdependence is high; however this effect was only significant for horizontal boundary spanning ($\beta = -.216$, $\Delta R^2 = .043$, $p < 05$). Specifically, when dyads perceive between-team interdependence as high, the horizontal leader boundary spanning behaviors that the dyads engage in across the platoon are significantly associated with an absence of goal alignment. Conversely, Approach #2 revealed a significant interaction of between-team interdependence and vertical LBS, such that when team-level perceptions of between-team interdependence are high, vertical LBS behaviors are associated with higher levels of goal alignment (γ_{30}

= 0.169, $p < .05$) .[6] The results from Approach #2 are presented in Table 6. This notion is substantiated by MTS research demonstrating that vertical communication can have more positive outcomes compared to horizontal communication among component teams (Davison et al., 2012). On the whole, the results indicate that component teams that are truly operating as a MTS (i.e., they perceive themselves as being interdependent with one another), component team leaders communicate laterally in an attempt to offset a misalignment of goals; however, goal alignment can be improved through formal, vertical communication with higher-level leaders. While the cross-sectional nature of the data preclude an investigation of the causal nature of these relationships, the nature of the sample, in which MTSs were either still forming or in training, suggest that teams and team-dyads were largely engaging in LBS behaviors in an attempt to remedy the absence of goal alignment in the system.

The Effect on Within-Team Cohesion on Between-Team Cohesion

Hypothesis 3 posited a curvilinear relationship between within- and between-team cohesion, such that too much or too little within-team cohesion would be detrimental to the development of between-team cohesion. To test the hypothesis using Approach #1, between-team cohesion was regressed onto within-team cohesion in Step 1 of an OLS regression, and onto the squared term of within-team cohesion in Step 2. Results demonstrate that the squared term of within-team cohesion did not significantly predict variance in between-team cohesion. Based on this finding, a quadratic relationship was

[6] Approach #3, which focused on determinants of squad member agreement, was not applied to this follow-up analysis. For one, agreement among members regarding between-team cohesion did not pertain to the relationships being tested. Second, because goal alignment was assessed using scores from one individual in each squad (i.e., the Squad Leader), estimates of agreement among squads were not able to be computed for goal alignment.

not supported. However, cubic functions also contain an inverted-U pattern, therefore the hypothesized relationship can also exist as one side of a cubic function. Moreover, it is probable that the cross-level relationships of emergent states in MTSs exhibit complex compilation patterns (DeChurch & Zaccaro, 2010), which may not be adequately represented by a relatively simple quadratic function. To accommodate this possibility, the cubed term of within-team cohesion was added in Step 3 of the hierarchical regression. The significant beta coefficient in Step 3 ($\beta = .213$, $\Delta R^2 = .016$, $p < .05$) indicates that the effect of within-team cohesion on between-team cohesion follows a cubic pattern. Specifically, the relationship exhibits an inverted-S shape, in which the slope initially accelerates, levels off, and then continues to accelerate. Approach #2 also yielded a significant inverted-S relationship ($\gamma_{30} = .126$, $p < .01$). The shape of this relationship and the hypothesized relationship are presented in Figure 3. Although the strong bivariate correlations among within- and between-team cohesion found in Approaches #1 and #2 suggest that a linear relationship is tenable, the incremental validity provided by the inclusion of a cubic term in Step 3 in both approaches indicates that a curvilinear relationship is also defensible. Conversely, Approach #3 yielded only a significant linear relationship ($\gamma_{10} = .089$, $p < .05$). Based on the results of Approach #3, teams who perceive themselves are being more cohesive tend to agree on the level of between-team cohesion that the squads in their platoon demonstrate. A summary of results from all three approaches is presented in Table 7.

The consistent results from Approaches #1 and #2 indicate that the relational pattern and boundary conditions present in the within- and between-team cohesion relationship are homologous at the team- and between-team levels. As seen in figure 5, teams and dyads at the lower end of the distribution demonstrate relatively low levels of perceived within- and between-team cohesion. Here, cohesive bonds within and among teams are increasing simultaneously, but within-team cohesion is not strong enough to create impermeable team boundaries, and between-team cohesion is not strong enough to eradicate those boundaries. Instead, members are simply forming the initial (if less substantial) intrateam and interteam bonds that facilitate proximal and distal goals, respectively. But, as hypothesized, the relationship demonstrates a boundary condition where perceptions of within- and between-team cohesion are no longer emerging in tandem. This pattern is evident in the middle of the distribution where the relationship levels off. Here, within-team cohesion may have created strong identities around component team membership, causing an inward focus on intrateam processes and proximal goals. As a result, between-team cohesive ties and cross-team collaborations are neglected and their development stagnates. As within-team cohesion continues to increase, between-team cohesion demonstrates an acceleration, as opposed to the deterioration that was proposed in Hypothesis 3. Teams and team-dyads at this end of the distribution no longer demonstrate a chiefly inward focus, but are instead directing their collaborative efforts outwards and forming cohesive ties across team boundaries. However, they are not doing so at the expense of the within-team cohesion that has emerged. Although Hypothesis 3 posited a tradeoff between within- and between-team cohesion, alternative explanations can account for the positive relationship that was observed. First, while dual identities (i.e., component team and MTS) can be competing, they are not always mutually exclusive and members can shift back and forth between their component team and larger MTS identities (Connaughton et al., 2012; Rockman, Pratt, & Northcraft, 2007). Second, cohesion within teams can result in more efficient functioning that allows members to attend to developing cohesive ties with other teams. Therefore teams and dyads can cultivate relatively high levels of between-team cohesion while still maintaining strong cohesive ties within their component teams. This results in a functional network of component teams that are capable of adopting an inward and outward focus on respective intra- and interteam processes.

The Effect of Between-Team Cohesion on System Readiness

Hypothesis 4 predicted a positive effect of between-team cohesion on system-level readiness. The higher-level (i.e., platoon) outcome variable warranted an aggregation of lower-level (i.e., squad) units. Based on previous methods in the literature (e.g., Marks et al., 2005) and techniques suggested by composition models (e.g., Chan, 1998), lower-level units were aggregated using mean scores. The number of individuals in each platoon was also entered as a covariate to control for the effects that available personnel can have on system readiness (Schank et al., 1997). Regression results show that shared perceptions of between-team cohesion do not significantly predict the overall platoon's level of readiness (β = -.035, ΔR^2 = .001, p = n.s.). Therefore, Hypothesis 4 was not supported. While this contradicts previous team-level research (e.g., Oliver et al., 1999; Siebold & Kelly, 1988a, 1988b), it corroborates other recent findings in which team-level phenomenon were not confirmed in a MTS context (e.g., Davison et al., 2012; Lanaj et al., in press). Additionally, because MTS-level outcomes can stem from both within- and between-team processes (Marks et al., 2005; Mathieu et al., 2001), the effects of within- and between-team cohesion may feasibly combine to predict overall system readiness. A moderated regression was conducted to test this possibility, and results, shown in Table 8, reveal a significant interaction between cohesion at the within- and between-team level ($\Delta R^2 = .130$, $\beta = -.395$, $p < .05$). A graph of the results, as depicted in Figure 4, shows a crossed interaction in which perceptions of between-team cohesion positively predict readiness when perceptions of within-team cohesion are low, yet negatively predict readiness when within-team cohesion perceptions are high. Potential explanations for these results are addressed in the discussion section below.

CHAPTER FIVE: DISCUSSION

Although MTSs abound in organizations today, research that explicitly examines their interteam dynamics is scant (DeChurch & Matieu, 2009; DeChurch & Zaccaro, 2010). Extant literature contains little to no theory that conceptualizes between-team emergent states or empirical research that examines how they manifest within MTSs. Answering the call to re-examine existing small group theories and findings through the lens of MTS theory (DeChurch & Zaccaro, 2010), the current dissertation explored multilevel perceptions of emergent states among teams in a MTS. To this end, the work focused specifically on cohesion among component teams. Cohesion has shown to be a critical driver of team functioning within the small group literature (e.g., Beal et al., 2003; Gully et al., 1995; Oliver et al., 1999), and is therefore likely to be an important factor in between-team functioning as well. This examination yielded several interesting findings; namely, that (1) interdependence among teams plays an important moderating role in the emergence of perceptions of between-team cohesion that are shared by component team dyads, (2) LBS behaviors, goal alignment, and within-team cohesion predict shared perceptions of between-team cohesion among team dyads, although important caveats are associated with these effects, and (3) shared perceptions of between-team cohesion do not significantly predict the readiness of the overall system.

Together, these findings illustrate the complexities inherent in MTS functioning and the nuanced patterns by which perceptions of emergent states arise among component teams.

Many of the proposed relationships regarding between-team cohesion were not confirmed in the study. This may be largely due to the fact that MTSs are complex networks that display more nuanced dynamics and findings than those described in the team-level literature on cohesion. It may also be attributed to the military context in which between-team cohesion was examined. While cohesion is important to the functioning of military units and has been the subject of many military studies (e.g., Siebold & Linsday, 1999; Oliver et al., 1999), the concept of cohesion as typically explored in the small group literature may vary somewhat from the phenomenon that is observed within the armed forces. Soldier interactions take place both within the formal boundaries of the military (e.g., training, combat operations) and in the informal contexts that surround military operations (e.g., shared living quarters, unit-wide social functions). At the small unit level (e.g., squads, platoons), Soldiers spend the majority of their time together on- and off-duty. The task- and socially-based interactions among Soldiers at this level are heavily intertwined and integral parts of military life. Therefore, the emergence and functioning of cohesion in military teams and multi-team systems, as explored in the current study, may differ from the cohesion that is typically described in current theory and research, which is largely based on ad hoc teams of university students or other individuals who interact with their teammates on a substantially less intensive basis.

Despite the potential differences in conceptualizations of cohesion, the study uncovered several interesting findings regarding emergent states within MTSs. First, the current research substantiated the profound effects that interdependence has on the relationships between MTS component teams. In short, the presence of between-team interdependence, as reported by component team leaders, heightens the importance of the cross-team interactions that play out in MTS functioning. For example, proper goal alignment and boundary spanning among team leaders is more important when leaders view their respective teams as being interdependent. As a result, the relationship between goal alignment and LBS behaviors was stronger under conditions of high interdependence. It's probable that when leaders perceived their teams as being interdependent with other teams in the platoon, team-pairs engaged in increased horizontal LBS behaviors to attend to an absence of goal alignment. Team perceptions of interdependence in the system also highlighted the potential for a positive relationship between vertical boundary spanning and goal alignment. This is substantiated by existing MTS research, which demonstrates that formal, vertical communication can have more positive outcomes compared to a proliferation of horizontal communications (Davison et al., 2012). Additionally, the collective effects of LBS behaviors and goal alignment became more crucial in the development of the squad-dyads' perceived cohesive ties between interdependent component teams, however this effect was only significant for horizontal LBS behaviors among squad dyads. Again, the results suggest that interdependence among component teams creates more intensive interteam coordination, and consequently requires component team leaders to communicate and align their respective goals in order to carry out their interdependent functions. As a result, horizontal communication among squad-dyads and alignment of proximal goals across the platoon become more crucial in the development of the shared cross-team cohesive bonds that members perceive within the larger system. Together, these findings highlight the extent to which interteam functioning in MTS is contingent on the interdependence that component teams exhibit within the system.

Second, findings confirm several predictors of perceived between-team cohesion, although these relationships are characterized by important nuances. As noted above, goal alignment and LBS behaviors jointly predicted dyad perceptions of between-team cohesion, but only when interdependence was included as a moderator of their respective effects. Additionally, their causal effects may be more complex than what was originally hypothesized. Instead, it is likely that goal *mis*alignment instigates LBS behaviors, which are then enacted to re-align component team goals and ultimately foster perceptions of between-team cohesion across team pairs. The cross-sectional nature of the data precludes an analysis of these longitudinal effects; however, given that the MTSs sampled were either being re-distributed or still in the process of unit training, it is likely that they exhibited the goal misalignment that characterizes the first half of this temporal pattern.

Shared perceptions of within-team cohesion also demonstrated a complex (i.e., curvilinear) predictive relationship with the shared perceptions of between-team cohesion. As proposed, perceptions of within- and between-team cohesion initially increase in tandem as members form internal and external cohesive bonds. This effect eventually reaches a boundary condition at which point teams with moderate levels of within-team cohesion adopt an internal focus at the expense of forming cross-team bonds. Contrary to what was hypothesized, teams that continue to develop within-team cohesion also reported higher levels of between-team cohesion. Rather than the tradeoff suggested by resource allocation theory, highly cohesive teams may be functioning very smoothly, allowing team members to allocate more resources toward between-team ties in pursuit of common goals. Also, the emergence of within-team cohesion did not result in the counterproductive ingroup-outgroup boundaries suggested by social identity theory. This could be explained by the fact that Army squads share a common organization (i.e., the platoon and larger Army) and superordinate values (Mathieu et al., 2001). Furthermore, combat arms platoons in particular consist of non-specialized squads that possess similar skills and proficiencies. Therefore while component team boundaries are still present, the commonalities between squads can reduce the salience of ingroup-outgroup boundaries and make them less likely to inhibit between-team cohesion.

In terms of the consequences of between-team cohesion, results did not confirm a positive effect of shared perceptions of between-team cohesion on system-level readiness. These results are nevertheless important as they diverge from previous research that shows a positive relationship (e.g., Beal et al., 2003; Gully et al., 1995), particularly in military settings (e.g., Oliver et al., 1999). One explanation is that MTS outcomes are the result of a complex pattern of within- and between-team interactions, as demonstrated by previous research and theory (e.g., DeChurch et al., 2011; DeChurch & Mathieu, 2009; Marks et al., 2005; Williams & Mahan, 2006; Zaccaro et al., 2012).

Based on this notion, the emergence of cross-team cohesive ties, while important to MTS functioning, do not necessarily predict MTS-level outcomes. Another explanation may lie in the important differences between the current study and previous empirical efforts. Several studies that link cohesion to combat readiness operationalized the latter in terms of individual member perceptions of readiness (e.g., Gal, 1986; Griffith, 1988; Yagil, 1995). These perceptions are more reflective of collective efficacy as opposed to the actual readiness that a unit demonstrates. Studies that did employ Company Commander ratings of readiness (e.g., Siebold & Kelly, 1988a, 1988b) also differ from the current work in that they conceptualized and measured cohesion at the platoon level, and essentially equated a platoon with a single group. This approach neglects the nested structure of a platoon whereby individual, distinct squads are simultaneously working on proximal and distal goals. A non-significant relationship could also be attributed to variables that were not captured by the current study. For example, teams in early stages of training may have formed cross-team cohesive bonds but not yet reached appropriate levels of skill proficiency needed for a CDR or 1SG to consider them ‘ready’.

Finally, perceptions of between-team cohesion were shown to interact with perceptions of within-team cohesion to predict system readiness. The nature of the interaction is such that perceptions of between-team cohesion positively predicted readiness when perceptions of within-team cohesion were low; yet negatively predicted readiness when within-team cohesion perceptions were high. Future research is needed to uncover a sound explanation for this interaction; however several theoretically-based reasons can be put forth. Platoons in which cohesion is perceived as low both within- and among their squads, would most likely demonstrate poor readiness, as individuals are less apt to be working with ingroup or outgroup members in the system. Platoons that demonstrate higher levels of readiness are those in which members perceive cohesion to be high at one level, and low at the other. This may indicate a compensatory effect where platoons can demonstrate readiness when members perceive themselves as cohesive with their immediate team, *or* when members perceive cross-team cohesion within the system. Such an effect would suggest that cohesion at either level (i.e., within- or between-teams) can be beneficial to the larger system. Most interestingly, however, is that platoons that demonstrate perceptions of high within- *and* between-team cohesion exhibited relatively low readiness. In these platoons, members' motivational resources and effort allocation (Kanfer, et al., 1994) may be divided between the establishment and maintenance of cohesive ties at both the within- and between-team level. The division of attention and effort would leave fewer resources that can be directed toward achieving proficiency in training, and consequently could result in lower levels of readiness among these platoons. This explanation, while speculative, is consistent with the application of resource allocation theory to MTSs (DeChurch & Zaccaro, 2010; Kanfer et al., 1994), whereby demands from multiple sources (e.g., the immediate team and larger MTS) result in a tradeoff for individuals. Nevertheless, future empirical investigations are needed before this interaction can be reasonably attributed to any of these proposed effects.

As a whole, findings confirm what has previously been put forth in examinations of the MTS literature: while team-level theories of cohesion (and emergent states in general) can strongly inform cross-team and MTS investigations, they do not fully encapsulate the complex processes and patterns of emergence that characterize higher-level dynamics. Consequently, concepts such as cohesion must be explicitly and empirically examined in interteam contexts to fully demarcate the ways in which between-team emergent states imitate and differ from their team-level parallels. To this end, the present research makes an important contribution in identifying the boundary conditions associated with applying small group theory to the cross-team and MTS domains. In particular, many of the processes and relationships that foster perceptions of cohesion in small groups (e.g., interdependence, common goals, quality leadership) are made more complex by the intertwined goals, functional interdependence, and dual within- and between-team interactions that characterize MTSs.

Implications

The current research presents implications for both theory and practice surrounding MTS emergent states. In terms of theory, little to no research currently exists on emergent states in MTS, and most emergent states have not been conceptualized in organizational units beyond the small group level. Recent literature has pointed out that while many of the constructs examined in the teams literature are valid and important, we know little about how they operate at higher levels (DeChurch & Mathieu, 2009; DeChurch & Zaccaro, 2010). In this capacity, the construct of cohesion is no exception. Its importance for team functioning and performance is widely supported (e.g., Dobbins & Zaccaro, 1986; Griffith, 2002; LePine et al., 2008; Oliver et al., 1999), yet these findings do not fully explain or articulate how cohesion spans team boundaries in a MTS. By investigating how cohesion operates across teams and identifying several important constructs and relationships crucial to its formation, the current work contributes not only to our understanding of cohesion as a phenomenon, but also to our knowledge of how emergent states function among teams in a large, complex system. In doing so, the current study exposed many intricacies and nuances in the emergence of consequences of between-team cohesion. For one, the manifestation of emergent processes among component teams will be a precise configuration of leadership behaviors, interdependencies, and shared goals. These cross-team effects will not simply converge to create between-team cohesion, but will interact and affect each other in complex ways. Second, emergent states that occur between teams are more than just an amalgam of their lower level counterparts. Instead, homologous constructs across levels will exhibit boundary conditions and curvilinear effects. Finally, the straightforward relationship between emergent states and team performance outcomes does not readily manifest in MTSs. These findings hold important contribution to our understanding of how MTSs function, and provide empirical support for the notion that constructs and relationships within the MTS domain are rarely reducible to their team-level parallels.

The current study poses practical implications as well. First, recommendations for leaders in MTSs should stress that boundary spanning behaviors will be crucial when goals are misaligned. To remedy this misalignment, boundary spanning behaviors should be enacted primarily among component team leaders, and in particular among leaders whose respective teams are highly interdependent within the system. Second, within- and between-team cohesion do not necessarily compete with one another, therefore it is possible for managers and organizations to cultivate cohesion at all levels of the MTS.

However, the interaction among perceptions of within- and between-team cohesion suggest that there may be a performance tradeoff associated with simultaneously high levels of within- and between-team cohesion. Finally, while emergent states between teams are likely to be crucial to MTS functioning, they may not necessarily result in MTS success. Instead, MTS outcomes are more likely to stem from a complex configuration of component team effectiveness, proximal and distal goal accomplishments, and sophisticated management of within- and between-team interdependencies (Marks et al., 2005; Mathieu et al., 2001). While a common understanding of between-team cohesion can facilitate these processes, it cannot singularly account for system-level effectiveness. These empirically-informed recommendations, as well as other strategies that arise from future research on MTS emergent states, have the potential to improve the functionality of the complex systems that characterize today's organizations.

Limitations and Future Directions

While the current research yielded several important and interesting findings, limitations of the study should be addressed in future efforts. For one, the dataset was plagued by a low response rate. Although acceptable levels of power were achieved, responses from all members of all units would have provided a more comprehensive picture of the emergence of between-team cohesion. Additionally, the units sampled were likely in different phases of training and development within the Army Force Generation (ARFORGEN) cycle[7], which may have affected the between-team cohesion each unit demonstrated. For example, units that had trained together for longer, or even deployed

[7] The ARFORGEN cycle is the Army's current training and deployment schedule, in which intact units (typically at the brigade level) proceed through the phases of *reset, ready/train,* and *available* in order to prepare for their deployment (AR 525-29).

together, may have experienced more between-team cohesion due to their tenure. [8] Future research should incorporate stages of group development as either a covariate or moderator in the examination of interteam emergent states. On a related note, longitudinal research could capture the temporal dynamics associated with between-team cohesion through longitudinal studies. Emergent phenomena by definition develop over time through interactions (Kozlowski & Klein, 2000; Marks et al., 2001); therefore a consideration of time in empirical studies will enhance our knowledge of how interteam emergent states develop. A longitudinal research design would also be the next step in confirming the cause-and-effect (i.e., purely predictive) nature of the relationships found in the present study, which can be more difficult to pinpoint in cross-sectional studies. For example, longitudinal data could uncover the potential temporal effects of goal misalignment on leader boundary spanning and subsequent between-team cohesion. Finally, future studies should attempt to generalize the present findings to domains outside of the military. In the teams literature, cohesion has been studied in many contexts (e.g., organizational, social, counseling; Dion, 2000; Mullen & Cooper, 1994); and while cohesion generally operates similarly across contexts, there have been some differential findings between the military and civilian literature (e.g., Harrell & Miller, 1997; MacCoun, 1996; Mullen & Cooper, 1994) which highlight the need for investigations across domains, structures, and contexts.

---

[8] The originally scheduled data collection involved surveying an entire Army brigade (approximately 36 platoons), whose units were all in the same phase of the ARFORGEN cycle. Due to unforeseen conflicts on the part of the brigade, all units were not able to participate in this planned data collection. Therefore, additional data collection opportunities were pursued, and several companies outside of the original brigade were sampled. These companies may have been at various stages of the ARFORGEN cycle. Unfortunately, because ARFORGEN phase was originally not supposed to vary across units, it was not captured in the survey instruments.

Table 1. Summary of Hypotheses 1-3 Results Using 3 Analytical Approaches

Hypothesis/Analysis	Approach #1: Shared perceptions of Between-Team Cohesion among squad-dyads	Approach #2: Shared perceptions of Between-Team Cohesion within squads	Approach #3: Uniform perception of Between-Team Cohesion within squads
H1: Between-Team Interdependence is positively associated with Between-Team Interdependence	Not supported	Not supported	Not supported
H2a: LBS is positively associated with Between-Team Cohesion			
Horizontal LBS	Not supported	Not supported	No supported
Vertical LBS	Not supported	Not supported	Not supported
H2a Follow Up: Interdependence interacts with LBS and Goal Alignment to predict Between-Team Cohesion			
Horizontal LBS	Supported – See Table 4	Not supported	Not supported
Vertical LBS	Not supported	Not supported	Not supported
H2b: LBS is positively associated with Goal alignment			
Horizontal LBS	Supported in the negative direction; See table 2	Supported in the negative direction; See Table 3	N/A
Vertical LBS	Supported – in the negative direction	Not supported	N/A
H2b Follow up: Interdependence interacts with LBS to predict Goal *MIS*alignment			
Horizontal LBS	Supported – See Table 5	Not supported	N/A
Vertical LBS	Not supported	Supported – See Table 6	N/A
H2c: Goal alignment partially mediates the relationship between LBS and Between-Team Cohesion			
Horizontal LBS	Not supported	Not supported	Not supported
Vertical LBS	Not supported	Not supported	Not supported
H3: Within-Team Cohesion demonstrates an inverted-U relationship with Between-Team Cohesion	Partially supported (inverted-S relationship) – See Table 7, Figure 5	Partially supported (inverted-S relationship) – See Table 7, Figure 5	Not supported (linear relationship) – See Table 7

Table 2. Dyad-Level Descriptives and Intercorrelations

Variable	M	SD	1	2	3	4	5
1. Between-Team Interdependence	4.57	.90	--				
2. Horizontal LBS	5.60	1.30	.199**	--			
3. Vertical LBS	5.41	1.34	-.019	.616**	--		
4. Goal Alignment	4.15	2.70	.170*	-.211**	-.265**	--	
5. Within-Team Cohesion	5.39	.589	-.010	.035	-.116	-.099	--
6. Between-Team Cohesion	4.92	.618	-.038	.024	-.073	.012	.654**

**p* < .05, ***p* < .01, one-tailed significance tests; pairwise-deletion was used, N ranges from 111 to 162, depending on response rate.

Table 3. Squad-Level Descriptives and Intercorrelations

Variable	M	SD	1	2	3	4	5	6
1. Between-Team Interdependence	4.52	1.12	--					
2. Horizontal LBS	5.65	1.58	.234*	--				
3. Vertical LBS	5.47	1.55	.070	.666**	--			
4. Goal Alignment	4.29	2.94	.052	-.249*	-.176	--		
5. Within-Team Cohesion	5.38	.85	-.052	.057	-.059	-.054	--	
6. Between-Team Cohesion	4.92	.85	-.034	.161	.080	.033	.667**	--
7. Between-Team Cohesion Agreement ($R_{wg(j)}$)	.429	.35	-.023	.093	.136	-.186	.192*	.368**

**p* < .05, ***p* < .01, one-tailed significance tests; pairwise-deletion was used, N ranges from 62 to 128, depending on response rate.

Table 4. Approach #1 Results of Moderating Effect of Between-Team Interdependence on Horizontal LBS and Goal Alignment in Predicting Between-Team Cohesion

	Between-Team Cohesion				
	β	R^2	ΔR^2	Simple Slope Analysis	
				β (at -1SD)	β (at +1SD)
Step 1		.025			
Horizontal LBS	.047				
Goal Alignment	.025				
Interdependence	-.052				
Step 2		.111	.086**		
Horizontal LBS X Interdependence	.237*			-.032	.158†
Goal Alignment X Interdependence	.275**			-.042	.082†

$^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, N = 110

Table 5. Approach #1 Results of the Moderating Effect of Between-Team Interdependence on Horizontal LBS in Predicting Goal Alignment

	Goal Alignment				
	β	R^2	ΔR^2	Simple Slopes Analysis	
				B (at -1 SD)	*B* (at +1 SD)
Step 1		.101**			
Horizontal LBS	-.253**				
Interdependence	.221*				
Step 2		.136*	.035*		
Horizontal LBS X Interdependence	-.216*			-.218	-1.054**

$^{*}p < .05$, $^{**}p < .01$, N = 110

Table 6. Approach #2 Results of Moderating Effect of Between-Team Interdependence on Vertical LBS in Predicting Goal Alignment

	Goal Alignment			
	Fixed Effects		Random Parameters	
	Coefficient	Std. Error	Std. Deviation	Variance Component
Intercept	9.067	.455	2.21	4.87**
Vertical LBS	-.028	.092		
Interdependence	.094	.212		
Vertical LBS X Interdependence	.169*	.076	.248	.062

*$p < .05$, **$p < .01$. Level 1 (squad) N = 62, Level 2 (platoon) N = 29.

Table 7. Summary of Approaches #1-#3 Results Testing the Relationship between Within- and Between-Team Cohesion

	Between-Team Cohesion						
	Approach #1 (OLS Regression)			Approach #2 (HLM)		Approach #3 (HLM)	
	β	R^2	ΔR^2	Coefficient	Std. Error	Coefficient	Std. Error
Within-Team Cohesion	.654**	.428**		.659**	.076	.089*	.041
Within-Team Cohesion (squared)	.035	.429	.001	.002	.082	.021	.044
Within-Team Cohesion (cubed)	.214*	.445**	.016*	.126**	.029	.061	.039

*$p < .05$, **$p < .001$, for Approach #1, N = 161; for Approaches #2 and #2, Level 1 N = 128, Level 2 N = 38

Table 8. Interaction of Within- and Between-Team Cohesion in Predicting System Readiness

	Platoon Readiness				
	β	R^2	ΔR^2	Simple Slope Analysis	
				B (at -1 SD)	B (at +1 SD)
Step 1		.035			
Between-Tm Cohesion	-.182				
Within-Tm Cohesion	.231				
Step 2		.165	.130*		
Between X Within Tm Cohesion	-.395*			1.04	-1.09*

*$p < .05$, N = 34

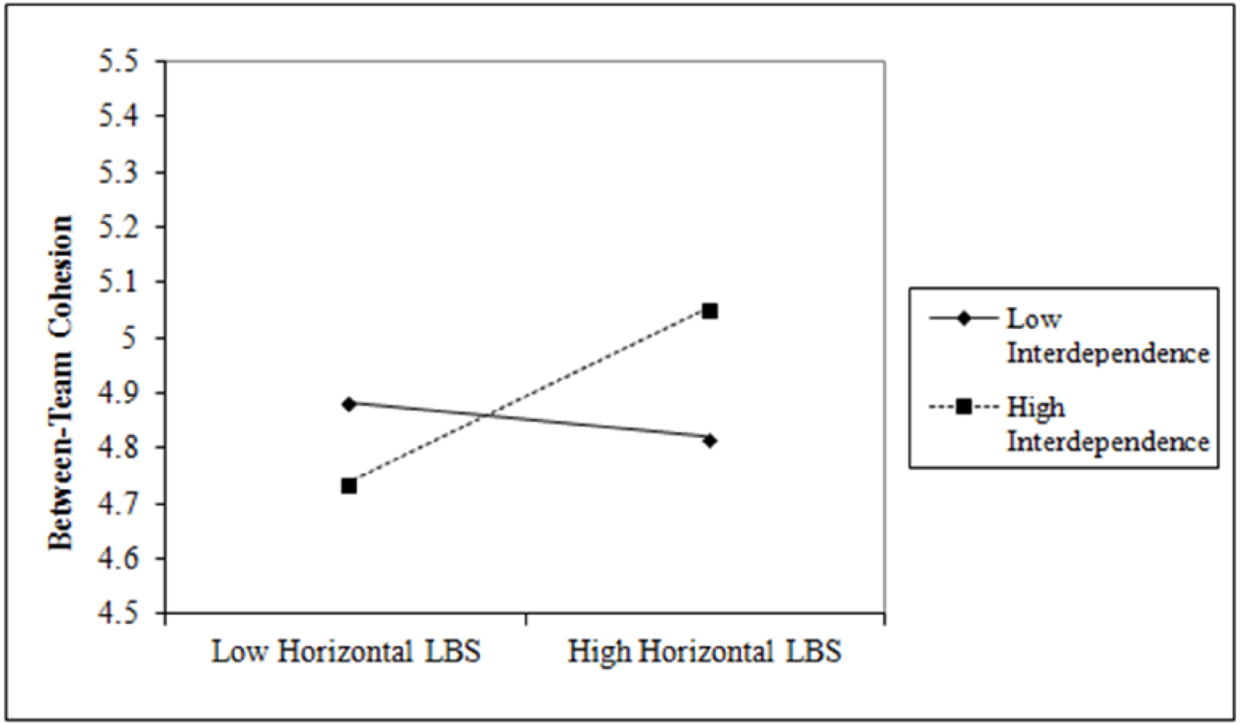


Figure 1.Interaction Effect of Between-Team Interdependence and Horizontal LBS in Predicting Between-Team Cohesion (Approach #1)

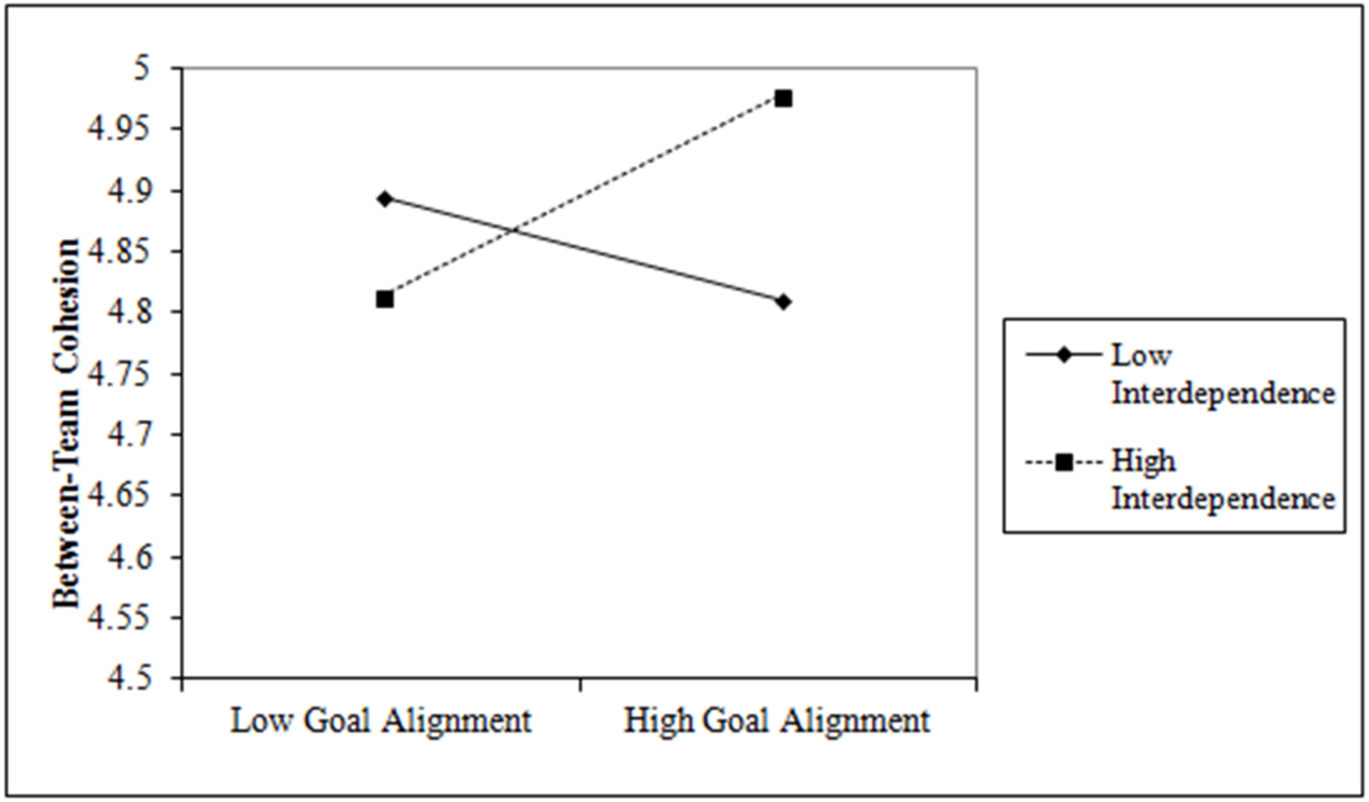


Figure 2. Interaction Effect of Between-Team Interdependence and Goal Alignment in predicting Between-Team Cohesion (Approach #1)

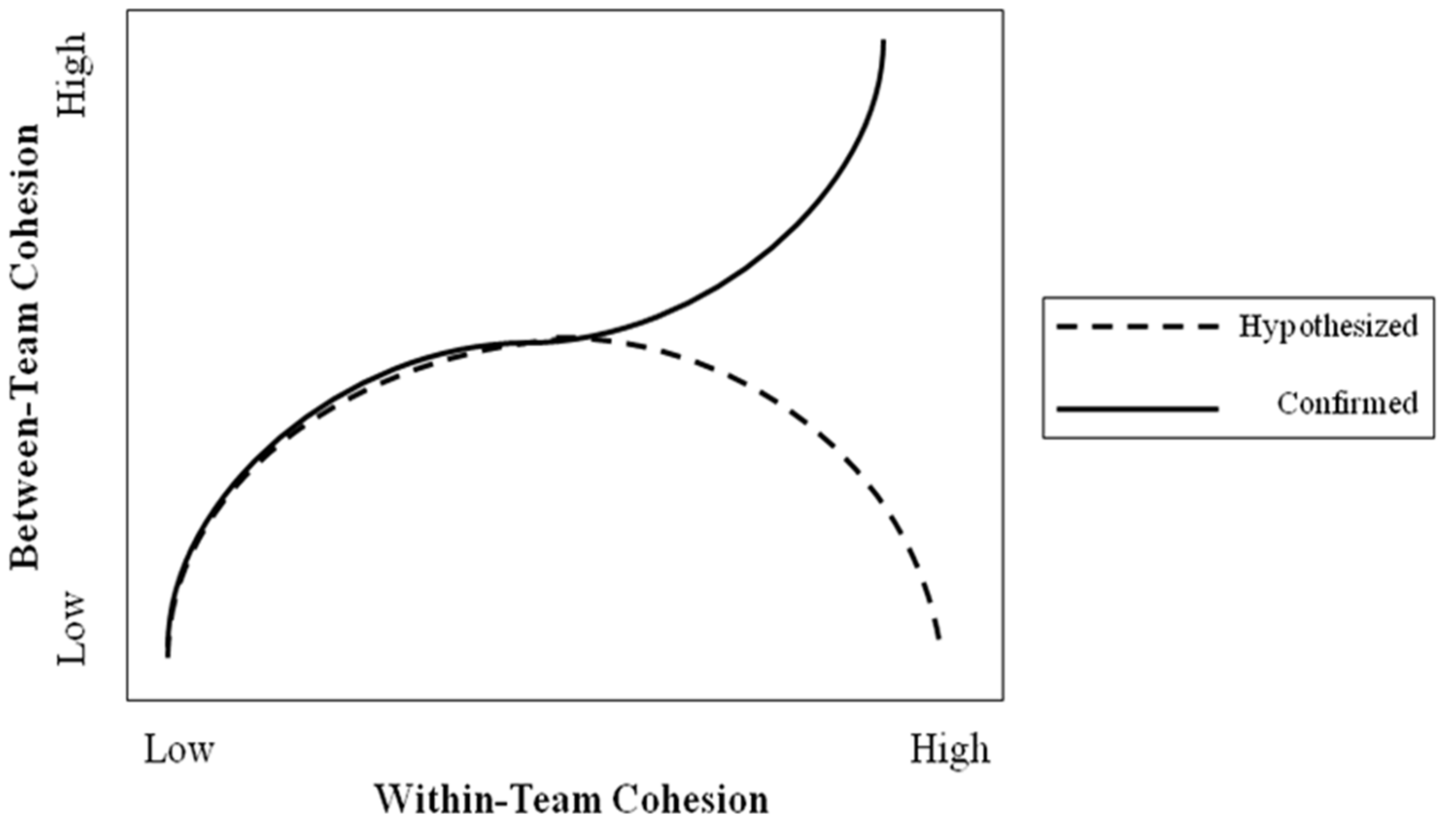


Figure 3. Plot of Hypothesized and Confirmed Relationship between Within- and Between-Team Cohesion (Approaches #1 and #2)

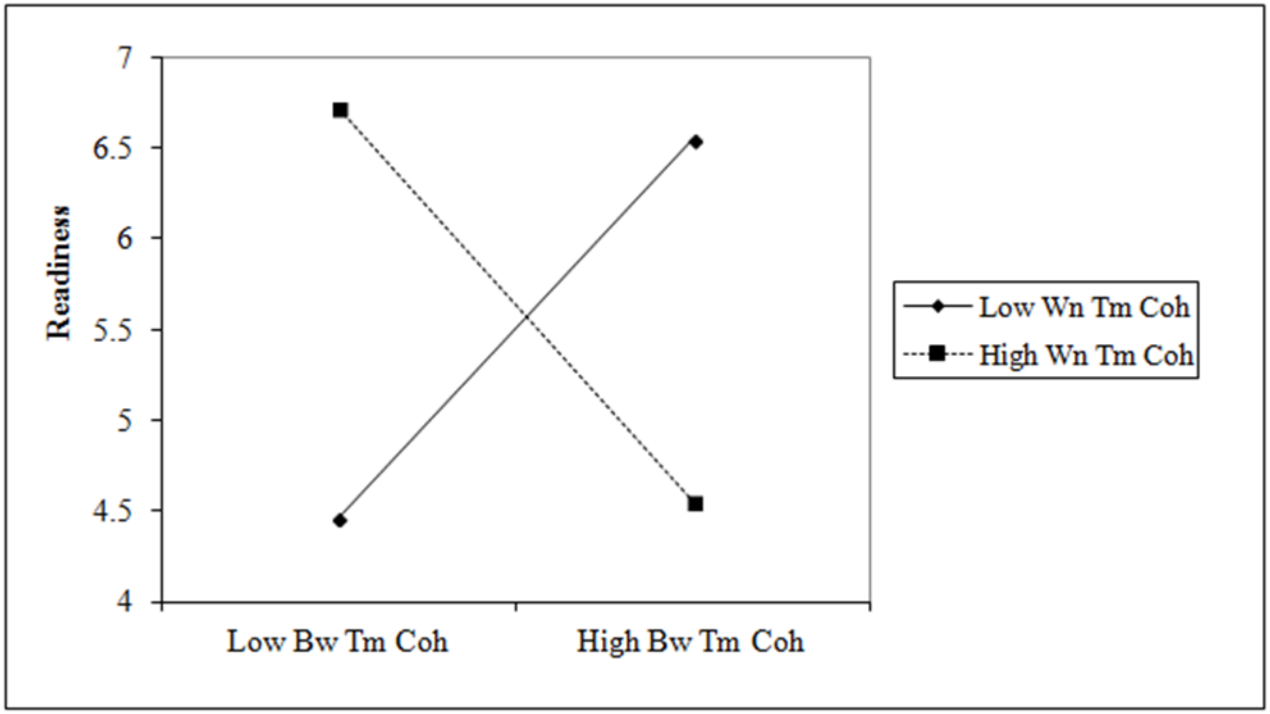


Figure 4. Interaction Effect of Within- and Between-Team Cohesion in Predicting System Readiness

APPENDIX A: MEASURES

Between-Team Interdependence

Instructions: Please answer the following questions regarding the SQUADS in your PLATOON.

1. The squads in this platoon cannot accomplish their missions without information and materials from other squads in the platoon.
2. The squads in this platoon depend on the other squads in this platoon for information and materials needed to perform the tasks.
3. Within my platoon, jobs performed by different squads are related to one another.
4. Within my platoon, the goals of any given squad are directly related to the goals of other squads.
5. Within my platoon, a squad's work activities on any given day are dependent on the work activities of other squads.

Goal Alignment

Instructions: According to your Company TTP, please list the top five (5) training goals your platoon has to accomplish this month?

1. Training Goal #1:
2. Training Goal #2:
3. Training Goal #3:
4. Training Goal #4:
5. Training Goal #5:

Leader Boundary Spanning:

Instructions: How often do you communicate with the following individuals regarding the goals you listed above? (Mark "this is me" for your own position)

1. Platoon Leader
2. Platoon Sergeant
3. 1st Squad Leader
4. 2nd Squad Leader
5. 3rd Squad Leader
6. 4th/Weapons Squad Leader

Within-Squad Cohesion

Instructions: Please answer the following questions about the SOLDIERS in your SQUAD.

1. This squad is a close one.
2. Soldiers in this squad really care about one another.
3. If I were to deploy, I would want to belong to a unit that includes Soldiers like the ones in this squad.
4. Soldiers in this squad pull together to perform as a team.
5. There is a lot of cooperation and teamwork among Soldiers in this squad.
6. This squad is united in trying to reach its goals for performance.

Between-Team Cohesion

Instructions: Please answer the following questions regarding SQUADS in your PLATOON.

1. All of the squads in my platoon are united in trying to reach the platoon's goals for performance.
2. I'm happy with the level of commitment that the individual squads in my platoon display toward the platoon's mission.
3. If I were to deploy again, I would want to belong to a platoon that includes squads like the ones in my current platoon.
4. All of the squads in my platoon pull together to perform as a unit.
5. There is a lot of cooperation and teamwork among the squads in my platoon.

Platoon Readiness

Instructions: Please answer the following questions for EACH of the platoons in your Company.

1. [1st/2nd/3rd] Platoon demonstrates a readiness to accomplish its training missions.
2. As a unit, [1st/2nd/3rd] Platoon is ready for its upcoming training missions.
3. [1st/2nd/3rd] Platoon would likely perform better in training compared to other platoons.
4. [1st/2nd/3rd] Platoon is prepared to perform its training missions.
5. [1st/2nd/3rd] Platoon has enough trained personnel to complete its immediate, mission-essential tasks.
6. [1st/2nd/3rd] Platoon has enough experienced personnel to complete its immediate, mission-essential tasks.
7. [1st/2nd/3rd] Platoon has enough motivated personnel to complete its immediate, mission-essential tasks.

APPENDIX B: DISSERTATION PROPOSAL AND FULL LITERATURE REVIEW

The field of industrial/organizational psychology has long recognized the importance of team functioning in organizations and the need for theory and research that can be applied to real-world settings. However, current conceptualizations of team inputs, processes, emergent states, and outcomes still fail to fully capture the complexity of how teams operate in today's organizations. Today's teams rarely function in a vacuum; instead, many teams operate within a multiteam system (MTS; Mathieu, Marks, & Zaccaro, 2001). Multiteam systems are more than just teams embedded within an organization or a large team with sub-units. Instead, these systems represent a team of teams in which constituent efforts and outputs combine to yield higher-level outcomes (DeChurch & Mathieu, 2009; DeChurch & Zaccaro, 2010). Given the complexity of today's work environment, MTSs are becoming more prevalent in modern organizations (Williams & Mahan, 2006). Paradoxically, these systems are rarely the focal level of analysis in theory or research (DeChurch & Mathieu, 2009). To address such a paradox, emerging team research will need to expand what we know about teams in order to encapsulate the various processes that occur across teams within a system. DeChurch and Zaccaro (2010) suggest that we need to account for this complexity by shifting our level of analysis upward. Fortunately, the team literature provides us with solid theories and empirical findings, which can be used as building blocks to create more complex, systems-level theories. Additionally, theory and research on MTSs will supply a useful framework for how certain constructs and relationships will play out in a larger system of teams.

Researchers have begun to extend certain team constructs to the systems-level. In particular, processes such as boundary spanning (Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005) and inputs such as leadership (DeChurch & Marks, 2006; DeChurch, Burke, Shuffler, Lyons, Doty, & Salas, 2011) have previously been explored in MTSs. Less work exists on emergent states that can take shape in an MTS. Emergent states are conceptualized as constructs that develop over time through group interactions (Marks et al., 2001). These differ from team processes in that they describe states resulting from interactions, rather than the interactions themselves. The development of emergent states is what accounts for the synergy of teams (Salas, Rosen, Burke, & Goodwin, 2009), in which the outcomes of the higher-level unit are greater than the sum of lower-level efforts (Zaccaro, Heinen, & Shuffler, 2009). At the team level, emergent states such as trust (Jarvenpaa & Leidner, 1999), cohesion (Mullen & Cooper, 1994), social identity (Hogg & Terry, 2000), and shared mental models (SMMs; Klimoski & Mohammed, 1995) have been investigated. These constructs exist solely at the level of aggregation, and not at lower levels (Dansereau, Alutto, & Yammarino, 1984; Weingart & Cronin, 2009). For example, trust cannot be conceptualized as an individual-level variable, as it characterizes a state that exists *between* individuals. Research and theory also emphasizes that the way in which emergent states form is an important consideration. The formation of these group-level states can fall on a spectrum ranging from relatively simple compositional (i.e., linear) models to more complex, compilational (i.e., non-linear) models (Kozlowski & Klein, 2000). These patterns of emergence will have implications for how the constructs should be operationalized and aggregated.

The research on emergent states in teams will provide valuable information in the study of emergent states in MTSs (DeChurch & Zaccaro, 2010). However, MTSs are more complex than teams; therefore the development and nature of emergent states at the system-level will be more complex as well. Several issues will need to be addressed in order to account for these additional complexities. First, MTS inputs, processes, and outcomes are the results of within-team and between-team factors (Marks et al., 2005). Accordingly, emergent states in an MTS will likely develop as a result of interactions both within and across teams in the system. The nature of these interactions at different levels, as well as how they combine to form higher-level outcomes, will need to be explored in future research. Second, as complex and adaptive structures, MTSs are likely to demonstrate non-linear emergent processes such as boundary conditions and thresholds (Aiken & Hanges, 2012; Coen & Schnackenberg, 2012; Gladwell, 2000; Urry, 2004). These follow compilational patterns of emergence; unfortunately, limited analyses and techniques exist for examining these more complex relationships (Kozlowski & Klein, 2000). Third, research will need to identify the precise relationship between emergent states at the system- and team-levels. While an emergent state at one level is likely to be related to the analogous emergent state at another level, the causal relationship may be harder to determine. For example, the team-level of an emergent state might foster the system-level of that emergent state through bottom-up processes; or, the reverse might occur through top-down processes. Also, system- and team-level states may be in competition with one another. MTSs require members to simultaneously attend to individual, team, and system level goals. These goals may be incongruent, or may overload the individual, causing him/her to attend to only one level of goal accomplishment. For example, an individual might devote cognitive resources to forming a SMM with immediate teammates at the expense of forming a SMM with the rest of the MTS. This would result in a negative relationship or a threshold effect between an emergent state at the team- and system-level. All of these issues raise important questions and avenues for research regarding the way emergent states develop and function within an MTS.

As one of the most commonly researched emergent states (Kozlowski & Ilgen, 2006), cohesion is one of the many important constructs that will need to be re-examined beyond the team level. Cohesion is considered to be one of the defining characteristics of groups and teams (Dion, 1990), but it is also likely to play in important role across teams in an MTS. Contemporary conceptualizations of team cohesion, however, only address its emergence within a single team; the precise nature of its role in an MTS and its emergence between teams has yet to be explored. Thus, there is a critical gap in current theory and research.

The purpose of this dissertation is to contribute to a broader understanding of emergent states at levels higher than the team. To do so, the current work will focus specifically on cohesion. First, the following section will review extant literature on theories and findings relevant to team cohesion and the functioning of MTSs. Based on this review, a conceptualization of between-team cohesion and its manifestation in MTSs will then be outlined. Next, the work will propose an empirical study to evaluate aspects of the proposed model. In doing so, the present research will augment both theory and practice by enhancing the theoretical understanding of how teams function within a system, and contributing to the development of practices that can be used for fostering cohesion across a system in order to enhance system outcomes. These implications will be discussed in more detail in the final section of the paper.

Literature Review

Team Cohesion

Definitions of Cohesion

Cohesion has been widely studied as a group phenomenon in many types of groups and teams, including organizational, social, counseling, and military (Dion, 2000; Mullen & Cooper, 1994). Not surprisingly, given these multiple domains, cohesion has been defined in a number of ways (Casey-Campbell & Martens, 2009). French (1941) first described cohesive groups as ones that demonstrated a “resistance to locomotion” (p. 371), or the tendency to stay intact. Festinger (1950) later elaborated on this notion and more fully defined cohesion as “the resultant of all forces acting on members to remain in the group” (p. 274). Similarly, Schachter, Ellerston, McBride, and Gregory (1951) defined cohesion as “the ‘cement’ binding together a group of members and maintaining their relationships with one another” (p. 229). As can be gleaned from these examples, early definitions of cohesion essentially posit that the construct reflects the degree to which a team is resistant to disruption. Other conceptualizations define cohesion largely in terms of an individual's attraction to the group (e.g., Back, 1951; Libo, 1953; Frank, 1957). Back (1951) defines cohesion as the "attraction of a group for its members" (p. 9). Libo (1953) provided a similar example of cohesion as "the attractiveness of the group as a goal object for its members" (p. 2). Critics have pointed out, however, that these definitions describe the *individual's* attitude toward the group, thus positing cohesion as an individual-level phenomenon, rather than one that exists solely at the group level (Cartwright, 1967; Evans & Jarvis, 1980). Instead, it is more precise to concur that the group-level phenomenon of cohesion as resistance to disruption stems from the uniform commitment that members demonstrate toward group membership. Other definitions conceptualize cohesion in terms of its covariates or characteristics, such as trust (e.g., Bednar, Weet, Evensen, Lanier, & Melnick, 1974; Siebold, 2007), task commitment (e.g., Goodman, Ravlin, Schminke, 1987), or interpersonal bonding (e.g., Bednar et al., 1974). While these constructs are likely to exist in cohesive groups, they are best conceptualized as manifestations of cohesion, rather than cohesion itself. For example, Gross and Martin (1952) point out that while attraction to the group will likely be an important force in creating cohesion, it is not the sole reason that cohesion forms. Accordingly, most contemporary views of cohesion conceptualize it as a multidimensional construct (Paskevich, Estabrooks, Brawley, & Carron, 2001). This notion is best reflected in more comprehensive definitions such as Festinger's (1950), which point out that cohesion is a factor of numerous forces acting on the group as a whole.

Cohesion as an emergent state

In terms of contemporary models of team functioning, cohesion is classified as an emergent state in that it develops over time through group interactions (Marks et al., 2001). Kozlowski and Klein (2000) define this type of phenomenon as a "collective structure that results from dynamic interactions among lower level elements" (p. 15). As such, emergent states cannot be reduced to their lower-level constituents (Dansereau et al., 1984). In this sense, cohesion represents a group level phenomenon that describes the connections between individuals, and therefore has no meaning at the individual level. As an emergent state, cohesion can also act as both an input and outcome of team functioning. Thus, while cohesion may form as a result of team functioning, it can also drive team functioning once it has formed in the group.

In describing emergent states, Kozlowski and Klein (2000) point out that it is important to fully define the bottom up processes by which the higher-level phenomenon emerges. Cohesion, like other emergent states, originates in individual perceptions, which converge over time through member interactions, shared experiences, and emerging relationships until ultimately, a higher-level phenomenon develops (F.H. Allport, 1954; Katz & Kahn, 1966; Kozlowski & Klein, 2000). This sharing among members occurs because constituents within a team are typically exposed to homogenous stimuli (James & Jones, 1974). Over time, the individual interpretations of the stimuli begin to converge to form a common interpretation, resulting in an overall consensus (Kozlowski & Klein, 2000). In the case of cohesion, individual perceptions or attitudes about a desire to remain in the group ultimately converge to represent the degree to which the group as a whole is resistant to member attrition. As such, cohesion at the team level represents a compositional model, in which lower-level phenomena converge in a relatively linear fashion to form a higher-level analog. Specifically, the number of group members that wish to remain in the group directly contributes to the level of robustness or cohesion that the group demonstrates. Constructs in compositional models are described as being isomorphic in that they are comparatively equivalent across levels in terms of both structure and function (Morgeson & Hofmann, 1999; Rousseau, 1985). Structure refers specifically to how the constructs are formed, while function refers to the effects created by the constructs (Morgeson & Hofmann, 1999).

While cohesion is a team-level construct, and therefore does not exist at the individual level per se, it still represents an isomorphic construct in that its structure and function are parallel to the desires to remain in the group that exist at the individual level. In terms of structure, an individual's desire to remain in the group is formed as a result of his/her attitude toward group membership. At the team-level, cohesion also forms as a result of individual attitudes towards the group, specifically, in the convergence of these attitudes towards a shared desire to keep the group intact. This uniform commitment and attraction to the group captures the essence of cohesion. In terms of function, an individual's desire to remain in the group will cause him/her to continue being a member of the group. At the team level, cohesion functions in the same manner in that the collective or shared desire of members to remain in the group will result in individuals maintaining their group membership and avoiding disbandment. This isomorphism represents a compositional model of emergence, in which lower level analogs converge to form a higher-level construct that is parallel in both function and structure.

Dimensions of Cohesion

Contemporary conceptualizations of cohesion consider it to be a multidimensional construct (e.g., Zaccaro & Lowe, 1988; Paskevich et al., 2001). Task and social cohesion are the most commonly cited dimensions of cohesion. *Task cohesion* refers to the members' shared commitment to the team task; while *social cohesion* refers to the interpersonal bonds that exist between members, such as liking, attraction, and trust (Craig & Kelly, 1999; Evans & Jarvis, 1980; Siebold, 1999). The distinction between these two aspects of cohesion was first made by Mikalachki (1969), and since then the task- and social- dimensions of cohesion have appeared frequently in the literature (e.g., Carron, Widmeyer, & Brawley, 1985; Siebold, 2006; Zaccaro & Lowe, 1988). These dimensions are not mutually exclusive, however; in fact, they typically show a strong positive correlation, as cohesion can arise from member commitments to both the task- and socially-based functions of the group (Carron, 1982; Carron et al., 1985; Hackman, 1976; Tziner, 1982; Zaccaro, 1991; Zaccaro & Lowe, 1988; Zaccaro & McCoy, 1988). Nevertheless, research shows that these dimensions are in fact distinct (e.g., Zaccaro, 1991; Zaccaro & Lowe, 1988; Zaccaro & McCoy, 1988). This occurs because the different types of cohesion develop as a function of *why* individuals value their group membership (Hackman, 1976; Tziner, 1982; Zaccaro & McCoy, 1988). Task cohesion stems largely from members' collective commitment to the task (Hackman, 1976) and the individual's perceptions that one's group membership will facilitate the accomplishment of one's goals (Festinger et al., 1950). Social (or interpersonal) cohesion arises when a member becomes attracted to a group because of the rewarding relationships and friendships that the group provides (Festinger et al., 1950; Lott & Lott, 1965). The distinction between task- and social- cohesion is also demonstrated by empirical studies showing their differential outcomes (e.g., Carron et al., 1985; Griffith, 1988; Mullen, Anthony, Salas, & Driskell, 1994; Mullen & Cooper, 1994; Siebold & Kelly, 1988; Zaccaro & McCoy, 1988). For example, task cohesion is more strongly related to a reduction in role uncertainty and absenteeism (Zaccaro, 1991), while social cohesion relates more strongly to member liking (Zaccaro & Lowe, 1988). The differential effects of task and social cohesion are particularly salient in reference to performance. Both types of cohesion have been shown to affect performance (Carless & DePaola, 2000; Chang & Bordia, 2001; Langfred, 1998; Neubert, 1999; Wech, Mossholder, Steel & Bennett, 1998), yet the debate remains over which aspect of cohesion better contributes to overall team performance. Results from meta-analyses have shown contradictory findings. On the one hand, task cohesion has been shown to be a stronger predictor of performance compared to social cohesion (Mullen & Cooper, 1994). Contrarily, task and social cohesion have been found to be equally significant predictors of performance (Beal et al., 2003). In exploring these competing results, research has identified certain moderators that may explain the divergent findings. First, the differential effect of cohesion dimensions on performance is moderated by team characteristics such as setting and type (Chiocchio & Essiembre, 2009). Second, the nature of the relationship will depend on the type of performance outcome, such that task cohesion will better predict task-related outcomes, while social cohesion will be more strongly related to interpersonally-oriented outcomes (Chang & Bordia, 2001). Regardless of these mixed findings, there is little debate in contemporary literature that cohesion is inherently a multidimensional construct containing both a task- and socially- oriented component, both of which affect team functioning.

Past Research on Cohesion

Cohesion is one of the most commonly studied emergent states in the teamwork literature (Kozlowski & Ilgen, 2006). A number of studies have examined antecedents and outcomes, as well as covariates of cohesion at the individual-, team-, and organizational-level. These constructs are listed in Table 1 and their relationships are illustrated in Figure 1.

Insert Table 1 here – Antecedents, covariates, and outcomes of cohesion

Insert Figure 1 here – Model of antecedents, covariates, and outcomes of cohesion

Outcomes of cohesion. Several important outcomes of cohesion have been identified in the literature. At the individual level, cohesion has been linked with behaviors such as decreased absenteeism (Sanders, 2004; Sanders & Hoekstra, 1998), increased effort (Greene, 1989), high adherence to norms and rules (Carron, Widmeyer, & Brawley et al., 1998; Oliver, Harman, Hoover, Hayes, & Pandhi, 1999; Prapavessis & Carron, 1997; Shields, Bredemeier, Gardner, & Boston, 1995; Schachter et al., 1951), and advice seeking and giving among members (Van Woerkem & Sanders, 2010). Cohesion has also been shown to enhance individual attitudes of job satisfaction (Ahrsonson & Cameron, 2009; Dobbins & Zaccaro, 1986; Oliver et al., 1999; Walsh, Matthews, Tuller, Parks, & McDonald, 2010), psychological adjustment (Griffith, 2002; Sanders, 2004; Sanders & Hoekstra, 1998), self-esteem (Cartwright, 1968; McGrath, 1984), and motivation (Shaw, 1981). However, because cohesion is a group-level concept, its strongest consequences tend to occur at the group-level. These include positive team-level attitudes such as collective efficacy (Paskevich et al., 2001) and team satisfaction (Tekleab, Quigley, & Tesluk, 2009), as well as negative outcomes such as groupthink (Janis, 1983) and excessive socializing (Zaccaro & McCoy, 1988). Most commonly studied and supported, however, is cohesion's relationship with team performance. Many studies have uncovered a positive relationship (e.g., Chang & Bordia, 2001; Yagil, 1995), and several meta-analyses have re-affirmed it (e.g., Carron, Colman, Wheeler, & Stevens, 2002; Evans & Dion, 1991; Mullen & Cooper, 1994; Gully, Devine, & Whitney, 1995). Research also shows that the cohesion-performance relationship is stronger at the group-level compared to the individual-level (Oliver et al., 1999; Salo, 2007). Although cohesion is substantiated as a strong predictor of performance, it does not always predict *good* performance. Schachter et al. (1951) observed that cohesive groups showed more uniformity in productivity, however group norms largely contributed to whether the productivity was high or low. Since members of highly cohesive groups strongly adhere to group norms, this can result in low productivity if group norms consist of shirking responsibilities or maintaining a low level of performance (i.e., rate busting; Bass, 1981; Janis, 1983). Therefore while cohesion strongly drives member behaviors, it is not a sufficient condition for team effort, productivity, or performance.

Covariates of Cohesion. Because cohesion can function as both an input and output over team performance cycles, it demonstrates a bidirectional, rather than causational, relationship with several constructs. These constructs are typically conceptualized as covariates of cohesion, rather than explicit antecedents or outcomes. For example, while the significant relationship between cohesion and performance outcomes is rarely debated, the temporal nature of the relationship is less clear. Meta-analyses suggest a reciprocal relationship (Carron et al., 2002; Mullen & Cooper, 1994) in which cohesion can enhance performance, but high performance can foster cohesion within the group as well. This results in a spiraling pattern similar to the one between performance and efficacy that has been described by Lindsley, Brass and Thomas (1995), in which iterations over time allow constructs to build upon each other. In the case of cohesion, cohesive teams are more capable of accomplishing goals without succumbing to disruption, which enhances the probability that future goals will be accomplished. Similarly, a group's successes increase the value of its membership, thus making its constituents less likely to disband. In this way, performance and cohesion increase in tandem through interactions and iterations over time. This cyclical relationship has also been described between cohesion and other constructs listed in Table 1, such as trust (Zaccaro & Dobbins, 1986), communication (Lott & Lott, 1961; Manning, 1991), collective efficacy (Paskevich, Brawley, Dorsch, & Widmeyer, 1999) and team processes (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). Like performance, it is likely that cohesion both fosters and forms from these constructs over time.

Antecedents of Cohesion. Although less research exists on antecedents to cohesion (Bartone & Adler, 1999; Bartone, Johnsen, Eid, Brun, & Laberg, 2002), several structural and situational factors have been identified as potential determinants of group cohesion. In terms of structural factors, group size (Mullen & Cooper, 1994; Siebold &

Kelly, 1988; Steiner, 1972; Widmeyer, Brawley, & Carron, 1990), and proximity (Festinger, 1950; Ingraham, 1984; Lott & Lott, 1965; Tajfel & Turner, 1979; Wilder, 1986) have both been shown to significantly affect the development of cohesion. Group size exhibits a negative effect on group cohesion (Hambrick, 1994; Seers, Keller, & Wilkerson, 2003). Steiner (1972) posited that as group size increases, the potential for process loss also increases, as it becomes more difficult to coordinate actions between a large number of members. This in turn reduces the productivity of a team, which can decrease existing cohesion or make it difficult for cohesion to develop at all (Carron, 1988; Widmeyer, Brawley, & Carron, 1985). Additionally, because the social aspect of cohesion largely stems from meaningful interpersonal relationships among members, larger groups tend to be less cohesive because it becomes more difficult to establish these relationships with larger numbers of individuals. Widmeyer and colleagues demonstrated these effects in their finding that larger sports teams tended to be less task- and socially-cohesive (Widmeyer, Brawley, & Carron, 1990). Proximity, on the other hand, demonstrates a positive relationship with cohesion (Festinger, Schachter, & Back, 1950; Ingraham, 1984; Lott & Lott, 1965; Tajfel & Turner, 1979; Wilder, 1986). Festinger and colleagues' (1950) seminal article demonstrated that interpersonal relationships were most likely to develop among individuals who lived in close proximity to each other. G.W. Allport's (1954) *contact hypothesis* purports that this effect occurs because increased contact between individuals tends to reduce stereotypes or prejudices that may initially exist. The trend is also attributed to what Zajonc (1968) described as the *mere exposure effect*, in which the evaluation of stimuli is enhanced as a result of frequent interaction. There are boundary conditions to this effect, however, as proximity has only been shown to promote cohesion within neutral environments that pose opportunities for interaction (Lott & Lott, 1965). This suggests that the development of cohesion is caused by the frequent interactions afforded by physical proximity, rather than the proximity itself. Within working teams, the recurrent interactions necessitated by teamwork serve to enhance task-based cohesion, while the social interactions that often occur in tandem foster interpersonal or social cohesion.

Demographic composition of the group can also affect the development of cohesion; however the literature shows mixed findings on the nature of this effect. Past research has posited that homogeneity in terms of member demographics (Lott & Lott, 1965) and personality (Hogg, 1992) would enhance cohesion, based on the notion that individuals tend to positively evaluate individuals similar to them (Byrne, 1971). Other theory and research, however, has found that member diversity holds little to no effect over the cohesion that develops within a team (e.g., Webber & Donahue, 2001; Seashore, 1954). Seashore (1954) points out that this latter effect is most often observed when the demographic or personality variable upon which group members vary is irrelevant to the group task or setting. Particularly in military settings, the effects of member diversity on cohesion have shown to be minimal if not non-existent (Anthony et al., 1993; Harrell & Miller, 1997; MacCoun, 1996; Siebold & Lindsay, 1999). Instead, the strong social identity associated with being a member of the armed forces tends to supersede any identities attached to demographic characteristics.

Several situational factors have also been shown to foster cohesion. For example, external threats can enhance cohesion by creating a common enemy and/or goal to unite team members (Coser, 1956; Dion, 1979; Schachter, 1959; Sherif, Harvey, White, Hood, & Sherif, 1961; Stein, 1976). Lott and Lott (1965) also point out that external threats create a shared responsibility among members to address the threat, thus promoting cohesion. Similarly, shared stressful experiences can enhance cohesion (Bartone et al., 2002; Gal, 1983; Manning, 1991; Marlowe, 1985). This relationship is commonly examined within military contexts due to the extreme stress created by the dangers of deployment and combat.

One of the most commonly researched and well supported antecedents of cohesion is quality leadership (Cartwright, 1967; Manning & Ingraham, 1983; Siebold & Kelly, 1988). Bartone and Kirkland (1991) found that in military teams, leaders had a significant influence on the degree to which cohesion developed. Further investigations of military teams found that cohesion was a significant partial mediator of the effects of leadership on performance, both assessed at the platoon level (Bass, Avolio, Jung, & Berson, 2003). Other research suggests that even perceptions of leadership can enhance cohesion, particularly when a leader is perceived as being both caring and competent (Griffith, 1985; Ingraham & Manning, 1981; Kirkland, 1987; Kirkland, Bartone, & Marlow, 1993; Manning, 1991; Marlowe, 1985; Siebold & Kelly, 1988). These findings are particularly relevant to the military, as leadership in the armed forces chiefly consists of leading intact teams rather than isolated individuals (Cronin, 1998).

Team performance can also be an antecedent to cohesion in addition to being a common outcome. As an antecedent, however, performance has demonstrated differential effects on cohesion. Many studies support the notion that high performance enhances cohesion (e.g., Mullen & Cooper, 1994). Essentially, high performance can cause individuals to perceive the group as more efficacious, which in turn improves their attitude toward the group and makes membership more valued and the prospect of leaving the group less attractive. As a result, the overall group becomes more cohesive in that it is increasingly resistant to disruption. Conversely, poor performance has also been shown to improve cohesion (Berkowitz, Levy, & Harvey, 1957; Shaw & Gilchrist, 1955). This effect is likely to occur when the group perceives its poor performance as a stressor, which, as previously mentioned, can enhance cohesiveness (Bartone et al., 2002; Gal, 1983; Manning, 1991). Similarly, members may bond together to address the external threat of not achieving goals in the future (Berkowitz et al., 1957). Although these findings are contradictory, it is likely that both relationships are possible, and that the nature of the performance-cohesion relationship depends on a number of factors, such as unit climate, leadership, the circumstances of performance, and the team's interpretation of successes and failures.

Relationship with Interdependence

The relationship between cohesion and performance is largely influenced by the moderating role of interdependence. Interdependence is "a state by which entities have mutual reliance, determination, influence, and shared vested interest in processes they use to accomplish work activities" (Mathieu et al., 2001, p. 293). Research typically delineates between different dimensions of team interdependence. Generally, interdependence dimensions refer to either the team's task(s) or goal(s). *Task interdependence* is the degree to which members must collaborate and interact in order to accomplish a task (Campion, Medsker & Higgs, 1993; Saavedra, Earley, & Van Dyne, 1993). Task interdependence is presumed to be prescribed by the task itself, as different kinds of tasks require different levels of interdependence of team members. *Goal interdependence* refers to the degree to which members share a common goal (Saavedra, et al., 1993). Because goals drive member efforts, the degree of goal interdependence often determines whether team members must engage in individual or collective actions (Deutsch, 1973; Earley & Northcraft, 1989; Earley, Wojnaroski, & Prest, 1987; Johnson & Johnson, 1989). Both of these types of interdependence have been shown to correlate positively with cohesion (Budman, Soldz, Demby, Davis, & Merry, 1993; Chen Tang, & Wang, 2009; Saavedra et al., 1993; Wageman, 1995, 2001). According to the contact hypothesis (G.W. Allport, 1954), when certain conditions are met, such as a norm of cooperation rather than competition, frequent interactions aid in the development of positive relationships. Because task interdependence requires members to cooperate in order to accomplish tasks, it can provide the grounds for the camaraderie, friendship, sense of belonging, and attachment among members that characterize cohesive groups (Campion et al., 1993, 1996; Johnson & Johnson, 1989). The contact hypothesis also cites common goals as a condition for relationship development (G.W. Allport, 1954). When teams exhibit goal interdependence, member goals become linked with each other. This goal congruence across members promotes solidarity within the team (Budman et al., 1993) and a shared commitment to each other and the goal, ultimately cultivating cohesion within the team (Chen et al., 2009; Hogg, 1992).

Interdependence has also been shown to moderate the cohesion-performance relationship, with the positive relationship between cohesion and performance increasing as the workload becomes more interdependent (Gully et al., 1995; Beal, Cohen, Burke, & McLendon, 2003). This effect is attributed to the fact that as interdependence increases, so does the potential for disruption (French, 1941). Thus, forces that defy disruption (i.e., cohesion) become more important for team performance. Research by Marks et al. (2005) suggests that this moderation also occurs at the systems-level. Their findings indicate that as interdependencies within an MTS increase, so does the importance of between-team interactions in predicting performance. Therefore, for highly interdependent systems, cohesion may need to exist between teams in order to allow them to carry out the interactions that lead to systems-level performance.

Cohesion in the military

Cohesion has long been identified as an important aspect of military readiness and effectiveness. For example, Shils and Janowitz (1948) found that a soldier’s relationship to his/her primary group is a stronger driver of behavior compared to one’s ideology of war or political values. In today’s military, cohesion is often credited as the force that drives soldiers to risk their lives for a mission (Henderson, 1985). The importance of cohesion to military success is evident in the U.S. Army’s emphasis on cohesion in training, doctrine and research. To wit, the U.S. Army Research Institute for the Behavioral and Social Sciences and the Walter Reed Army Institute of Research have consistently investigated cohesion in the Army for the past three decades (Siebold, 2007). A meta-analysis by Oliver et al. (1999) served to further solidify the importance of cohesion in the military, as it confirmed that within military teams cohesion was related to many beneficial outcomes such as group performance, job satisfaction, well-being, retention, and readiness. Despite the recognized importance of military cohesion and the military's emphasis on cultivating cohesion, there still exists a lack of uniformly high cohesion across Army units (Griffith, 1989; Henderson, 1985).

More so than the civilian literature, the military literature focuses on cohesion as a means to achieve unit effectiveness and align goals, actions, and commitments, rather than interpersonal relationships or social bonding. Within the military, cohesion has been defined as "the assurance that a military unit will attempt to perform its assigned order or charged mission, irrespective of the situation" (Savage & Gabriel, 1976, p. 341). Correspondingly, Johns and Johns (1984) defined it as "the bonding together of members of an organization/unit in such a way as to sustain their will and commitment to each other, their unit, and their mission" (p. 9). This bonding occurs when the goals of the individual soldier, his/her group, and his/her leader are all aligned (Henderson, 1985). Research in the military domain commonly subscribes to what has been deemed the 'standard model of cohesion' as a framework for examining the phenomenon (Siebold, 2006, 2007, 2011). This model, stemming from Siebold's work, delineates between primary and secondary group cohesion in addition to task (i.e., instrumental) and social (i.e., affective). Primary group cohesion refers to the face-to-face interactions that produce cohesive ties within a unit. These interactions can occur both horizontally among solider and their peers, and vertically between soldiers and their leader(s). Secondary cohesion describes bonding with higher levels that occurs through indirect interactions and the acceptance of norms and values. These secondary relationships exist at both the organizational- (e.g., a bond with the company) or institutional- (e.g., a bond with the Army) level. Although the notion of secondary cohesion described in Siebold's model goes beyond the team-level, it still fails to capture the notion of between-team cohesion. First, it portrays a relationship in terms of the bonding an *individual* feels with levels of an institution, rather than bonds between entire entities. Second, the definition specifically notes that this is a "social relationship" (Siebold, 2011, p. 455) as opposed to a functional one characterized by task-based connections. In effect, Siebold's definition of secondary cohesion refers more to an individual's pride in an organization and efforts towards an organization's goals (Siebold, & Kelly, 1988). This notion better encapsulates constructs of individual-organizational attachment such as commitment, organizational pride, and esprit de corps, rather than the functional ties that can exist between teams in a system.

Measurement and Operationalization of Cohesion

A difficulty in examining any emergent state is that while the researcher is dealing with an inherently group-level construct, group-level indices are rare. Instead, researchers must often aggregate individual-level data to represent the group construct, and this aggregation must be handled carefully so as not to simply reduce a group-level construct to its lower-level constituents (Deutsch, 1954; Israel, 1956). Cohesion in particular exists not simply when members desire to remain in a group, but when that desire is uniform across the entire team. In other words, if only a few members feel strongly about remaining in the group, that group can hardly be characterized as cohesive. Rather, the essence of cohesion lies in its limited variance within the group. To capture this, an index of agreement is commonly used to justify the aggregation of cohesion to a measure of central tendency. This ensures that groups classified as "cohesive" are demonstrating a certain level of homogeneity (i.e., low variability) across individuals (Chan, 1998). The agreement is commonly indexed by calculating r_{WG} (James, Demaree, & Wolfe, 1984), which compares the variance in each group to the variance of a theoretical null distribution. The null distribution demonstrates the maximum possible variance, i.e., the variance expected if ratings were given completely at random. Typically, this complete lack of agreement is attributed to a uniform (i.e., rectangular) distribution (LeBreton, Burgess, Kaiser, Atchley, & James, 2003), although James et al. (1984) provide guidelines for exploring other distributions (LeBreton & Senter, 2008). As a rule of thumb, researchers generally use r_{WG} = .70 as a minimum cutoff level of agreement to warrant aggregation (Klein et al., 2000; Lance, Butts, & Michels, 2006; LeBreton et al., 2003; LeBreton & Senter, 2008).

Since its introduction, however, researchers have identified issues with the original formulation of r_{WG}, and have recommended adjustments accordingly. The first issue lies in the possibility of using alternative null distributions to calculate r_{WG}. The original formula for r_{WG} compares group variance to a uniform distribution resulting from completely random responses. James et al. (1984) acknowledge, however, that in some circumstances completely random responding may still be subject to systematic bias (e.g., leniency or severity bias). To account for this, several researchers have investigated the use of various other distributions (e.g., positively skewed, negatively skewed, triangular) in calculating an index of agreement (e.g., Kozlowski & Hults, 1987; LeBreton et al., 2003; LeBreton & Senter, 2008). For example, Kozlowski & Hults (1987) demonstrate a method in which the upper range of r_{WG} is bound by a uniform distribution, in which responses are completely random, while the lower range is bound by the distribution of an independent data set, in which responses are completely biased. True agreement is presumed to exist somewhere within this range (Bliese, 2000). Bliese and colleagues present another alternative in which the distribution of the data is compared to a number of hypothetical random distributions generated through random group resampling (RGR; Bliese & Halverson, 1996, 1998a, 2002; Bliese, Halverson, & Rothberg, 1994). This method, however, introduces between-group variance, and as such more closely resembles an index of reliability rather than agreement (Bliese, 2000). These investigations have yielded several options for setting the null distribution in the calculation of r_{WG}. Researchers are encouraged to investigate multiple null distributions and consider what type of response bias (if any) would best fit the data (LeBreton & Senter, 2008).

Another limitation of the original r_{WG} calculation is that values can fall outside of the expected range of 0 (perfect lack of agreement) to 1 (perfect agreement). Researchers can obtain r_{WG} values outside this range if the observed variance of a dataset exceeds the variance of the theoretical null distribution (LeBreton & Senter, 2008). James et al. (1984) originally attributed these instances to sampling error, and suggested setting all out-of-range values to zero (i.e., lack of agreement). However, as Lindell and colleages point out, negative r_{WG} values can occur when there is systematic disagreement between members (Lindell & Brandt, 1999; Lindell, Brandt, & Whitney, 1999). For example, half of the members might indicate the lowest rating, while the other half might indicate the highest rating. Lindell and colleagues also note that this systematic disagreement is not the same as a lack of agreement. Specifically, the former implies a bi-modal distribution, while the latter implies a rectangular distribution with no mode. To address the issue, Lindell et al. (1999) constructed a calculation of r^*_{WG}; this calculation essentially follows the same formula as r_{WG}, however it allows the index of agreement to assume negative values. LeBreton, James, & Lindell (2005) also introduced a formula for r_{WGp}, which accommodates the possibility that a construct has multiple true scores due to systematic differences in ratings between subgroups. This formula compares the pooled variance within groups to the theoretical null distribution. While this method can eliminate the need to distinguish between r_{WG} and r^*_{WG} values, it is only appropriate when subgroups are hypothesized a priori; otherwise, researchers risk achieving significant findings as a result of chance (LeBreton & Senter, 2008). In any case, the method of indexing agreement (e.g., r_{WG}, r^*_{WG}, r_{WGp}) should be justified based on theoretically-grounded hypotheses.

The manner in which data is collected should also consider the aggregation issues that pertain to the operationalization of cohesion. Typically, higher-level constructs are assessed by collecting individual responses and aggregating them to the group level, pending an appropriate level of r_{WG} as a justification for aggregation. As such, the aggregate posits the group belief as the homogeneity among member beliefs. This is particularly pertinent to the assessment of emergent states, in which the meaning of the higher-level construct is derived from the agreement among lower-level constituents (Kozlowski & Klein, 2000). In terms of cohesion, the aggregation technique is applied based on the notion that highly cohesive groups are ones in which the desire to remain in the group is uniform across members. In his typology of composition models, Chan (1998) outlines two ways in which this data can be acquired. The first uses a *direct consensus* approach, in which group members are asked to indicate their attitudes towards the group. Bollen & Hoyle (1990) employed this model to assess cohesion in the development of the Perceived Cohesion Scale (PCS), which asks member to respond to items such as "I feel a sense of belonging to my group." Chan (1998) posits that data can also be ascertained through a *referent-shift* approach, in which individuals are asked to indicate their thoughts on what the group believes. This model assumes that individual team members have access to the cognitions and attitudes of the collectives (Casey-Campbell & Martens, 2009; Lindsley, Brass, & Thomas, 1995; Weick & Roberts, 1993). Like direct consensus models, referent-shift models use lower-level constructs to compose higher-level aggregates; however, in this case the lower-level construct is distinct from the individual-level analog that was employed in a direct consensus model (Chan, 1998). For example, a referent-shift assessment of cohesion would ask individuals to indicate their thoughts and perceptions of what the *group* believes, rather than what they personally believe about the group. Items from Moos and colleagues' Group Environment Scale (GES) represent a referent-shift approach to assessing cohesion. Their measure asks respondents to agree or disagree with statements like, “Members put a lot of energy into this group” and “There is a feeling of unity in this group” (Moos & Humphrey, 1974; Moos, Insel, & Humphrey, 1974). For each of these models, Chan (1998) recommends using an index of agreement (e.g., r_{WG}) to justify the aggregation of the higher-level construct, as this will capture both the amount and agreement of the higher-level construct.

An alternative to these approaches, and one that attempts to sidestep the issue of aggregation entirely, is to assess the higher-level construct by having groups respond as a collective to construct-related items. In this process, group members discuss their answers to the items until they come to a consensus. While this method treats the group as a single entity (rather than an amalgam of individuals), it introduces the practical and methodological problems associated with having members respond as a group. For example, responses may reflect the opinions of more dominant members such as leaders or highly extraverted individuals. Gist (1987) suggested this method as a means to capture team efficacy, but also acknowledges that it is not necessarily superior to aggregation-based methods. To date, aggregation-based methods dominate research on emergent states, while this method is infrequently used or mentioned in the literature. Nevertheless, each of these operationalizations pose potential advantages and disadvantages, therefore the research question needs to drive the selection of the most appropriate methodology.

Assessments of cohesion are typically achieved through self-report. The current literature possesses a number of self-report tools for assessing cohesion within a group, most of which reflect the multidimensional nature of the construct. Cohesion is most commonly assessed using a 2-dimensional approach to capture both social and task-related aspects of cohesion (e.g., Bollen & Hoyle, 1990; Zaccaro, 1991). Other measurements employ a 3-dimensional model of cohesion that assesses attraction to the group in addition to task and social cohesion (e.g., Carless & DePaola, 2000; Dyce & Cornell. 1996). Also common is a four-factor model of cohesion that looks at both task and social components of attraction to the group (ATG), and group integration (GI), or member perceptions of the group. A frequently used example is the Group Environment Questionnaire (GEQ; Carron, Widmeyer, & Brawley, 1985), which was originally designed for sports teams, but has since been adapted for other environments such as the workplace (Carless & DePaola, 2000) and the military (Ahronson & Cameron, 2009). Cohesion within the U.S. Army has commonly been measured using the Platoon Cohesion Index (PCI; Siebold & Kelly, 1988b). This tool also employs a 4-factor model, however the factors within the PCI reflect those outlined in the military's standard model of cohesion; namely, primary-horizontal, primary-vertical, secondary-organizational, and secondary-institutional. These factors are further broken down into scales that reflect instrumental (i.e., task) and affective (i.e., social) aspects of cohesion. The measure consists of 20 items drawn from Siebold & Kelly's (1988a) original 98-item assessment of military cohesion, the Combat Platoon Cohesion Questionnaire (CPCQ). While the CPCQ and PCI possess the advantage of being specifically tailored to a military setting, they are somewhat limited in that they use a higher-level group (i.e., platoon), as the referent small group. This ignores the fact that Army platoons consist of several smaller squads of 8-10 soldiers. In assessing within-team cohesion, the squad-level would be a more appropriate unit of analysis as opposed to the much larger platoon, which typically consists of 16-40 soldiers. Therefore, assessments of team-level cohesion in the military may be better captured through measurements that use the squad as the reference group. This issue will be addressed further in the discussion of MTSs within the military.

Although less frequently employed than self-report measures, observational methods also exist for assessing cohesion in a team. These methods involve researchers noting or measuring observable behaviors that are considered to be proxies of cohesion. For example, Kirshner, Dies, and Brown (1978) quantified group cohesion by the length of a group's collective hug at the end of a session. Other researchers have used observations of physical proximity (e.g., how close members stand to each other) to operationalize cohesion (Knowles & Brickner, 1981). Studies have also captured cohesion by member displays of identity with the group, such as the use of collective pronouns (e.g., "we"; Cialdini, Borden, Thorne, Walker, Freeman, & Sloane, 1976) and the display of group-identifying paraphernalia (e.g., team badges; Cialdini, et al., 1976; Snyder, Lassegard, & Ford, 1986). While these observational methods allow for non-obtrusive measurement that is relatively free of self-report bias, critics point out that they chiefly assess proxies of cohesion, rather than the construct itself. Additionally, these methods tend to be less highly validated compared to more traditional self-report measures (Casey-Campbell & Martens, 2009), making them less likely to be used in empirical studies.

Gaps in the cohesion literature

While the cohesion literature is both prolific and informative, it resides entirely at the team level. In the past, the specialized focus on teams in the research rendered this point of view useful and sufficient. Today, however, research is increasingly examining how teams function within a broader system or environment (DeChurch & Mathieu, 2009). Unfortunately, the extant cohesion literature cannot simply be aggregated to the systems-level. Due to the complexity created by multilevel and cross-team functioning in MTSs, it is not appropriate to assume that cohesion between teams is identical to the typical group-level concept of cohesion that has been previously studied. Therefore, a systematic exploration of the phenomenon at a higher level is warranted. Fortunately, the existing cohesion literature provides a wealth of important theoretical notions and empirical findings that can be used as a foundation for expanding our understanding of cohesion. To do this, however, we must possess not only a familiarity with the current conceptualization of cohesion, but also with the notion of MTSs, and how teams function as part of a network.

Multiteam Systems

An MTS is defined as a system in which multiple teams coordinate their efforts in order to reach shared distal goals (Mathieu et al., 2001). Teams that make up an MTS, or *component teams*, are considered to be "non-reducible and distinguishable wholes with interdependent members and proximal goals" (DeChurch & Mathieu, 2009, p. 270). These teams possess clear, observable boundaries, and are capable of completing actions independently of one another (Arrow & McGrath, 1995; DeChurch & Mathieu, 2009).

MTSs differ from simply a collection of teams or an organization with subunits in three important ways. First, components teams have their own proximal goals, but share one or more distal goals (Bateman, O'Neill, & Kenworthy-U'Ren, 2002; Zaccaro, Marks, & DeChurch, 2012). A distal goal is one that could not be accomplished by a single team, thus warranting the formation of an MTS. The proximal goals are pursued by different component teams, and ultimately combine to contribute to the distal goal (Arrow & McGrath, 1995; Mathieu et al., 2001). Second, MTSs demonstrate a significant degree of between-team interdependencies, in addition to within-team interdependencies. Interdependencies within-teams create distinguishable boundaries between component teams, thus rendering a system of distinct, intact teams as opposed to simply a large collective (Arrow & McGrath, 1995; Mathieu et al., 2001; Marks et al., 2005). However, component teams in an MTS demonstrate *functional interdependence* across team boundaries, such that the inputs, processes, and outputs of any component team are intertwined with at least one other team in the system (DeChurch & Mathieu, 2009; Mathieu et al., 2001). This functional interdependence will drive the structure of the MTS and the within- and between-team interdependencies that exist within the system (DeChurch & Mathieu, 2009). Because typical team processes and interactions (e.g., coordination, communication) must also occur between-team in order to accomplish the distal goal, the intensity of the between-team interdependencies in an MTS will moderate (i.e., strengthen) the effect of between-team processes on system-level performance (Marks et al., 2005). Finally, MTSs are unique in that team efforts combine synergistically, resulting in MTS outcomes are greater than the sum of individual team outputs (DeChurch & Mathieu, 2009). In this way, MTS parallel teams in that they possess a *synergistic threshold,* at which point the higher-level unit begins to function as an entity rather than an amalgam of lower-level units (Zaccaro et al., 2009).

The way in which teams work together will be structured by the *goal hierarchy* of the MTS. Mathieu et al (2001, p. 300) define goal hierarchy as "an interconnected network of collective goals where the shortest term (proximal) goals are at the lowest level of the hierarchy, longer term (distal goals) are at higher levels, and subordinate distal goals that represent the MTS objectives are at the top of the hierarchy". Within a hierarchy, goals at higher levels will require more coordination among component teams (Mathieu et al., 2001), and the overall superordinate goal will require input from all teams within the MTS (Zaccaro et al., 2012). Because they require input from several (or all) component teams, these higher levels goals will be strongly driven and predicted by between-team processes. By laying out how teams will contribute to the distal goal, the goal hierarchy drives how loosely or tightly teams are coupled around proximal goals, and the degree of interdependence between them (DeChurch & Mathieu, 2009; Marks et al., 2005). In this way, the overall system dictates the amount of within- and between-team processes necessary for MTS success.

Due to the interdependencies that exist between component teams, MTS performance is largely a function of both individual team performance and between-team coordination (Smith-Jentsch, Sierra, Weaver, Bedell, & Salas, 2011; Zaccaro et al., 2012). This notion is reflected in research findings that demonstrate that between-team processes provide incremental validity over within-team processes in predicting MTS-level outcomes (DeChurch & Marks, 2006; Marks et al, 2005). This creates demands for component team members and leaders, however, as they must be able to functionally shift their focus from within- to between-team processes in order to contribute to the overall system (DeChurch & Mathieu, 2009).

Leadership in MTS

In general, leadership issues in MTSs are not as well understood as issues pertaining to leadership of a single team. This is largely due to the fact that MTS leadership is far more complex. Leadership in an MTS is particularly challenging in that it often requires dealing with non-routine, unpredictable tasks in a reduced-control environment (DeChurch et al., 2011). In addition, the role requires MTS leaders to engage in both team-level (e.g., analyzing the situation, defining problems, managing information flow) and organizational-level (e.g., seeing the big picture, sense-making, strategizing) functions (DeChurch et al., 2011), all the while ensuring that component teams are contributing to both proximal and distal goals (Mathieu et al., 2001). Leaders are also often responsible for creating the plan that will link component team goals to distal goal accomplishment (i.e., the goal hierarchy; DeChurch & Marks, 2006). Due to the critical role between-team functioning plays in MTS outcomes (Marks et al., 2005), managing this interdependence and coordinating between-team actions will be a pivotal responsibility of the leader (DeChurch & Marks, 2006; Hoegl & Weinkauf, 2005; Mathieu et al., 2001; Zaccaro et al., 2012). Research also supports the significant effects that leader functioning can have on MTS-level performance. Specifically, DeChurch and Marks (2006) found that leader behaviors of coordination and strategizing significantly affected MTS-level emergent states, processes, and outcomes; and that a leader's focus on between-team processes can foster positive outcomes at both the MTS- and team-level.

The Army Platoon as an MTS

MTS functioning is particularly relevant to the U.S. Army, as its structure is prevalent in the armed forces. The Army has consistently used MTSs in the form of platoons and companies (as opposed to single, specialized teams) to accomplish missions. While this structure has existed for a long time, research and conceptualizations of MTSs are much more recent (DeChurch & Mathieu, 2009), and therefore provide a relatively novel way to describe and frame the Army's structure. The U.S. Army has a hierarchically nested structure, such that several squads make up a platoon, several platoons make up a company, several companies make up a battalion, and so on. This structure extends all the way to the highest level of the Army, and is depicted in Figure 2. The structure allows teams to deploy as part of larger units in order to accomplish a mission that could not be completed by a single squad, platoon, or company. A platoon represents the most basic form of MTS structure within the Army. Each squad in a platoon will have individual proximal goals, all the while working toward the same distal goal of the platoon. For example, a platoon's mission might be to rescue hostages from enemy territory. This ultimate goal would require respective squads within the platoon to conduct surveillance, obtain equipment, transport hostages, ensure civilian safety, and monitor enemy activity. To accomplish their missions, Army squads need to act in concert in order to function as a higher level unit (i.e., platoon), accomplish the mission, and ultimately keep soldiers alive. This requires squads to not only accomplish their proximal goals, but direct their outputs toward the other squads in the platoon working toward distal goal accomplishment. For instance, it is not enough for a reconnaissance team to simply gather intelligence; they must also interpret and impart that intelligence to squads that need it, such as the squad that will be infiltrating the enemy territory. Temporal issues must also be considered, as these cross-team collaborations will need to happen in the appropriate sequence. Consider, for example, a helicopter squad whose job it is to transport the soldiers and hostages out of enemy territory. A late arrival would jeopardize the mission and the lives of the squad on the ground, while an early arrival would expose the ground troops before they were able to complete their goal. These issues not only illustrate the importance of between-team functioning in the accomplishment MTS distal goals, but also the complexities involved in orchestrating collaboration across component teams.

Insert Figure 2 here – Diagram of Army structure

Gaps in the MTS literature

In the literature, MTSs are rarely studied as an entity or as the focal level of analysis (DeChurch & Mathieu, 2009). As Hackman (2003) points out, "much of what we know about MTS resides at the team level" (p. 275). Many existing theories and ideas that apply to individual teams have simply been shifted upward to the MTS level. However, as previously mentioned, MTS is more than the sum of component team functions; therefore a simple aggregation of team functioning is not necessarily appropriate. For this reason, researchers (e.g., Arrow & McGrath, 1995; Hackman, 2003) tout the importance of *bracketing*, which involves looking at a phenomenon one level above and below the typical level of analysis and theory. DeChurch and Zaccaro (2010) also note that a better understanding of teams and systems will require an upward shift in the focal level of analysis. In terms of cohesion, the phenomenon has rarely (if ever) been studied at any level above the small team. While current theories on cohesion can serve as a foundation, additional theory needs to be formulated that posits how cohesion functions between teams in an MTS. Additionally, empirical research will need to follow in order to lend support to developing theories, and inform how these theories may need to be modified or expanded.

Defining Cohesion Among Teams in an MTS

As noted in the preceding sections, a defining characteristic of MTS is the synergistic combination of within- and between-team processes. At the MTS-level, cohesion will ultimately be the result of the bonds that exist both within- and between-teams. However, current research and theory on cohesion reside solely at the small group (i.e., within-team) level. We know little about the between-team bonds that contribute to the cohesion of an overall system. Due to the complex functioning of MTS, it is tenuous to assume that these between-team bonds are identical to those at the team level (DeChurch & Zaccaro, 2010; Zaccaro et al., 2012). Previous findings also demonstrate that between-team processes provide incremental validity over within-team processes in explaining variance at the MTS-level (Marks et al., 2005), and should therefore be carefully considered in the examination of MTSs. To address this, group theory will need to be expanded to examine how between-team emergent states such as cohesion develop and uniquely contribute to multilevel outcomes. Kozlowski and Klein (2000) point out that in developing multilevel theory or expanding existing theory to multiple levels, it is necessary to fully define the endogenous construct across levels before formulating hypotheses or conducting empirical research. Accordingly, this section seeks to define and conceptualize cohesion among component teams in an MTS. Furthermore, this section delineates precisely how cohesion between teams differs from the extant conceptualization of cohesion at the small group (i.e., within-team) level. In doing so, several important questions will need to be addressed in order clarify why new theory is warranted, and how it will contribute to applied practices. Specifically, this section addresses the following: What is between-team cohesion? Why might cohesion be different at a higher level? How do cohesive ties form between teams? How is between-team cohesion related to within-team cohesion? What does a cohesive MTS look like? Why is between-team cohesion relevant?

What is between-team cohesion?

At the between-team level, cohesion most closely resembles its original definition, in which the construct is conceptualized as the bonds that allow a unit to resist disruption and maintain functionality (Festinger, 1950; French, 1941; Schachter et al., 1951). In its original context, which largely explored social groups, disruption typically referred to group disbandment. In organizations, however, disbandment is not always an option for employees who have been assigned to a work team if they want to remain in the organization. This is particularly true in the armed forces, where a soldier cannot simply transfer units merely because he/she feels a unit is not cohesive. At a systems-level, disruption refers to a breakdown of between-team functioning, thus rendering the system less capable (or incapable) of acting as an intact entity in order to accomplish its distal goal(s). In other words, cohesion is not necessarily what keeps a system (or team) intact, but rather what keeps it functioning as a synergistic whole. Between-team cohesion exists in the ties necessary for component teams to work together toward mission accomplishment. The functional ties that develop between teams in an MTS should ultimately serve three purposes: (a) create a shared commitment among teams to the distal goal(s) of the MTS, (b) allow component teams to link their actions and operations towards distal goal(s), and (c) render the system more able to achieve and maintain functionality by increasing system resilience. As such, between-team cohesion allows an MTS to develop the robustness and resiliency needed to accomplish higher-level goals.

Why might cohesion be different at a higher level?

It is often the case that combinations of phenomena at higher levels are more complex. DeChurch and Zaccaro (2010) allude to this in their call to develop a more refined conceptualization of our understanding of system-level emergent states. While extant knowledge of team cohesion can inform this additional theory, it cannot be assumed that cohesion is identical at the within- and between-team levels. For example, Griffith (2002) found that in a military sample, cohesion had differential effects at the individual and company level, which suggests that the construct may function differently at distinct levels of analysis. To address this complexity, additional theory is needed to describe how cohesion between teams differs from typical conceptualizations of cohesion that exist at the team level.

Cohesive ties that exist at the between-team level more closely resemble the functional ties that characterize task cohesion, rather than an interpersonal attraction to the group and fellow members. At the team level, a shared commitment to the task has shown to be a greater contributor to overall success compared to social relationships (Zaccaro, Rittman, & Marks, 2001). This occurs because in the face of disruptive forces, teams high in task cohesion engage in more behaviors that cause the team to remain intact, such as increasing efforts, setting high performance norms, and planning more efficiently (Zaccaro & McCoy, 1988; Hackman, 1976; Hackman & Morris, 1975). In an MTS, the connections between teams are driven by the functional interdependence of the tasks in the goal hierarchy (DeChurch & Mathieu, 2009). This interdependence around a shared distal goal is what unites component teams in the first place. Therefore the behaviors that arise from a shared commitment to the task will be even more critical, and will chiefly characterize the cohesion that develops between component teams. The mutual interdependence that connects teams in an MTS will require the alignment of task-related behaviors and cognitions, which will be more important for between team functioning compared to liking or interpersonal relationships. Thus, the cohesion that develops between component teams in an MTS resembles a shared commitment to the distal goal and the task processes that foster its completion.

In addition to the increased importance of task-based cohesion at the between-team level, social cohesion becomes less significant. This aspect of between-team cohesion strays from other conceptualizations of within-team cohesion, which tend to focus more heavily on the notion of interpersonal attraction. Many works define cohesion in terms of the attraction a member feels toward a particular group. For example, Cartwright (1967) defines cohesion as a common attraction to the group; and Lott and Lott (1961, 1965) define it as the amount of positive attitudes within the group. While attraction and interpersonal bonds may be an important part of within-team cohesion, specifically social cohesion (Festinger et al., 1950), this aspect becomes less applicable at higher levels of team functioning. This is largely due to the fact that the MTS is inevitably a much larger unit than the team. Previously outlined literature points out that cohesion at the small-group level becomes less likely to form in large entities (e.g., Indik, 1965; Mullen & Cooper, 1994; Siebold & Kelly, 1988; Steiner, 1972). In these large systems, it is simply not feasible that close, interpersonal bonds would develop between all members of an MTS. Within a team, these bonds are more able to form as a result of consistent and frequent interpersonal interactions (Cota, Evans, Dion, Kilik, & Longman, 1995; Seibold, 2007); however, members within an MTS don’t engage as frequently in interactions with all members of the system, making these bonds less likely to form. As a result, cohesion at a higher level is less a function of the socially- or emotionally-driven aspect of social cohesion, and more a function of the shared commitment to the task or goal.

Although cohesion can exist at levels beyond that of a single team, it remains conceptually distinct in many ways from other higher-level constructs such as organizational pride, organizational commitment, and organizational climate. First, these constructs capture characteristics and attitudes regarding the organization as a whole. The notion of between-team cohesion describes the bonds that can exist among teams in an MTS. As Mathieu et al. (2001) point out, while MTSs can be large and contain several components, they are distinct from organizations in both size and function. Secondly, between-team cohesion differs from these constructs in that it refers specifically to the relational bonds that exist among components of a system. When these relational bonds are uniformly strong among components teams, that system can be characterized as cohesive. Conversely, organizational pride and organizational commitment refer to an individual's attitude or attachment toward the organization as a whole. In the case of organizational pride, this attachment stems from a positive self-evaluation that an individual can derive from belonging to a valued organization (Tyler, 1999; Tyler & Blader, 2000). With organizational commitment, the attachment stems from an employee's perception of fairness or a fulfillment of a psychological contract (Schleicher, Hansen, & Fox, 2011). Neither of these forms of attachment resemble the uniform desire to cultivate the functional and beneficial relationships that characterize between-team cohesion. Organizational climate also differs from between-team cohesion in that it refers to uniform perceptions among individuals about the norms and practices of an organization (Bowen & Ostroff, 2004). Between-team cohesion, however, refers to a uniformity of the strength of the relational ties that exist among teams in a system. Finally, the cohesive bonds that exist among teams capture the essence of the MTS, and distinguish it from simply an amalgam of individual units. The relational bonds of between-team cohesion will be what allow teams to exhibit the collaboration and coordination characteristic of an MTS. While constructs like organizational commitment, pride, and climate may make it easier or more likely for units to work together, they are not defining characteristics of the higher-level entity.

How do cohesive ties form between teams?

Although cohesion at the between-team level is distinct from its manifestation at the within-team level, cohesion between teams will form much in the same way as cohesion between individuals. Specifically, cohesion at both levels will follow a compositional model of emergence. In both cases, the cohesion emerges from homogeneity of perceptions and attitudes at the lower level (Kozlowski & Klein, 2000). Within a single team, the homogeneity refers to members' shared desire to remain in the group. Between teams, this homogeneity arises from a shared commitment across teams to work collaboratively as part of a system. Constructs that emerge in this manner are generally classified as isomorphic, in that the structure and function are consistent across levels (Kozlowski & Klein, 2000; Morgeson & Hofmann, 1999; Rousseau, 1985). At the team-level, cohesion derives its structure from the shared attitudes and cognitions among individuals to remain part of the team. Between-team cohesion forms in a parallel way, as it derives its structure from the shared attitudes and cognitions across teams to remain part of the overall system. In terms of function, cohesion also operates similarly across levels. Namely, it results in the entities (e.g., individuals or component teams) remaining in the higher level unit (e.g., team or MTS), thus rendering the higher level unit more robust. Kozlowski and Klein (2000) define this is a homologous model, in which the constructs, processes, and relationships surrounding a phenomenon are observed at multiple levels.

Purely isomorphic constructs, however, are rare (Bliese, 2000). Therefore even though cohesion at the within and between-team levels are both based on similar perceptions (i.e., the desire to remain in and function as part of the higher-level unit), the nature of these perceptions are not completely identical across levels. The literature on team cohesion posits that the member attitudes and cognitions from which cohesion forms are based largely on social interactions and interpersonal relationships in addition to a shared commitment to the task (Cota et al., 1995; Festinger et al., 1950; Lott & Lott, 1965). As discussed above, these social relationships have less bearing on a team's desire to remain as part of an MTS. Instead, component teams' cohesion in an MTS will be based on their task-relevant relationships, as opposed to interpersonal liking or emotional bonding. This occurs because unlike small groups in which members can be linked through socially-oriented bonds, component teams in an MTS are linked by their interdependence of tasks and goals and their potential to combine synergistically. Mathieu et al. (2001) point out that this functional interdependence is a defining characteristic of MTSs. Because team relationships in an MTS are driven by functional interdependence rather than interpersonal liking, cohesive ties within an MTS will be largely driven by task requirements and the structure of the system's goal hierarchy. As a result, the cohesive ties that form between teams will chiefly be based on the shared cognitions and attitudes regarding the ability of other component teams and the system as a whole to accomplish both proximal and distal goals. Therefore between-team ties of cohesion will be characterized by functionality, as opposed to attraction. In this way, between-team cohesion parallels, yet is distinct from within-team cohesion in an important and meaningful capacity.

How is between-team cohesion related to within-team cohesion?

While between-team cohesion forms in a similar manner to within-team cohesion (namely, from a uniform desire for lower-level constituents to remain part of the higher-level unit), it is not directly caused by, nor does it stem from within-team cohesion. Specifically, between-team cohesion does not simply manifest when component teams are uniformly cohesive within themselves. Instead, the relationship between cohesion at the different levels is likely to be one of covariance rather than causality. Therefore even though between-team cohesion is more than simply within-team cohesion aggregated upward, they are presumed to share a strong relationship. The nature of that relationship, however, is a complex one that will require careful examination. In particular, theories from social psychology and teamwork literature suggest that a team's cohesion may inhibit its ability or tendency to form cohesive bonds with other teams. Resource allocation theory (Kanfer, Ackerman, Murtha, Dugdale, & Nelson, 1994) states that individuals have finite resources (e.g., time, effort) to devote to both team and MTS processes in tasks, resulting in an inevitable tradeoff. Social Identity Theory (Tajfel, 1982) also points out that as team boundaries and cohesion increase, there is a natural inclination for members to form negative perceptions of outgroups. Both of these theories suggest that within-team cohesion may actually compete with between-team cohesion, rather than acting as a contributor. Alternatively, however, the presence of within-team cohesion may foster cohesion among teams in a system. For example, individuals who feel little motivation to remain part of their teams will likely feel little to motivation to function as a part of the overall system as well (Williams & Mahan, 2006). Put another way, an individual's positive or negative evaluation of a team is likely to extend to his/her evaluation of the overall system of which the team is a part. Because these evaluations and perceptions are a strong determinant of cohesion across levels, it is possible that high or low cohesion within a team could affect its manifestation within a system. Additionally, other component teams are less likely to form cohesive ties with a team that is low in cohesion, and therefore prone to dysfunction or disruption. The potential for competing trends highlights the complexity that is likely to exist in the relationship between cohesion at the team- and system-levels, and demonstrates the need for cross-level models to show how cohesion between teams relates to its lower level analog.

The complex relationship between within- and between-team cohesion has important implications for the emergence of the cohesion of the overall system. As previously demonstrated in the research, MTS-level phenomena are a function of factors that reside at both the within- and between-team level (Marks et al., 2005). Accordingly, MTS-level cohesion will result from the cohesion of individual component teams as well as the cohesive ties across component teams. However, the potentially complex interactions between cohesion at these different levels indicates that overall MTS-level cohesion will likely follow a compilational model of emergence. In these models, higher-level phenomena are the result of a precise configuration of lower-level units (Kozlowski

& Klein, 2000). Due to the possible threshold effects and interactions described above, it is likely within- and between-team cohesion will need to occur in a specific pattern (or patterns) in order to yield a productive level of overall cohesion across the entire system. Additionally, the relative importance of between-team processes compared to within-team processes in predicting system-level outcomes suggest that between-team cohesion will be a stronger contributor to MTS-cohesion. The combination of between- and within-team cohesion will need to be appropriately weighted in order to reflect their differential significance in predicting system-level cohesion. These issues created by the complex relationship between cohesion at different levels of analysis suggest that while both within- and between-team cohesion emerge in a relatively compositional manner, the cohesion that develops across an entire system will likely be the result of a far more complex compilational pattern of emergence.

What does a cohesive MTS look like?

The cohesion in an MTS will stem from the presence of both within- and between-team cohesion. To some degree, component teams in an MTS must be cohesive within themselves so that they continue to function as distinct, intact units. In any MTS, the interdependencies within teams will be greater than those between component teams; this is what distinguishes an MTS from simply a large team (Marks et al., 2005). However, research supports the notion that between-team processes and emergent states are more vital to MTS functioning (Marks et al., 2005), therefore while some within-team cohesion must be present, between-team cohesion will play a more significant role in shaping the cohesion of the entire MTS. Ultimately, this between-team cohesion will manifest itself as the functional, relational ties between teams in an MTS. The result will be an MTS in which component teams share the workload and contribute to the accomplishment of the MTS' distal goal(s).

The literature on teams indicates that cohesion in strong norms (Carron et al., 1988; Oliver et al., 1999; Prapavessis & Carron, 1997; Shields et al., 1995; Schachter et al., 1951). In an MTS, cohesion is also likely to foster strong norms that regulate member and team efforts toward collaboration, coordination, and distal goal accomplishment. First, cohesion will cultivate a norm of cooperation, rather than competition, among component teams. Component teams within a cohesive MTS will recognize that the structure of their goal hierarchy requires all teams to contribute toward the distal goal. Therefore the success of any component team relates in some way to the success of the overall mission. Because all component teams are linked to the distal goal in some way, there is little need to compete for resources. Instead, teams would be better served, and better serve the system, by supporting each other. This support can mean sharing resources, aiding in proximal goal accomplishment, or participating in backing up behaviors. Second, the strong norms associated with a cohesive MTS can also cultivate guidelines and protocols for working together, in order to make cross-team collaborations run more smoothly and efficiently. For example, it might be an implicit norm that an important task for any component team is to monitor other teams and proactively provide help or services when needed. This would not only facilitate the cross-team processes that significantly contribute to MTS outcomes (Marks et al., 2005), but would also perpetuate a common perception of unity among component teams in the system. Again, this unity is not necessarily based on friendships, but on the shared understanding that teams are inherently linked together by their mutual and interdependent contributions to the system's mission. In this way, component teams care about the success of the other teams in the system; not because they "like" each other per se, but because the other teams' goals and outcomes are intertwined with their own and those of the system.

An important characteristic of MTS cohesion will also be the cohesion that exists among the leaders of individual component teams and the higher level leaders of the overall system. In developing cohesive relationships with one another, the leadership team in the MTS can set the norms of cooperation and collaboration for the rest of the system. Not only does this provide the system members with an example of functional cohesive ties, but it also allows leaders to work closely together in orienting their respective teams toward goal accomplishment. The cohesion among the leaders will be necessary for developing a shared understanding of distal goals, as well as how proximal goals will eventually combine toward distal goal achievement. By developing this shared understanding with one another and subsequently communicating it to their respective component teams, leaders can foster the shared commitment across teams distinctive to a cohesive MTS. This cohesion among leaders, however, is not always a sufficient condition for MTS cohesion. In some cases, leaders may be cohesive with one another, but uniformly agree to structure tasks and goals so that their respective teams can work relatively independently of one another. In this instance, cohesion among leaders would not manifest as a cohesive MTS in which component teams uniformly commit to and actively collaborate toward common goals. Additionally, cohesion among leaders does not fully capture the essence of cohesion between teams, as it still resides at the small group level. While cohesive ties among leaders may cross formal (i.e., component team) boundaries, the leadership members themselves comprise a team. As such, the cohesion between them more closely represents the small group conceptualization that has previously been examined in the literature. This differs from the relational bonds between intact units that define between-team cohesion and characterize a cohesive MTS.

Another defining characteristic of a cohesive MTS is that the system is indeed operating as a synergistic whole. At its highest capacity, an MTS is capable of achieving more than a single team or the sum of individual team outcomes. The cohesion that exists between teams in the system will play a pivotal role in reaching this capacity. In a cohesive MTS, the distal goal not only gets accomplished, but is truly the result of a synergistic combination of proximal goals, rather than of one proximal goal or an amalgam of them. Figures 3.1 and 3.2 both represent an MTS structure; however, only Figure 3.2 depicts a cohesive network of teams that is truly functioning as an MTS. In Figure 3.1, the distal goal of the system is reached, but only through the efforts of Team A. Teams B and C accomplish their respective proximal goals, but in no way contribute to the system’s outcome. This could be because their proximal outcomes were never translated into inputs for the distal goal, or simply because the goal hierarchy did not require the teams to work together. In any case, the system depicted in Figure 3.1 is technically ‘successful’ in accomplishing both proximal and distal goals, but can hardly be described as cohesive, as the component teams are not all working toward or contributing to the distal goal. Figure 3.2, however, shows an MTS in which the distal goal is the result of all team proximal goals, either directly or indirectly. Specifically, the proximal goals of Teams A and C contribute directly to the distal goal, while the proximal goal of Team B enabled Teams A and C to accomplish their respective goals. This MTS demonstrates system-level cohesion in two important ways. First, teams share a commitment to the task, in that all are working towards the same distal goal. Second, team efforts are combining synergistically. A single team could not accomplish the mission, while the failure of a single team could jeopardize the mission. As such, the ultimate success of the MTS involves the unique, joint contributions of the component teams.

Insert Figures 3.1 and 3.2 here – Model of MTS with low vs. high cohesion

Figure 4 further illustrates MTS cohesion by depicting an Army platoon functioning as a cohesive system. In this example, the platoon is made up of four squads (1st, 2nd, 3rd, and 4th), whose ultimate goal is to destroy enemy targets. The goal hierarchy demonstrates that all of the proximal goals of the independent squads contribute in some way to this distal goal. Therefore, all squads share responsibility for completing the mission. Ultimately, it might be a single squad (i.e., 4th squad) that physically destroys the enemy targets; however, this could not have been done without the accomplishment and synchronization of the proximal goals of other squads in the platoon. Without these inputs, 4th squad would not have had the intelligence to plan the mission, the ammunition to destroy the targets, or the security to enter enemy territory. Their cooperation also requires temporal sequencing. For example, 3rd squad must communicate their intelligence before 4th squad can plan the mission, while 1st squad must secure the perimeter before 4th squad can attack. The relationships between these activities represent sequential interdependence, and as such require an even more intense level of collaboration among the platoon squads (Thompson, 1967). The cohesion that exists between the squads will be the driving force behind their ability to effectively communicate and coordinate their actions toward both proximal and distal goal accomplishment. In this way, the platoon functions as a cohesive unit in that all components (i.e., squads) are working together to accomplish a mission that is beyond the capabilities of a single squad.

Insert Figure 4 here – Example of goal hierarchy of a cohesive platoon

Why is between-team cohesion relevant?

An improved understanding about the cohesion that develops between teams in a system would be particularly relevant in today's research and practice arenas, as MTSs are increasingly being studied and employed. The U.S. Army would especially benefit from research on cohesion between teams due to the frequent cross-team collaborations required by its hierarchical structure and prevalent employment of MTSs in mission accomplishment. As previously mentioned, the U.S. Army has already recognized the importance of team cohesion, as evident in their emphasis on cohesion in training and the prevalence of military research on cohesion. Many studies have linked unit cohesion to important military outcomes (e.g., Ahronson & Cameron, 2009; Oliver et al., 1999); however the Army has yet to explicitly examine how cohesion functions in an MTS. While past military research has chiefly assessed cohesion in platoons, this falls short of an MTS-level examination, as the platoon has typically been treated as the primary level of analysis (i.e., the component team). This trend fails to acknowledge that the platoon itself is acting as an MTS, with squads serving as component teams in the system. To address this shortcoming, platoon-level cohesion needs to be examined as an MTS-level construct, while the investigation of team-level cohesion needs to be brought down to the squad-level. This conceptualization better characterizes the structure of a platoon, in which individual squads work together to accomplish the platoon's mission. The ability for these squads to work together effectively will reside in the cohesive ties that develop across units in the platoon (i.e., between-team cohesion). As a result, the cohesion among squads stands to render the higher level unit more resistant to disruption, and will essentially be what separates a platoon from simply a composite of squads.

Hypotheses and Rationale

The degree of cohesion that develops at the MTS-level will be a function of the cohesion that exists at both the within- and between-team levels. To date, theory and research have focused primarily on the formation of within-team cohesion; therefore we know relatively little about the development of between-team cohesion. Kozlowski and Klein (2000) point out that in developing multilevel theory (or expanding existing theory to a multilevel framework) the first step after defining the construct is to identify its antecedents. The current proposal explores hypotheses regarding the formation of cohesion between teams in order to begin to more fully understand how it develops in a system. Additionally, the importance of between-team cohesion in terms of its effects on higher-level outcomes will be investigated as well.

Although they are distinct mechanisms, MTS functioning parallels that of teams in many ways. Namely, the constituents combine synergistically to create a greater outcome. Therefore, while the teams literature is not sufficient to explain between-team cohesion, extant findings still provide a good starting point for formulating hypotheses, as between-team cohesion is likely to parallel within-team cohesion in its formation and functioning. The sections below posit hypotheses regarding interdependence, boundary spanning, and goal alignment as antecedents of between-team cohesion; the relationship among cohesive ties at the within- and between-team levels; and the degree to which between-team cohesion predicts system-level readiness. These hypotheses are largely informed by the existing literature of how both teams and MTSs function, and aim to further advance our understanding of between-team cohesion by exploring the team- and system-level factors that can foster it.

Interdependence between teams

Interdependence is defined as the degree to which team member relationships are characterized by collective, collaborative, and interactive efforts (Barrick, Bradley, Kristof-Brown, & Colbert, 2007; Campion et al., 1993; Saavedra et al., 1993; Thompson, 1967). Interdependence factors heavily into group functioning, as it is a defining characteristic of both teams and MTSs. The interdependent ties within a system will drive the structure of the MTS (DeChurch & Mathieu, 2009) and dictate precisely which ties across the system are relevant to distal goal accomplishment. As previously noted, an effectively cohesive MTS is not one that demonstrates all possible cohesive ties; rather, it is one in which the necessary, functional ties develop. Therefore the functional bonds required by the interdependencies between teams will ultimately dictate where cohesive ties between teams should be formed in order to create a synergistic and high-performing system. In this way, this interdependence will drive the degree and patterns of between-team cohesion in an MTS.

While the effects of interdependence observed at the team level are also likely to manifest at the MTS-level, specifically, the effects of interdependence on the development of cohesion, the precise nature of the process may be slightly different in that it is less dependent on interpersonal liking or attraction. In terms of task interdependence, when members understand that their tasks are intertwined with those of another team, they will be more inclined to develop and maintain working relationships, as they recognize that these relationships will be necessary in order to complete their tasks. Thus, the requirements of task interdependence between teams may create increased collaboration and more frequent interactions, allowing trust and perceived competency to form as bases of cohesion. Goal interdependence will also drive cohesion. Once members recognize that their proximal goals are linked to those of other teams such that they all contribute to a common distal goal, teams will be more likely to develop cohesive ties in order to ensure that all proximal and distal goals are reached. In essence, when teams experience task or goal interdependence with another team in the system, members and leaders will be more inclined to develop and maintain the functional ties that characterize cohesion. Therefore, it is hypothesized that:

Hypothesis 1: The level of interdependence between teams will be positively associated with between-team cohesion

Leader Boundary Spanning Behaviors

Managing between-team processes in an MTS is particularly challenging, as it requires leaders to engage in more “sophisticated boundary management” (Kozlowski, Gully, McHugh, Salas, & Cannon-Bowers, 1996; p. 971). In an MTS, the leader(s) will need to determine where cohesive ties need to be, and initiate or reinforce those ties between teams. This will require leaders to engage in boundary spanning behaviors, in which they communicate with leaders of other teams. Ancona and Caldwell (1988, 1992) described a variety of boundary-spanning activities that individuals engage in to manage these cross-team communications. Due to the complexity and size of MTSs, these responsibilities usually fall on system- and team-level leaders (Davison & Hollenbeck, 2012). First, boundary spanning involves external communication, in which boundary spanners (e.g., team leaders) gather information about other teams, as well as disseminate information about their own team to their external constituents (Ancona & Caldwell, 1988, 1992). Within an MTS, leaders who engage in these cross-team exchanges can work to align the goals of their respective teams and form a shared understanding of the system’s distal goal. A second major responsibility that boundary spanners have is to translate or filter the information gleaned from external communications to their respective teams (Ancona & Caldwell, 1988, 1992). Often, this involves distilling or clarifying externally gathered information into messages that are pertinent to the component team. Information communicated through translation or filtering should be limited to what team members need to know in order to work toward both distal and proximal goal accomplishment. Through these behaviors, boundary spanners disseminate relevant and complementary information to their respective teams, and in doing so enable component teams to develop an accurate and shared understanding of the within- and between-team processes necessary for MTS success. The shared understanding across component teams will ultimately allow teams to recognize where cohesive ties should form within the system, and cultivate these ties accordingly.

Support for the importance of leaders in developing between-team cohesion comes from both the traditional cohesion literature as well as the MTS literature. In terms of within-team cohesion, communication between leaders and team members has shown to be important for its development (Manning, 1991). Boundary spanning and communication have also been identified as important processes in fostering MTS-level effectiveness (DeChurch & Mathieu, 2009). Additionally, DeChurch et al. (2011) found that the coordinating functions of leaders affected the emergent states, processes, and outcomes of an MTS. This coordination needs to occur within teams, between teams, and between the MTS and external constituents. Boundary spanning behaviors will essentially allow leaders to manage the between-team interdependencies that are so crucial to MTS functioning (Hoegl & Weinkauf, 2005). Therefore, it is hypothesized that:

Hypothesis 2a: Leader boundary spanning behaviors will be positively associated with between-team cohesion

Leader boundary spanning behaviors, while pivotal to its development, may not directly lead to between-team cohesion. Instead, these behaviors will allow leaders to foster cohesion through the alignment of team goals.

Goal Alignment

Leaders create goal alignment by "ensuring compatibility between all of the goals in the goal hierarchy" (Williams & Mahan, 2006; p. 221). This compatibility will foster an understanding among members that their tasks and goals are inherently linked to those of other component teams, and that working relationships must be established for tasks to be completed and goals accomplished. At the within-team level, theorists (e.g., Griffin & Moorhead, 1986; Schermerhorn, Hunt, & Osborn, 1988) have proposed that cohesion can *only* improve performance when group and organizational goals are aligned. Empirical studies substantiate this notion, as within-team cohesion has been shown to be enhanced by the creation of a distinctive and purposeful team goal (Cartwright, 1967; Brawley, Carron, & Widmeyer, 1993). Leaders have also been shown to play an important role in this process by linking member goals to each other (Bartone et al., 2002) and the organization (Henderson, 1985). In his work on military cohesion, Henderson (1985) notes that the role of a leader within a cohesive unit is also to transmit the organizational goals down the chain of command. In an MTS, this function is paralleled such that leaders must link proximal goals to each other and the distal goal(s) of the system (DeChurch et al., 2011). Based on this research, it is hypothesized that:

Hypothesis 2b: Leader boundary spanning behaviors will be positively associated with goal alignment between leaders.

When leaders use information gathered through boundary spanning to foster goal alignment, they ensure that proximal goals are compatible with each other and that all component teams are working toward the distal goal. This ultimately creates a more cohesive system in which the necessary cross-team functions are taking place to accomplish superordinate goals, thus producing a system that is robust and resistant to disruption. In this way, goal alignment serves as the mediator through which leader boundary spanning behaviors foster between-team cohesive ties. While goal alignment is likely to act as an important mediator of this process, other possible mediators exist that might explain the relationship between leader boundary spanning and between-team cohesion. For example, boundary spanning between leaders may cultivate cross-team cohesive ties through the development of shared cognitions or interpersonal attraction between leaders. Additionally, structural factors such as composition of the leadership team, or situational factors such as previous working relationships among leaders may also act as mediators. Therefore, goal alignment is hypothesized to serve as a partial mediator of the relationship, specifically:

Hypothesis 2c: Goal alignment will partially mediate the relationship between leader boundary spanning behaviors and between-team cohesion.

Within-Team Cohesion

While cohesion at the between-team level is proposed to be distinct from within-team cohesion, it is likely that the two share a significant relationship. Research and theory from the MTS literature suggest that the relationship between component teams and the overall MTS is such that strong emergent states at the team-level might deter the development of those states at higher levels (DeChurch & Zaccaro, 2010). Specifically, emergent states that create unity within a group (e.g., trust, cohesion, shared mental models) can also make ingroup-outgroup boundaries more salient (Tajfel, 1982). In terms of cohesion, team-level cohesion might actually inhibit the emergence of system-level cohesion, due to the strong team boundaries that these ties create. Alternatively, the degree to which members are motivated to cooperate with their team may be relevant to how motivated they are to work with other teams in the system (William & Mahan, 2006). If so, members of a highly cohesive component team will be more likely to seek out cohesive relationships with other teams as well, in order to ensure that their team is contributing to the success of the greater system of which they are a part. Additionally, other component teams will be more likely to initiate cohesive ties with teams that demonstrate high internal cohesion as opposed to dysfunctional teams with poor cohesion. These relationships would be reflected in a positive correlation between cohesion across levels. The competing trends presented in the literature suggest an inverted-U relationship, in which too much or too little team cohesion is detrimental to the formation of cohesive ties across teams in a system. Based on this notion, it is hypothesized that:

Hypothesis 3: Within-team cohesion will demonstrate an inverted-U relationship with the level of between-team cohesion in an MTS, such that too much or too little team cohesion will be associated with a lower level of cohesive ties across teams in the system.

System Readiness

Team cohesion has demonstrated a robust relationship with both individual (e.g., Kellett, 1982) and group performance (e.g., Mullen & Cooper, 1994). In military settings, however, precise measures of performance are nearly impossible to capture, as the performance domain occurs in combat during a deployment. Therefore, performance-related outcomes of cohesion are generally operationalized in terms of a unit's *readiness*, or the team's ability to successfully complete a mission (Oliver et al., 1999). A unit that is deemed 'ready' by its Company Commander is one that consistently demonstrates preparedness and proficiency during pre-deployment training, and as such is expected to successfully complete the mission it is taxed with during deployment. This capability is largely a function of the degree to which a unit is adequately staffed with experienced and motivated individuals (Schank, Harrell, Thie, Pinto, & Sollinger, 1997). Cohesion, particularly task cohesion, has been shown to relate positively to military readiness at the group level (Griffith, 2002; Oliver et al., 1999). In particular, the shared commitment, satisfaction, and effort characteristic of cohesive teams generally produces a force that is both capable and motivated to perform successfully in combat.

Extant literature also demonstrates that processes which occur between teams have shown to be significant determinants of MTS-level outcomes (Marks et al., 2005). Therefore, a system- or platoon-level outcome, such as the readiness of the higher level unit, is likely to be strongly predicted by the level of between-team ties that exist. In particular, the degree to which a system (or platoon) is ready will not simply be a function of individual- or team-level capabilities, but rather the degree to which teams within the system demonstrate a shared commitment, understanding, and collective effort toward the achievement of the system's distal goal(s). Based on this notion, it is hypothesized that:

Hypothesis 4: Between-team cohesion will be positively associated with system readiness.

The MTS literature demonstrates that although MTS-level outcomes are more strongly attributed to between-team processes (e.g. DeChurch & Marks, 2006; Marks et al., 2005), these higher-level outcomes are ultimately the result of a combination of processes at both the between- and within-team level. In terms of cohesion, the potential for complex interactions and a curvilinear relationship between the construct at different levels suggest a compilational model of emergence, in which higher-level outcomes are the result of precise patterns and configurations of lower-level phenomena (Kozlowski & Klein, 2000). The complexity of these models and the limited research on cohesion across levels make it difficult to hypothesize the exact nature of this configuration. Therefore, the current dissertation will investigate various combinations of between- and within-team cohesion, using both sociometric and psychometric approaches, in order to attempt to explain the most significant amount of variance in the system-level readiness. Because extant literature and aggregation techniques provide little bases for forming concrete hypotheses regarding the precise combination of the cohesion variable across levels, these investigations will be exploratory and will address the following research question:

Research Question 1: How will between-team cohesion and within-team cohesion combine to predict system readiness?

Hypothesized Model

Insert Figure 5 here – Model of proposed hypotheses

Proposed Study Methodology

Method

The method for investigating the outlined hypotheses will consist of a cross-sectional field investigation sampling U.S. Army soldiers and leaders. Variables will largely be assessed using leader ratings and self-report surveys, which will be administered to soldiers as well as leaders at the squad-, platoon-, and company-level (see Table 2). To investigate data at the squad- and platoon-level, several constructs will be operationalized by aggregating data collected from these individuals. Specifically, individual responses from soldiers will be aggregated to the squad level to capture within-team cohesion, and further aggregated to capture cohesion between squads. Other constructs, namely between-team interdependence, leader boundary spanning, goal alignment, and readiness, will be captured by asking leaders to provide a global assessment for the entire unit or system. This technique elicits responses from individuals, but the individual is used to represent the unit as a whole, thus resulting in group-level data. Like many techniques, there are benefits and drawbacks to this method. Rousseau (1985), for example, claims that "the use of global data is to be preferred because they are more clearly linked to the level of measurement, avoiding the ambiguity inherent in aggregated data" (p. 31). Conversely, Klein, Dansereau, and Hall (1994) propose that when "a global measure is used to characterize a group, [the researcher] lacks the data needed to test whether members are indeed homogenous within groups on the variable of interest" (p. 210). Kozlowski and Klein (2000) point out, however, that global assessment is appropriate when it is used to assess constructs that are readily observable, and/or those to which leaders might have unique insight or access. Because the constructs assessed through leader responses in the current study meet these criteria, global assessment is considered a valid method for assessing these constructs. Additionally, the use of global assessments can mitigate the effects of statistical artifacts due to same source bias, which is an important issue to address in multilevel research (Chen, Mathieu, & Bliese, 2004). With cohesion studies in particular, single-source bias is a common limitation (e.g., Walsh et al., 2010; Gillespie, Chaboyer, Longbottom, & Wallis, 2010; Tekleab et al., 2009), as self-reports are typically used to assess both antecedents and consequences of cohesion, as well as cohesion itself, within the same study (Oliver et al., 1999). In the past, researchers have addressed this issue in the same way that the current study proposes, namely by separating sources across levels of analysis (e.g., Hoegl & Weinkauf, 2005).

Sample

The sample will consist of soldiers and leaders from a Stryker Brigade Combat Team (SBCT), which is a type of infantry brigade within the U.S. Army. A typical SBCT in the Army consists of 80-300 squads within 27-80 platoons. Each squad generally consists of 8-10 soldiers, led by a squad leader, typically a Staff Sergeant (SSG). A platoon is typically made up of 2-4 squads (i.e., 16-40 soldiers), and is led by a Platoon Leader (PL) and a Platoon Sergeant (PSG). Commonly, a First or Second Lieutenant (1LT or 2LT, respectively) serves as PL, with a Sergeant First Class (SFC) serving as PSG. At the time of data collection, units within the SBCT will be in Phase I of the Army Force Generation (ARFORGEN) cycle. In this phase, newly formed and trained squads are beginning to train as an intact platoon.

Power Analysis

Very little work exists on conducting a power analysis in multilevel research (Boyle & Willms, 2001; Hofmann, Griffin, & Gavin, 2000; Maas & Hox, 2004, 2005; Resise & Duan, 2003); therefore appropriate sample sizes are primarily determined by guidelines that have been derived from simulation studies (e.g., Maas & Hox, 2005; Scherbaum & Ferreter, 2009). These studies largely confirm that in multilevel research, sample size of the higher-level group (Level 2) has a much greater effect on power compared to sample size of lower-level constituents (Level 1). As a result, the average amount of data points per group (i.e., cluster size) is of less importance than the number of higher-level groups (Snijders, 2005). In the current study, this means that the number of platoons in the sample will be more important than the total number of squads in achieving an acceptable level of statistical power. Simulation studies of power in multilevel analyses also reveal that while a Level 2 sample size of N=50 or greater is ideal for minimizing Level 2 standard errors, acceptable statistical power can be achieved with a minimum Level 2 sample size of N=30 (Maas & Hox, 2004, 2005). As the proposed research will sample an entire brigade consisting of 27-80 platoons, it is likely that the current study will meet if not greatly exceed the required Level 2 sample size for achieving an acceptable level of statistical power.

Measurement

Level of Measurement

Within the sample, squads will be assessed as component teams, while the platoon will represent the MTS. In the past, investigations of within-team cohesion in the military have typically assessed component teams at the platoon level (e.g., Siebold & Kelly, 1988). This method, however, neglects the nested structure of a platoon, which consists of several individual squads. To address this notion, the current study proposes to assess component team functioning at the squad level, and MTS or between-team functioning at the platoon level. While not typically used (for an exception, see Siebold & Lindsay, 1999), these levels have been recommended in the study of cohesion in the past, as structure, group member behaviors, and leader techniques can be more readily observed at the squad level (Henderson, 1985; Savage & Gabriel, 1976).

Variables

Between-team interdependence. Interdependence among squads in the platoon will be assessed by administering survey items to squad leaders. While squad members may have some idea of their interdependence with other squads in the platoon, they will likely lack a full understanding of the interdependence of the greater system outside of their own individual experiences. Leaders at the squad-level, however, should possess a more comprehensive mental representation of the extent to which their squad is required to work interdependently with other squads in order to accomplish the goals of the platoon.

Squad leaders will be presented with a list of all squads within the platoon, and will be asked to indicate the degree to which their squad requires action from each other squad for the platoon to be successful. Because soldiers will be in the training phase (Phase I) of the ARFORGEN cycle at the time of data collection, the question specifically refers to the training exercises that the platoon will be engaging in, in order to provide more context for the respondents. All respondents will be asked to indicate their answers on a 7-point Likert-type scale ranging from "no extent" (1) to "a very great extent" (7). They will also be asked to indicate "this is my squad" (0) when presented with their own squad in the list.

Goal Alignment. Goal alignment will be assessed by surveying squad and platoon leaders. Leaders at both levels will be given an open-ended response question in which they are asked to list the top five training priorities that their platoon needs to address over the next month. Goal alignment will be determined by content coding the responses in order to quantify the degree to which the priorities listed by the squad leaders match or complement those provided by the platoon leadership.

Leader Boundary Spanning. Leader boundary spanning behaviors will be assessed through self-reports from squad- and platoon-level leaders. Within an Army platoon, the responsibility of engaging in boundary spanning behaviors should fall on lower level leaders (e.g., Platoon Leaders, Platoon Sergeants, Squad Leaders), as leadership at the platoon level and below will be most influential in developing cohesion within and between units. Above the platoon level (e.g., Company Commander, Battalion Commander, Brigade Commander), leaders are primarily concerned with strategy and management (Henderson, 1985), and have less direct interaction with soldiers. Platoon and squad leaders, however, have more frequent and direct interactions with soldiers, and are therefore more likely to be influential in developing attitudes and behaviors.

These leaders will be given the names of squad- and platoon-level leaders in the platoon, and asked "How often do you communicate with the following individuals regarding these priorities?" The measure will be given in conjunction with the goal alignment measure described above, as the question references the priorities they listed in their response to the goal alignment measure. Respondents will be provided with a 7-point Likert-type scale ranging from “never” (1) to “more than once per day” (7). They will also be asked to indicate “this is me” (0) when presented with their own name in the list.

Within-team Cohesion. The current study will assess cohesion at the squad-level using a traditional psychometric approach. Squad members will be presented with 6-items that were drawn from a variety of measures previously used to assess group cohesion (Carron et al., 1985; Griffith, 1988; Siebold & Kelly, 1988a, Stokes, 1983; Zaccaro & McCoy, 1985). These items were modified slightly in order to reference an Army squad rather than a generic team (see Appendix E). Respondents will be asked to indicate their answer on a 7-point Likert-type scale ranging from “very strongly disagree” (1) to “very strongly agree” (7).

Readiness. In the U.S. Army, unit readiness is commonly used as a proxy for performance or combat effectiveness (Oliver et al., 1999). Because it is impractical to collect performance data in an actual deployment setting, readiness is typically assessed in order to capture a unit’s capability to complete its mission. While actual measures of unit readiness are currently collected from Company Commanders in the U.S. Army, these evaluations are classified. Therefore, the current proposal will assess unit readiness by asking Company Commanders to provide an informal (i.e., non-classified) evaluation of readiness of the platoons in their company. Company Commanders will be asked to answer 7 items pertaining to the capabilities, manpower, and training of each platoon.

These items were adapted from measures previously used and validated in other efforts assessing unit readiness in the military (Department of Defense, 2010; Griffith, 1988). Company Commanders will be asked to respond to these items on a 7-point Likert-type scale ranging from "very strongly disagree" (1) to "very strongly agree" (7).

Between-team cohesion. Platoon-level cohesion will be assessed using both sociometric and psychometric measures. To avoid single-source bias, these measures will be administered to a different set of respondents than those who completed the measure of within-team cohesion. Specifically, more senior squad members, who have been formally designated as "team leaders" will be asked to assess between-team cohesion. Each squad typically contains two team leaders who possess the rank of Corporal (CPL). While these individuals carry out many of the same duties as squad members, they possess slightly more experience and are therefore likely better equipped to evaluate the higher-level cohesion that exists between squads in the platoon. In the sociometric measure, team leaders will be asked to indicate the degree to which their squad is cohesive with each of the other squads in the platoon. Respondents will be asked to indicate their responses on a 7-point Likert-type scale ranging from "to no extent" (1) to "a very great extent" (7). They will also be asked to indicate "this is my squad" (0) when presented with their own squad in the list. This will result in a matrix of dyadic-level data which captures the cohesive ties between each combination of squad-pairs within the platoon. In addition to the sociometric measure, a more traditional, psychometric measure will be administered to respondents. This measure includes items that have been used and validated in the small group cohesion literature, and can therefore serve to further validate the relatively novel sociometric measure aimed at capturing between-team cohesion. Five items were drawn from several studies assessing cohesion (Griffith, 1988; Siebold & Kelly, 1988a; Stokes, 1983; Zaccaro & McCoy, 1985), and were modified to reflect (a) an Army context and (b) the cohesive ties between units rather than individuals. Individuals will be asked to respond to the items using a 7-point Likert-type scale ranging from "very strongly disagree" (1) to "very strongly agree" (7). While some items reflect those administered to assess within-team cohesion, the measure of between-team cohesion focuses more on the bonds surrounding shared tasks and goals, rather than interpersonal attraction or liking. In this way, these items more closely represent the conceptualization of between-team cohesion as a largely task-based commitment resulting in functional ties across units within a system.

Proposed Analyses

Operationalization and aggregation of variables

Between-team interdependence

Because between-team interdependence will be assessed using a sociometric measure that will result in dyadic-level data, social network analysis (SNA) techniques, which treat the dyad as the level of analysis, are most appropriate for operationalization. To maintain information at the dyadic-level, network data are typically represented by a matrix, rather than reduced to a single value. A basic form of representing this data is a case-by-case sociomatrix. In this matrix, actors (in this case, squads) are listed across rows and columns. The value in each cell quantifies the relationship between pairs of actors listed in the corresponding row and column (Knoke & Yang, 2008; Scott, 1991).

The result is a square, symmetrical matrix representing the strength of each possible tie within the network. The current study will derive this matrix by averaging the responses provided by each actor in the pair regarding their relationship (i.e., interdependence). For example, the value representing the relationship between Squad A and Squad B in the interdependence sociomatrix will be the average of the response provided by Squad A's leader regarding Squad B, and Squad B's leader regarding Squad A.

Leader Boundary Spanning

Leader boundary spanning represents the degree to which squad leaders communicate across team barriers, as indicated by their responses to the measure described above. Like between-team interdependence, data describing leader boundary spanning behaviors will exist at the dyad-level, and will therefore be best represented in a case-by-case sociomatrix. The values in the leader boundary spanning sociomatrix will be derived by averaging responses from each pair, and will result in a square, symmetrical matrix.

Goal Alignment

Goal alignment will operationalized by content coding the similarities between leader responses to the item assessing goal alignment. The process of content coding will provide a quantifiable value that represents the degree to which squad leaders fully understand the goals of the platoon as a whole. Although the data was collected from individuals (i.e., platoon- and squad-level leaders), these individuals provided global assessments of the goal alignment at the higher-level. Therefore data will not need to be aggregated, as it already exists at the squad-level. Each squad will receive a score that represents the number of training priorities listed by the squad leader that match or complement those provided by the platoon leadership. This will result in a score for each squad, ranging from 0-5. The platoon-level of goal alignment will be operationalized by summing the scores of all the squads in the platoon.

Within-team cohesion

Within-team cohesion will be operationalized using the method commonly adopted in cohesion research, namely as a measure of central tendency (in this case, the mean) pending an acceptable level of agreement. Agreement will be calculated using the index r_{WG} (James et al., 1984), with the cutoff set at the traditional value of $r_{WG} = .70$. Following typical protocol, teams whose level of agreement falls below this value will be given a within-team cohesion score of “0” (Klein & Kozlowksi, 2000). As outlined in the above review of the literature, this assessment captures the level of cohesion while recognizing that a cohesive team is one whose members uniformly desire to remain part of the group.

Readiness

Because readiness will be assessed by asking the Company Commander to report on each platoon, data will already exist at the platoon-level, and will therefore not need to be aggregated. Instead, the readiness level of each platoon will be operationalized by the average rating given by the Company Commander.

Between-team cohesion

Between-team cohesion will be aggregated to the platoon level using different methods for both psychometric and sociometric data. Because between-team cohesion develops in much the same way as within-team cohesion, the psychometric data capturing between-team cohesion will be aggregated similarly; namely, by setting a cutoff for agreement (i.e., r_{WG} = .70), and taking the mean of the units that meet this cutoff. For between-team cohesion, however, data will have to be aggregated to the platoon-level, rather than the squad. This will require using the responses to calculate both the agreement within squads and well as the agreement between squads in the platoon. Pending acceptable levels, between-team cohesion can be operationalized by calculating the mean of responses across squads in the platoon. This will result in nested data, which represents the level of cohesiveness that exists between intact, lower-level units (i.e., squads) within the higher-level system (i.e., platoon).

Using sociometric data, between-team cohesion will be represented using a case-by-case sociomatrix, similar to those calculated for between-team interdependence and leader boundary spanning that are described above. Unlike these variables, however, the sociometric measure of between-team cohesion was distributed to multiple individuals, as opposed to a single individual representing the entire squad. Therefore, before a sociomatrix can be created, the completed matrices from all respondents in each squad will need to be collapsed into a single matrix that represents the responses of the entire squad. This can be computed by averaging a squad's responses regarding each squad, pending acceptable levels of rwg (i.e., rwg = .70). Once a matrix has been computed for each squad, these can be combined into a sociomatrix using the procedures described above. This will yield a symmetrical matrix representing the strength of the cohesive ties between each possible pair of squads in a platoon.

Analyses

Preliminary analyses

Prior to conducting hypothesis tests, a series of preliminary analyses will be conducted on the variables of interest. These will include computing the means and standard deviations of variables, as well as conducting reliability analyses on the measures used. Additionally, correlations will be conducted to determine the relationships among the variables. These analyses do not directly test the proposed hypotheses, however they are an important first step for identifying any potential outliers, issues with measurement, problems with the data, or other trends that may warrant further statistical analysis.

Hypothesis 1

Hypothesis 1 will be tested by conducting a network regression using the Quadratic Assignment Procedure (QAP). This technique is an extension of the traditional linear regression model that uses Ordinary Least Squads (OLS; Hanneman & Riddle, 2005). Network regression, however, does not assume that data points are independent, as network data consists of relationships between actors, and is therefore inherently not independent. In a network regression, each element of the matrix of the dependent variable is regressed onto the respective element in the matrix of the independent variable in order to yield regression coefficients and standard errors. To test the current hypothesis, a network regression would involve the matrix of between-team cohesion ties being regressed onto the matrix of between-team interdependent ties. The degree to which these network structures map onto each other (i.e., the structure of between-team interdependence predicts the structure of between-team cohesion) will be reflected in the statistical significance of the regression coefficients and the overall model fit (i.e., R-squared).

Hypothesis 1 will also be tested using data from the psychometric assessment of between-team cohesion. Because the between-team interdependence and between-team cohesion data will both exist at the platoon-level, a simple OLS regression can be applied. In this case, the platoon-level value of between-team cohesion (as assessed by the psychometric measure) can be regressed onto an index of central tendency that characterizes the network of interdependent ties in the platoon, specifically, the mean tie strength. This will result in a simple regression in which the value of between-team cohesion will be regressed onto the mean tie strength of the interdependence of each platoon.

Hypothesis 2

Like hypothesis 1, hypothesis 2 will be tested using both sociometric and psychometric representations of between-team cohesion. As previously mentioned, sociometric and psychometric data can be analyzed using network regression and traditional OLS linear regression, respectively. Both types of regression can be implemented into Baron and Kenny's (1986) process for testing mediation. This method outlines three steps. First, the dependent variable (between-team cohesion) is regressed on the proposed mediator (goal alignment), to determine the degree to which the mediator directly predicts the outcome. Next, the dependent variable is regressed onto the independent variable (leader boundary spanning) to confirm that there is a statistically significant relationship between the variables. Finally, the dependent variable is regressed onto the independent variable, with the mediating variable held constant. If a partial mediation exists, the relationship between the independent and dependent variables should become non-significant when the mediator is controlled for. This demonstrates that the significant relationship between the independent and dependent variables is due to the transmitting effect of the mediator.

Hypothesis 3

Hypothesis 3 proposes a correlation between the average within-team cohesion of squads in a platoon and the cohesive ties between squads in the platoon. However, hypothesis 3 specifically proposes an inverted-U relationship between the two variables, which would not be represented by a single correlation coefficient. Instead, a parabolic relationship might manifest as a non-significant or even zero correlation. Therefore, to further investigate the relationship, data points will be plotted to determine the shape of the relationship. Also, platoons can be classified as being high, medium, or low in within-team cohesion, and additional correlational analyses can be run for each group. If an inverted-U relationship exists, this should be exhibited in the different valences of the correlation coefficients across each group. Specifically, platoons classified as low in within-team cohesion should demonstrate a positive correlation with between-team cohesion, while medium and highly cohesive squads should demonstrate a non-significant and negative relationship with between-team cohesion, respectively. Other methods for identifying a curvilinear relationship, such as an analysis of variance

(ANOVA) or a non-parametric correlation (e.g., Spearman R) will also be used to further investigate the data.

Hypothesis 4

Hypothesis 4 will be tested by regressing the dependent variable of platoon readiness onto between-team cohesion. As with previous hypotheses, various regressions will be run, using between-team cohesion data gleaned from both sociometric and psychometric approaches. Specifically, platoon readiness will be separately regressed onto the matrix of the between-team cohesive ties within each platoon, in order to examine sociometric data. For psychometric data readiness will be regressed onto the average of the responses that each platoon provided to the questionnaire of between-team cohesion.

Research Question 1

Because Research Question 1 is largely exploratory, several variations and combinations of within- and between-team cohesion will be investigated in order to determine the precise configuration that best predicts platoon level readiness. In doing so, several issues will need to be addressed. First, multilevel issues will need to be carefully considered, as the variables of interest exist across different levels of analysis (namely, team, between-team, and system) and as such represent a nested data structure. Additionally, the interactions between variables across levels are hypothesized to be non-linear in nature, and will likely require an exploration of complex, compilational emergence. Finally, the incremental validity of between-team processes over within-team processes in predicting system-level outcomes suggest that variables will need to be differentially weighted in their combination. Exploration of various configurations will evaluate both psychometric and sociometric data, using both multilevel and network analysis approaches.

Discussion

The current research will have implications for both theory and practice surrounding the formation of cohesion in an MTS.

Theoretical Implications

Currently, little to no conceptual work exists that adequately defines cohesion in organizational units above the team or component team level. Recent literature has pointed out that while many of the constructs examined in the teams literature are valid and important, we know little about how they operate at higher levels (e.g., DeChurch & Mathieu, 2009; DeChurch & Zaccaro, 2010). In this capacity, the construct of cohesion is no exception. While its importance for team functioning and performance is widely supported (e.g., Dobbins & Zaccaro, 1986; Griffith, 2002; LePine et al., 2008; Oliver et al., 1999), these findings do not fully explain how cohesion spans team boundaries within an MTS. By specifying how cohesion operates across multiple levels, and describing the characteristics of an MTS that demonstrates between-team cohesion, the current work contributes not only to our understanding of cohesion as a phenomenon, but also to our knowledge of how teams operate and interact within a larger system.

Practical Implications

The present research will also make practical contributions, as empirical findings regarding the determinants and covariates of between-team cohesion could be readily applied to real-world settings. Once sound research has identified team- and systems-level parameters that can foster between-team cohesion, these factors can be implemented or developed within organizations in order to create high functioning and cohesive MTSs. While this single study does not irrefutably identify all antecedents, it can serve as a starting point for developing an evidence-based model of how cohesion between teams develops and contributes to MTS outcomes. Due to its military sample, the present work is especially relevant to the armed forces. Based on its known relationship with performance, it is not surprising that cohesion is often an important consideration for military teams, whose performance domain involves high-risk environments and high-stakes outcomes (Yagil, 1995). Additionally, the structure of the U.S. Army (i.e., squads nested within platoons, platoons nested within companies, etc.) requires that lower-level units share resources, communicate, and coordinate in order to function successfully as a higher-level entity. Therefore, any empirically validated tools or techniques that can be used by leaders to quickly and effectively cultivate cohesion within the Army would be an essential practice for promoting military readiness and effectiveness.

Table 1. **Antecedents, Covariates, and Outcomes of Cohesion**

Construct	**Empirical Support**
Antecedents of cohesion	
Altruism	Prapavessis & Carron (1997)
Conflict management	Tekleab et al. (2009)
Demographic homogeneity (mixed findings)	Lott & Lott (1965); Siebold & Lindsay (1999)
External Threats	Dion (1979); Schachter (1959); Sherif et al. (1961); Stein (1976)
Functional diversity (-)	Shapcott et al. (2006)
Group size (-)	Mullen & Cooper (1994); Siebold & Kelly (1988); Steiner (1972); Widmeyer et al. (1990)
Leadership	Bartone et al. (2002); Cartwright (1967); Harrell & Miller (1997); Henderson (1985); Kozub (1993); Manning & Ingraham (1983); Siebold & Kelly (1988); Smith & Hagman (2006); Westre & Weiss (1991)
Proximity	Festinger (1950); Ingraham (1984); Lott & Lott (1965); Tajfel & Turner (1979); Wilder (1986)
Stress	Bartone et al. (2002)
Team Goal Setting	Brawley et al. (1988, 1993)
Training quality	Bartone & Adler (1999); Bartone et al. (2002); Bartone & Kirland (1991); McIntyre et al. (2003)
Unit Climate	Siebold (2007); Smith & Hagman (2006)
Covariates of cohesion	
Communication between members	Lott & Lott (1961); Manning (1991)
Collective Efficacy	Paskevich et al. (1999)
Team processes (action, transition, interpersonal)	LePine et al. (2008)
Trust	Calnan & Rowe (2007); Grossman et al. (2001); Gilbert & Tang (1998); Hansen et al. (2002); Mach et al. (2010); Thau et al. (2007)
Outcomes of cohesion	
Adherence to norms and rules	Carron et al. (1998); Oliver et al. (1999); Prapavessis & Carron (1997); Shields et al. (1995); Schachter et al. (1951)
Advice seeking and giving	Van Woerkom & Sanders (2010)
Cooperation	Kidwell et al. (1997); Sanders (2004); Sanders & Van Emmerik (2004)
Decreased absenteeism	Sanders (2004); Sanders & Hoekstra (1998); Zaccaro (1991)
Increased performance (civilian settings)	Beal et al. (2003); Chang & Bordia (2001); Evans & Dion (1991); Gully et al. (1995); Mullen & Cooper (1994); Oliver (1988); Oliver et al. (1999); Yagil (1995); Zaccaro (1991)
Increased performance (military settings)	Griffith (2002); Kellett (1982); Little (1964); Marshall (1966); Oliver et al. (1999)

Table 1. **Continued**

Increased productivity	Carron et al. (2002); Keyton & Sprinston (1990); Oliver et al. (1999)
Individual effort	Greene (1989)
Job satisfaction	Ahronson & Cameron (2009); Dobbins & Zaccaro (1986); Oliver et al. (1999); Walsh et al. (2010); Williams & Hacker (1982)
Member self-esteem	Cartwright (1967); McGrath (1984); Shaw (1981)
Motivation	Shaw (1981); Stogdill (1972)
Perceived performance	Tekleab et al. (2009)
Psychological adjustment	Ahronson & Cameron (2009); Griffith (2002); Sanders (2004); Sanders & Hoekstra (1998)
Organizational citizenship behaviors	Chen et al. (2009); Kidwell et al. (1997)
Organizational effectiveness	Greene (1989)
Resistance to disruption	Brawley et al. (1988)
Team satisfaction	Tekleab et al. (2009)
Team viability	Tekleab et al. (2009)

Figure 1. **Model of Antecedents, Covariates, and Outcomes of Team Cohesion**

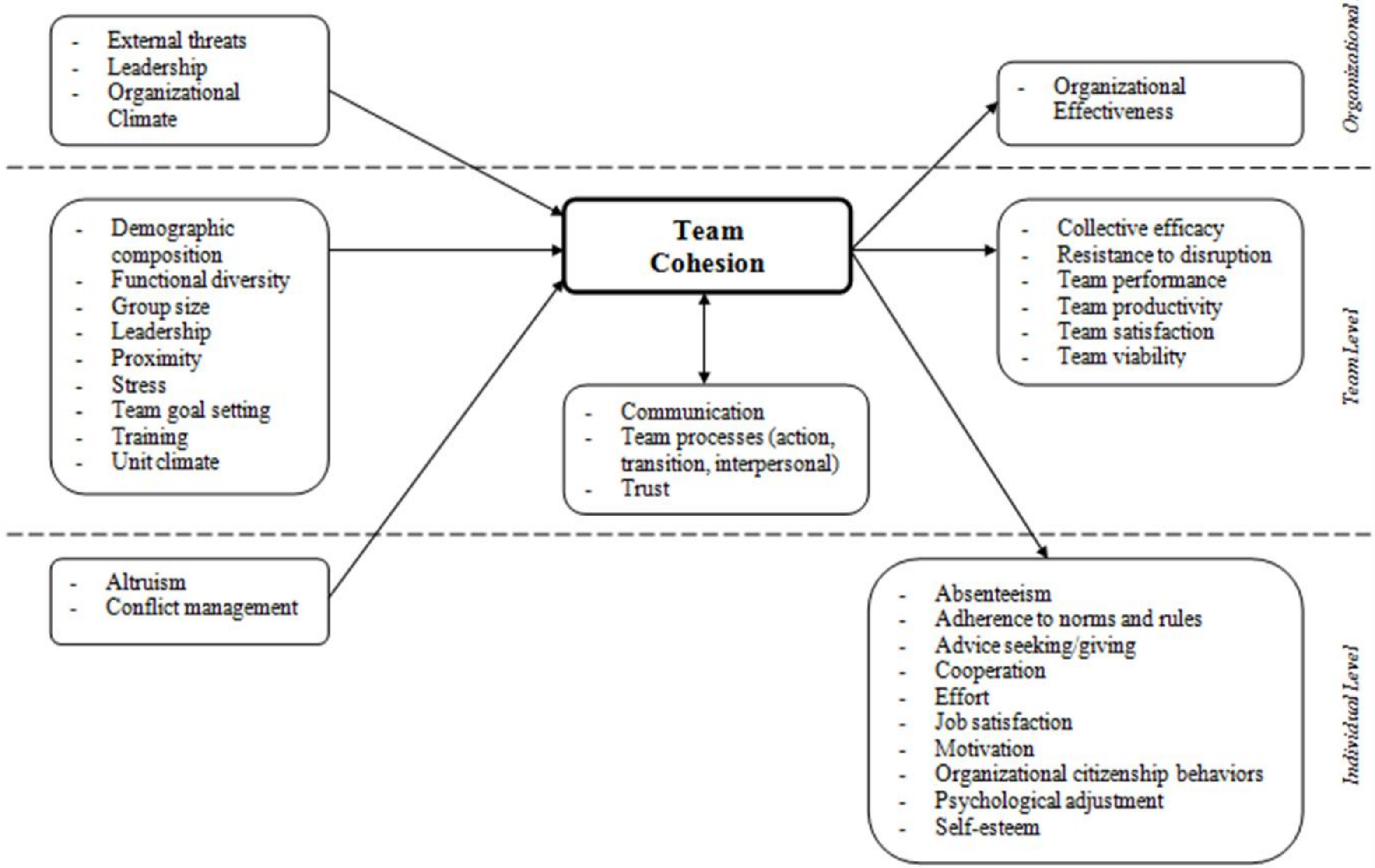


Figure 2. U.S. Army Hierarchical Structure

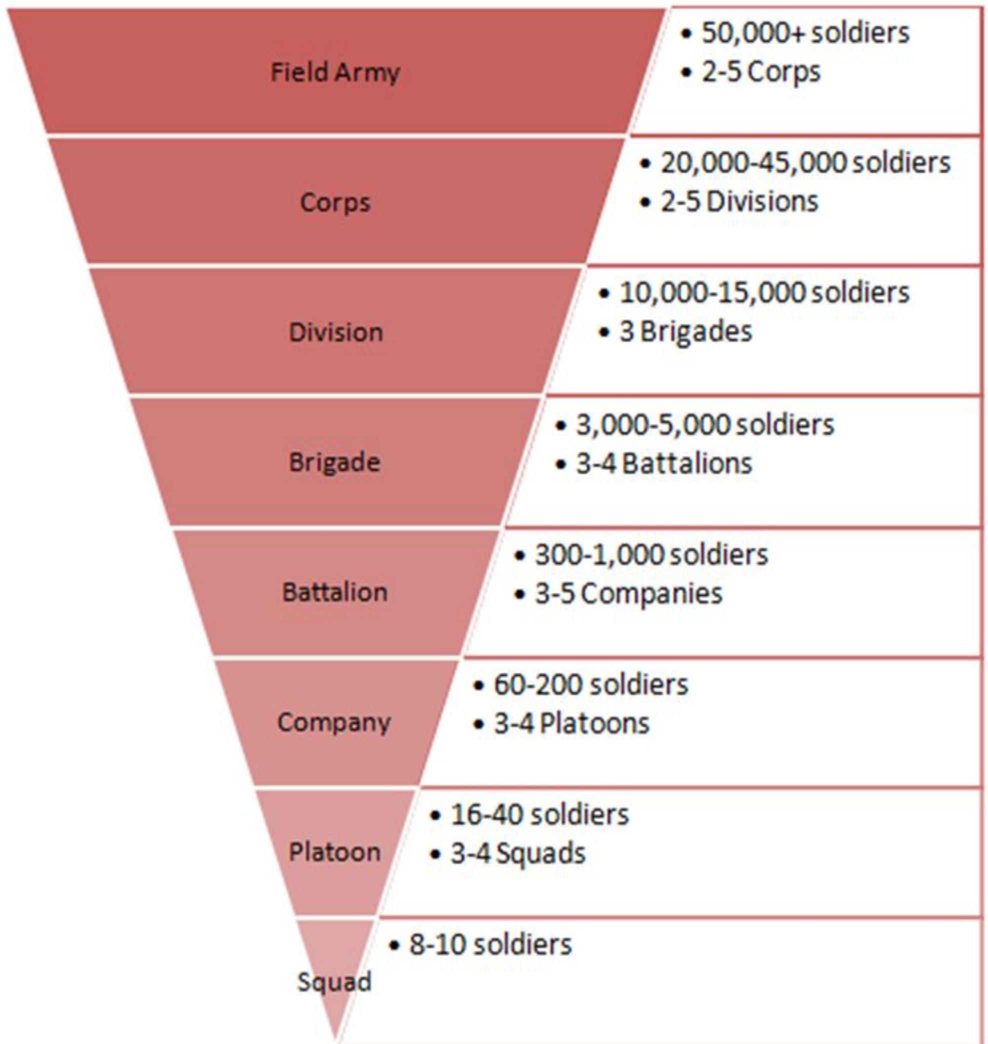


Figure 3.1. Model of MTS with low Between-Team Cohesion

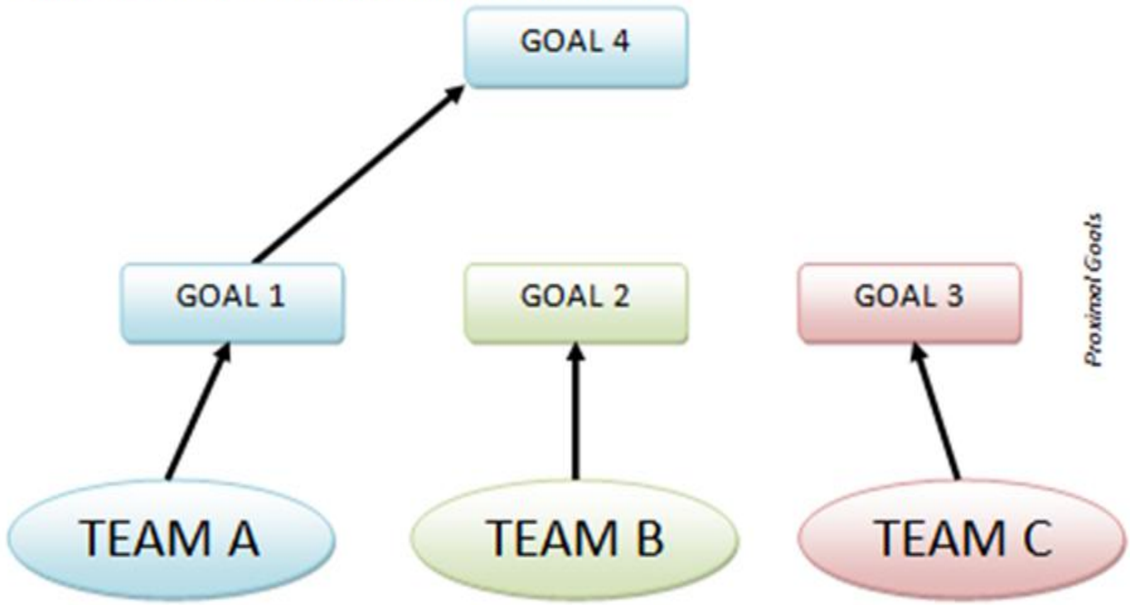


Figure 3.2. Model of MTS with high Between-Team Cohesion

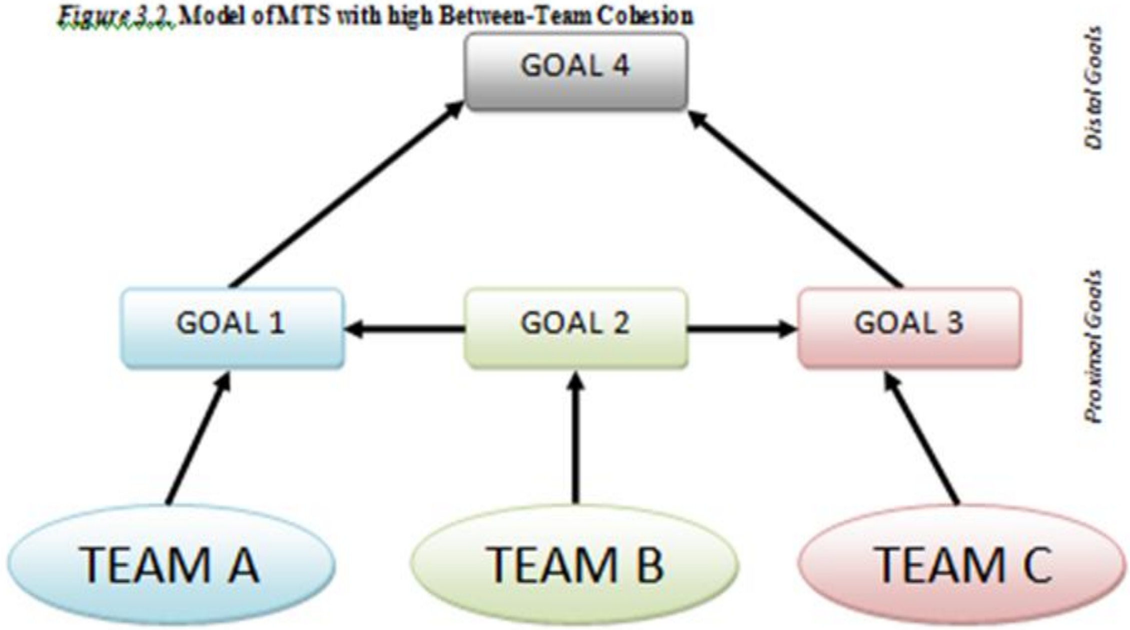


Figure 4. **Example Goal Hierarchy of a Cohesive Platoon**

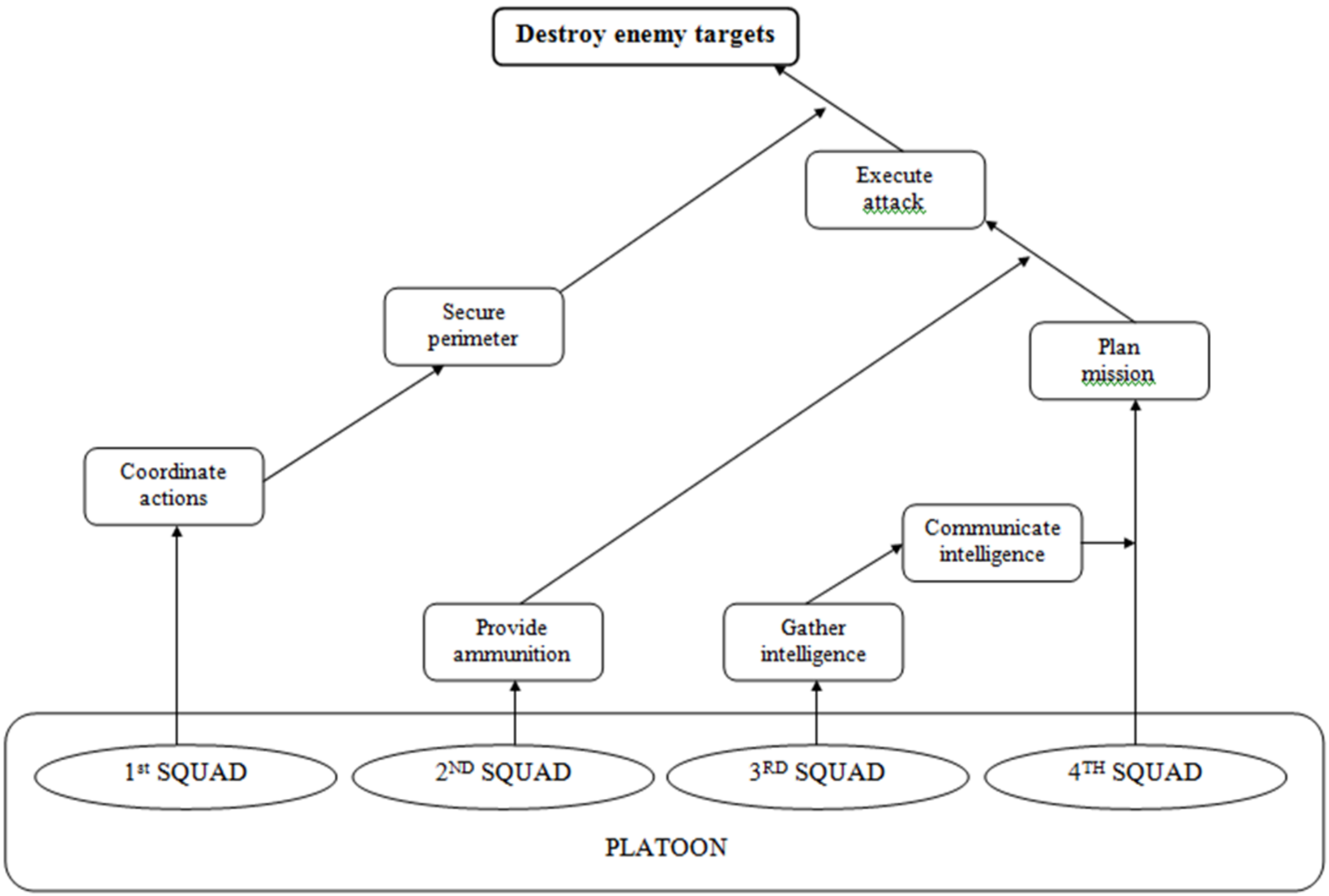
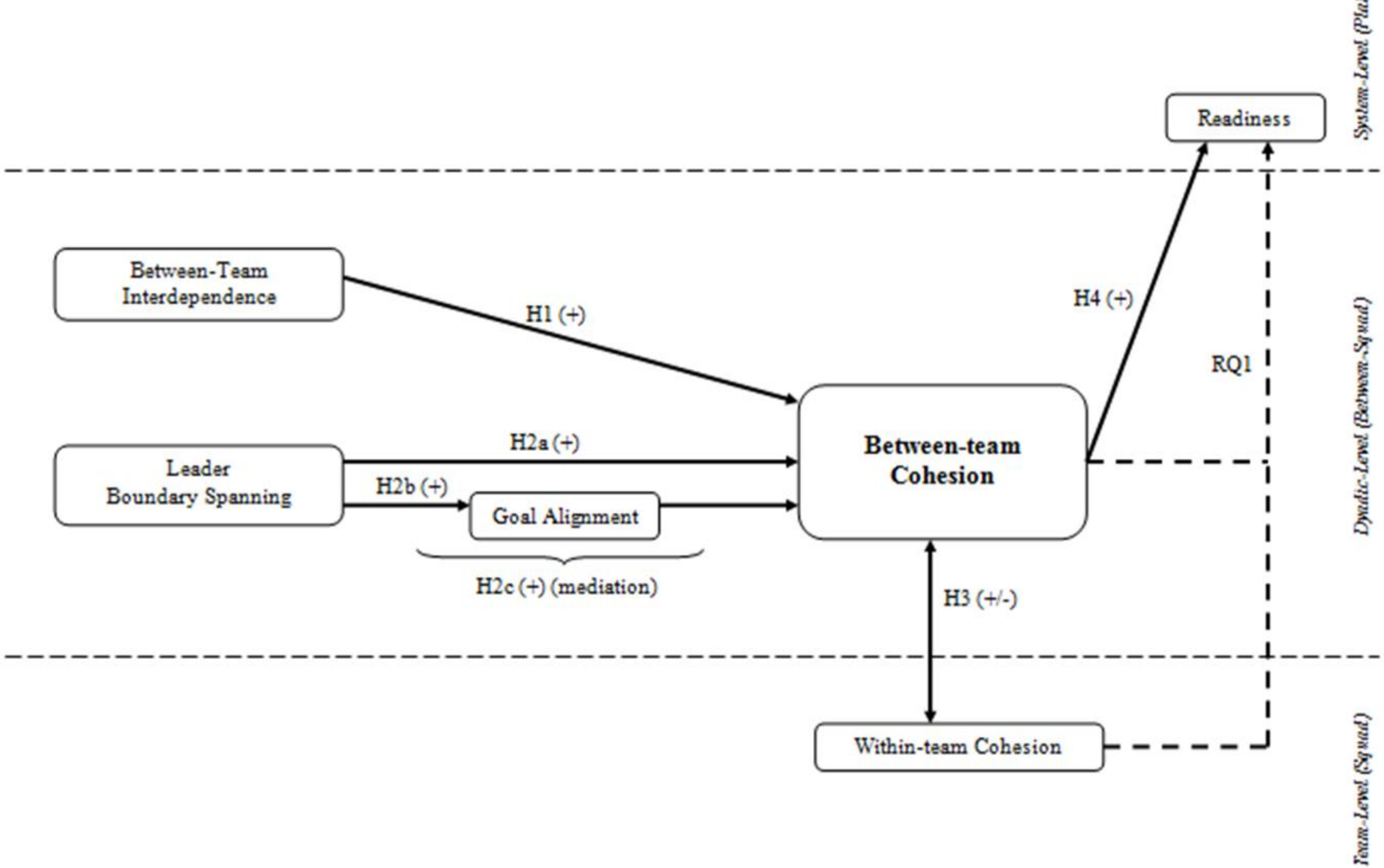


Figure 5. **Model of Proposed Hypotheses**



REFERENCES

REFERENCES

Ahronson, A., & Cameron, J.E. (2009). The nature and consequences of group cohesion in the military. *Military Psychology, 19,* 9-25.

Aiken, J.R., & Hanges, P.J. (2012). Research methodology for studying dynamic multiteam systems: Application of complexity science. In S.J. Zaccaro, M.A. Marks, & L.A. DeChurch (Eds.), *Multiteam Systems: An organization form for dynamic and complex environments* (pp. 431-458). New York: Taylor & Francis.

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Allport, F.H. (1954). The structuring of events: Outline of a general theory with application to psychology, *Psychological Review, 61,* 281-303.

Allport, G.W. (1954). *The nature of prejudice.* Reading, MA: Addison-Wesley.

Ancona, D.G., & Caldwell, D.F. (1988). Beyond task maintenance: Defining external functions in groups. *Groups & Organization Studies, 13,* 468-494.

Ancona, D.G., & Caldwell, D.F. (1992). Bridging the boundary: External activity and performance in organizational teams. *Administrative Science Quarterly, 37,* 634-655.

Antonioni, D. (1994). The effects of feedback accountability on upward appraisal ratings. *Personnel Psychology, 47*, 249-256.

Back, K.W. (1951). Influence through social communication. *Journal of Abnormal and Social Psychology, 46,* 9-23.

Bandura, A. (1986). *Social foundations of thought and action: A social-cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173-1182.

Bartone, P.T., & Adler, A.B. (1999). Cohesion overtime in a peacekeeping medical task force. *Military Psychology, 11,* 85-107.

Bartone, P.T., & Kirkland, F.R. (1991). Optimal leadership in small army units. In R. Gal & A.D. Mangelsdorff (Eds.), *Handbook of Military Psychology* (pp. 393-409). Chichester, England: John Wiley & Sons.

Bartone, P.T., Johnsen B.H., Eid, J., Brun, W., & Laberg, J.C. (2002). Factors influencing small-unit cohesion in Norwegian Navy officer cadets. *Military Psychology, 14,* 1-22.

Bass, B.M. (1981). *Stogdill's handbook of leadership* (revised and expanded edition). New York: Free Press.

Bass, B.M., Avolio, B.J., Jung, D.I., & Benson, Y. (2003). Predicting unit performance by assessing transformation and transactional leadership. *Journal of Applied Psychology, 88,* 207-218.

Bateman, T.S., O'Neill, H., Kenworthy-U'Ren, A. (2002). A hierarchical taxonomy of top managers' goals. *Journal of Applied Psychology, 87,* 1134-1148.

Beal, D.J., Cohen, R.R., Burke, M.J., & McLendon, C.L. (2003). Cohesion and performance in groups: A meta-analytic clarification of construct relations. *Journal of Applied Psychology, 88,* 989-1004.

Bednar, R.L., West, C., Evensen, P., Lanier, D., & Melnick, J. (1974). Empirical guidelines for group therapy: Pretraining, cohesion, and modeling. *Journal of Applied Behavioral Sciences, 10,* 149-165.

Beehr, T.A. (1976). Perceived situational moderators of the relationship between subject role ambiguity and role strain. *Journal of Applied Psychology, 61,* 35-40.

Berkowitz, L., Levy, B., & Harvey, A.R. (1957). Effects of performance evaluation of group integration and motivation. *Human Relations, 10,* 195-208.

Bliese, P.D., & Halverson, R.R. (1996). Individual and nomothetic models of job stress: An examination of work hours, cohesion, and well-being. *Journal of Applied Psychology, 26,* 1171-1189.

Bliese, P.D., & Halverson, R.R. (1998a). Group consensus and psychological well-being: A large field study. *Journal of Applied Psychology, 28,* 563-580.

Bliese, P.D., & Halverson, R.R. (2002). Using random group resampling in multilevel research: An example of the buffering effect of leadership climate. *The Leadership Quarterly, 13,* 53-68.

BLiese, P.D., Halverson, R.R., & J.M. (1994). Within-group agreement scores: Using resampling procedures to estimate expected variance. *Academy of Management Best Paper Proceedings,* 303-307.

Bollen, K.A., & Hoyle, R.H. (1990). Perceived cohesion: A conceptual and empirical investigation. *Social Forces, 69,* 479-504.

Bowen, D.E., & Ostroff, C. (2004). Understanding HRM-firm performance linkages: The role of "strength" in the HRM system. *Academy of Management Review, 29,* 203-221.

Boyle, M.H., & Williams, J.D. (2001). Multilevel modeling of hierarchical data in developmental studies. *Journal of Child Psychology and Psychiatry and Aligned Disciplines, 42,* 141-162.

Brawley, L., Carron, A., & Widmeyer, W. (1988). Exploring the relationship between cohesion and group resistance to disruption. *Journal of Sport and Exercise Psychology, 10*, 199-213.

Brawley, L., Carron, A., & Widmeyer, W. (1993). The influence of the group and its cohesiveness on perceptions of group-related variables. *Journal of Sport and Exercise Psychology, 15,* 245-260.

Brewer, M.B., & Pierce, K.P. (2005). Social identity complexity and outgroup tolerance. *Personality and Social Psychology Bulletin, 31,* 428-437.

Brown, R.D., & Hauenstein, N.M.A. (2005). Interrater agreement reconsidered: An alternative to the r_{WG} indices. *Organizational Research Methods, 8,* 165-184.

Bryk, A.S., Raudenbush, S.W., & Congdon, R.T., Jr. (1996). *HLM: Hierarchical linear and non-linear modeling with the HLM/2L and HLM/3L programs.* Chicago, IL: Scientific Software International.

Budman, S.H., Soldz, S., Demby, A., Davis, M., & Merry, J. (1993). What is cohesiveness? An empirical examination. *Small Group Behavior, 24,* 199-216.

Bryne, D. (1971). *The attraction paradigm.* New York: Academic Press.

Calnan, M., & Rowe, R. (2007). Trust and healthcare. *Sociology Compass, 1,* 283-308.

Campbell, D.T. (1958). Common fate, similarity, and other indices of the status of aggregates of persons as social entities. *Behavioral Science, 3*, 14-25.

Campion, M.A., Medsker, G.J., & Higgs, A.C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology, 46,* 823-847.

Campion, M.A., Papper, E.M., & Medsker, G.J. (1996). Relations between work-team characteristics and effectiveness: A replication and extension. *Personnel Psychology, 49,* 429-452.

Carless, S.A., & DePaola, C. (2000). The measurement of cohesion in work teams. *Small Group Research, 31,* 71-88.

Carron, A.V. (1982). Cohesiveness in sport groups: Interpretations and considerations. *Journal of Sport Psychology, 4,* 123-138.

Carron, A.V. (1988). *Group dynamics in sport: Theoretical and practical issues.* London, Ontario: Spodym.

Carron, A.V., Brawley, L.R., Eys, M.A., Bray, S.R., Dorsch, K.D., Estabrooke, P.A., Hall, C.R., Hardy, J., Hausenblaus, H., Madison, R., Paskevich, D.M., Patterson, M.M., Prapavessis, H., Spink, K.S., & Terry, P.C. (2003). Do individual perceptions of group cohesion reflect shared beliefs? An empirical analysis. *Small Group Research, 34,* 468-496.

Carron, A.V., Brawley, L.R., Eys, M.A., Bray, S.R., Dorsch, K.D., Estabrooke, P.A., Hall, C.R., Hardy, J., Hausenblaus, H., Madison, R., Paskevich, D.M., Patterson, M.M., Prapavessis, H., Spink, K.S., & Terry, P.C. (2004). Using consensus as a criterion for groupness: Implications for the cohesion-group success relationship. *Small Group Research, 35,* 466-491.

Carron, A.V., Colman, M.M., Wheeler, J., & Stevens, D. (2002). Cohesion and performance in sport: A meta-analysis. *Journal of Sport and Exercise Psychology, 24,* 168-188.

Carron, A.V., Widmeyer, W.N., & Brawley, L.R. (1985). The development of an instrument to assess cohesion in sports teams: The Group Environment Questionnaire. *Journal of Sport Psychology, 7,* 244-266.

Carron, A.V., Widmeyer, W.N., & Brawley, L.R. (1998). Group cohesion and individual adherence to physical activity. *Journal of Sport and Exercise Psychology, 10,* 119-126.

Cartwright, D. (1967). The nature of group cohesiveness. In D. Cartwright & A. Zander (Eds.), *Group Dynamics: Research and Theory.* New York: Harper & Row.

Casey-Campbell, M., & Martens, M.L. (2009). Sticking it all together: A critical assessment of the group cohesion-performance literature. *International Journal of Management Reviews, 11,* 223-246.

Chang, A., & Bordia, P. (2001). A multidimensional approach to the group cohesion-group performance relationship. *Small Group Research*, *32,* 379-405.

Chan, D. (1998). Functional relations among constructs in the same context domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology, 83,* 234-246.

Chen, C.-H.V., Tang, Y.-Y., & Wang, S.-J. (2009). Interdependence and organizational citizenship behavior: Exploring the mediating effect of group cohesion in multilevel analysis. *Journal of Psychology, 143,* 625-640.

Chen, G., Mathieu, J.E., & Bliese, P.D. (2004). A framework for conducting multilevel construct validation. In F.J. Yammarino & F. Dansereau (Eds.), *Research in Multilevel Issues: Multilevel issues in organizational behavior and processes* (Vol. 3, pp. 273-303). Oxford, England: Elsevier.

Chiocchio, F., Y Essiembre, H. (2009). Cohesion and performance: A meta-analytic review of disparities between project teams, production teams, and service teams. *Small Group Research, 40,* 382-420.

Cialdini, R.B., Borden, R., Thorne, A., Walker, M., Freeman, S., & Sloane, L.R. (1976). Basking in reflected glory: Three (football) field studies. *Journal of Personality and Social Psychology, 34,* 366-375.

Cobb, M.G., & Mathieu, J.E. (2003, April). The impact of training and environmental complexity on the effectiveness of multi-team systems. In J.E. Mathieu (Chair), *Investigations of multi-team systems.* Symposium presented at the 18th Annual Conference of the Society for Industrial and Organizational Psychology, Orlando, FL.

Coen, C.A., & Schnackenberg, A. (2012). Complex systems methods for studying multiteam systems. In S.J. Zaccaro, M.A. Marks, & L.A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments* (pp. 459-486). New York: Taylor & Francis.

Coser, L. (1956). *Functions of Social Conflict.* New York: Free Press.

Cota, A., Evans, C., Dion, K., Kilik, L., & Longman, R. (1995). The structure of group cohesion. *Personality and Social Psychology Bulletin, 21,* 572-580.

Craig, T.Y., & Kelly, J.R. (1999). Group cohesiveness and creative performance. *Group dynamics: Theory, research, and practice*, *3,* 243-258.

Cronin, C. (1998). *Military Psychology: An Introduction.* Needman Heights, MA: Simon & Schuster Custom Publishing.

Dansereau, F., Alutto, J.A., & Yammarino, F.J. (1984). *Theory testing in organizational behavior: The variant approach.* Englewood Cliffs, NJ: Prentice Hall.

Davison, R.B., & Hollenbeck, J.R. (2012). Boundary spanning in the domain of multiteam systems. In S.J. Zaccaro, M.A. Marks, & L.A. DeChurch (Eds.), *Multiteam Systems: An organization form for dynamic and complex environments* (pp. 323-362). New York: RoutledgeTaylor-Francis.

Davison, R.B., Hollenbeck, J.R., Barnes, C.M., Sleesman, D.J., & Ilgen, D.R. (2012). Coordinated action in multiteam systems. *Journal of Applied Psychology, 97,* 808-824.

DeChurch, L.A., Burke, C.S., Mathieu, J.E., Resick, C.J., Murase, T., Rodriguez, M.J., Doty, D., & Benishek, L. (in press). *Examining leadership processes in complex network environments.* Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

DeChurch, L.A., & Marks, M.A. (2006). Leadership in multiteam systems. *Journal of Applied Psychology, 91,* 311-329.

DeChurch, L.A., & Mathieu, J.E. (2009). Thinking in terms of multiteam systems. In E. Salas, G.F. Goodwin, & C.S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (pp. 267-292). New York: Taylor & Francis.

DeChurch, L.A., & Zaccaro, S.J. (2010). Perspectives: Teams won't solve this problem. *Human Factors, 52,* 329-334.

DeChurch, L.A., Burke, C.S., Shuffler, M., Lyons, R., Doty, D., & Salas, E. (2011). A historiometric analysis of leadership in mission critical multiteam environments. *Leadership Quarterly, 22,* 152-169.

Department of Defense (2010). *Report of the Comprehensive Review of the Issues Associated with the Repeal of "Don't Ask, Don't Tell."* Report prepared for the Office of the Secretary of Defense.

Deutsch, M. (1954). Field theory in social psychology. In G. Lindzey (Ed.), *Handbook of Social Psychology*, (Vol. 1). Reading, MA: Addison-Wesley.

Deutsch, M. (1973). *The resolution of conflict.* New Haven, CT: Yale University Press.

Dion, K.L. (1979). Intergroup conflict and intragroup cohesiveness. In W.G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations.* Newbury Park, CA: Sage.

Dion, K.L. (1999). Group morale. In R. Brown (Ed.), *The Marshall Cavendish Encyclopedia of Personal Relationships: Human Behavior, How Groups Work* (Vol. 15, pp. 1854-1861). Oxford, England: Cavendish.

Dobbins, G.H., & Zaccaro, S.J. (1986). The effects of group cohesion and leader behavior on subordinate satisfaction. *Group & Organization Studies, 11,* 203-219.

Dyce, J.A., & Cornell, J. (1996). Factorial validity of the Group Environment Questionnaire among musicians. *Journal of Social Psychology, 136,* 263-264.

Earley, P.C., & Northcraft, G.B. (1989). Goal setting, resource interdependence, and conflict. In M.A. Rahim (Ed.), *Managing Conflict: An Interdisciplinary Approach* (pp. 161-170). New York: Praeger.

Earley, P.C., Wojnaroski, P., & Prest, W. (1987). Task planning and energy expended: Exploration of how goals influence performance. *Journal of Applied Psychology, 72,* 107-114.

Edmonson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44,* 350-383.

Evans, C.R., & Dion, K.L. (1991). Group cohesion and performance: A meta-analysis. *Small Group Research, 22,* 175-186.

Evans, N.J., & Jarvis, P.A. (1980). Group cohesion: A review and reevaluation. *Small Group Behavior, 11,* 359-370.

Festinger, L. (1950). Informal social communication. *Psychological Review, 57,* 271-282.

Festinger, L., Schachter, S., & Back, K. (1950). *Social Pressures in Informal Groups.* New York: Harper.

Forsyth, D.R. (1999). *Group Dynamics* (3rd ed.). Belmont, CA: Wadsworth Publishing Company.

Frank, J.D. (1957). Some determinants, manifestations, and effects of cohesiveness in therapy groups. *International Journal of Group Psychotherapy, 7,* 53-63.

French (1941). The disruption of cohesion of groups. *Journal of Abnormal and Social Psychology, 36*, 361-377.

Gal, R. (1986). Unit morale: From a theoretical puzzle to an empirical illustration – An Israeli example. *Journal of Applied Social Psychology, 16*, 549-564.

Gilbert, J.A., & Tang, T.L. (1998). An examination of organizational trust antecedents. *Public Personnel Management, 27,* 321-338.

Gillespie, B.M., Chaboyer, W., Longbottom, P., & Wallis, M. (2010). The impact of organizational and individual factors on team communication surgery: A qualitative study. *International Journal of Nursing Studies, 47*, 732-741.

Gist, M.E. (1987). Self-efficacy: Implications for organizational behavior and human resource management. *Academy of Management Review, 12*, 472-485.

Gladwell, M. (2000). *Tipping Points: How little things can make a big difference.* Boston: Little, Brown.

Goodman, P.S., Ravlin, E., & Schminke, M. (1987). Understanding groups in organizations. In L.L. Cummings & B.M. Staw (Eds.), *Research in Organizational Behavior* (Vol. 9, pp. 121-173). Greenwich, CT: JAI Press.

Greene, C.N. (1989). Cohesion and productivity in work groups. *Small Group Behavior, 20*, 70-86.

Griffin, R.W., & Moorehead, G. (1986). *Organizational Behavior.* Dallas: Houghton-Mifflin.

Griffith, J.E. (1988). The measurement of group cohesion in U.S. Army units. *Basic and Applied Social Psychology, 9,* 149-171.

Griffith, J.E. (1989). The Army's new unit replacement system and its relation to group cohesion and social support. *Military Psychology, 1,* 17-34.

Griffith, J.E. (2002). Multilevel analysis of cohesion's relation to stress, well-being, identification, disintegration, and perceived combat readiness. *Military Psychology, 14,* 217-239.

Gross, N., & Martin, W.E. (1952). On group cohesiveness. *American Journal of Sociology, 57,* 546-564.

Grossman, P., Wineburg, S., & Woolworth, S. (2001). Toward a theory of teacher community. *Teacher's College Record, 103,* 942-1012.

Gully, S.M., Devine, D.J., & Whitney, D.J. (1995). A meta-analysis of cohesion and performance: Effects of level of analysis and task interdependence. *Small Group Research, 26,* 497-520.

Gully, S.M., Incalcaterra, K.A., Joshi, A., & Beaubien, J.M. (2002). A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of observed relationships. *Journal of Applied Psychology, 87,* 819-832.

Guzzo, R.A., Yost, P.R., Campbell, R.J., & Shea, G.P. (1993). Potency in groups: Articulating a construct. *British Journal of Social Psychology, 32,* 87-106.

Hackman, J.R. (2003). Learning more by crossing levels: Evidence from airplanes, hospitals, and orchestras. *Journal of Organizational Behavior, 24,* 905-922.

Hackman, J.R. (1976). Group influence on individuals. In M. Dunette (Ed.), *Handbook of Industrial and Organizational Psychology* (pp. 1455-1525). Chicago, IL: Rand-McNally.

Hackman, J.R., & Morris, C.G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 8, pp. 45-99). New York: Academic Press.

Hambrick, D.C. (1994). Top management groups: A conceptual integration and reconsideration of the "team" label. In D.C. Hambrick (Ed.), *Research in Organizational Behavior* (Vol. 16, pp. 171-213). Greenwich, CT: JAI Press.

Hanneman, R.A., & Riddle, M. (2005). *Introduction to Social Network Methods.* Riverdale, CA: University of California, Riverside.

Hansen, M., Morrow, J.L., & Batista, J. (2002). The impact of trust on cooperative membership retention, performance, and satisfaction: An exploratory study. *International Food and Agribusiness Management Review, 5,* 41-59.

Harrell, M.C., & Miller, L.L. (1997). *New opportunities for military women: Effects upon readiness, cohesion, and morale.* Washington, DC: RAND Corporation.

Henderson, W.D. (1985). *Cohesion: The human element in combat.* Washington, DC: National Defense University Press.

Heuze, J.-P., Raimbault, N., & Fontayne, P. (2006). Relationships between cohesion, collective efficacy, and performance in professional basketball teams: An examination of mediating effects. *Journal of Sports Sciences*, *24,* 59-68.

Hoegl, M., & Weinkauf, K. (2005). Managing task interdependence in multi-team systems. *Journal of Management Studies*, *42,* 1287-1308.

Hofmann, D.A., Griffin, M.A., & Gavin, B. (2000). The application of hierarchical linear modeling to organizational research. In K.J. Klein & S.W.J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 467-511). San Francisco, CA: Jossey-Bass.

Hogg, M.A. (1992). *The Social Psychology of Group Cohesiveness.* Toronto: Harvester Wheatsheaf.

Hogg, M.A., & Terry, D.J. (2000). Social identity and self-categorization processes in organizational contexts. *Academy of Management Review*, *25,* 121-140.

Huisman, M. (2009). Imputation of missing network data: Some simple procedures. *Journal of Social Structure*, *10,* 1-29.

Ilgen, D.R., Hollenbeck, J.R., Johnson, M., & Jundt, D. (2005). Teams in organizations: From input-process-outcome models to IMOI models. *Annual Review of Psychology*, *56*, 517-543.

Ingraham, L.H. (1984). *The Boys in the Barracks.* Philadelphia, PA: Institute for the Study of Human Issues.

Israel, J. (1954). *Self-evaluation and Rejection in Groups.* Stockholm: Almqvist & Wiskell.

James, L.R. (1982). Aggregation in estimates of perceptual agreement. *Journal of Applied Psychology, 67,* 219-229.

James, L.R., & Brett, J.M. (1984). Mediators, moderators, and tests for mediation. *Journal of Applied Psychology, 69,* 307-321.

James, L.R., Demaree, R.G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, *69,* 85-98.

James, L.R., Demaree, R.G., & Wolfe, G. (1993). Rwg: An assessment of within-group rater agreement. *Journal of Applied Psychology, 78,* 306-309.

James, L.R., & Jones, A.P. (1974). Organizational climate: A review of theory and research. *Psychological Bulletin, 81,* 1096-1112.

Janis, I.L. (1983). *Groupthink: Psychological studies of policy decisions and fiascoes* (2nd ed.). Boston: Houghton Mifflin.

Jarvenpaa, S.L., & Leidner, D.E. (1999). Communication and trust in global virtual teams. *Organization Science, 10,* 791-815.

Jawahar, I.M., & Williams, C.R. (1997). Where all the children are above average: The performance appraisal purpose effect. *Personnel Psychology, 50,* 905-925.

Johnson, D.W., & Johnson, R.T. (1989). *Cooperation and competition: Theory and research.* Edina, MN: Interaction.

Kanfer, R., Ackerman, P., Murtha, T.C., Dugdale, B., & Nelson, L. (1994). Goal-setting, conditions of practice, and task performance: A resource allocation perspective. *Journal of Applied Psychology, 79,* 826-835.

Katz, D., & Kahn, R.L. (1966). *The social psychology of organizations.* New York: Wiley.

Kellett, A. (1982). *Combat motivation: The behavior of Soldiers in battle.* Boston: Kluwer-Nijhoff.

Kenny, D., & LaVoie, L. (1985). Separating individual and group effects. *Journal of Personality and Social Psychology, 48,* 339-348.

Keyton, J., & Sprinston, J. (1990). Redefining cohesiveness in groups. *Small Group Research, 21,* 234-254.

Kidwell, J.R.E., Missholder, K.W., & Bennett, N. (1997). Cohesiveness and organizational citizenship behavior: A multi-level analysis using work groups and individuals. *Journal of Management, 23,* 775-793.

Kirkland, F.R. (1987). *Leading in COHORT Companies.* Washington, DC: Walter Reed Army Institute of Research.

Kirkland, F.R., Bartone, P.T., & Marlowe, D.H. (1993). Commander's priorities and psychological readiness. *Armed Forces & Society, 19,* 579-598.

Kirshner, B.J., Dies, R.R., & Brown, R.A. (1978). Effects of experimental manipulation of self-disclosure on group cohesiveness. *Journal of Consulting and Counseling Psychology, 46,* 1171-1177.

Klein, K.J., Bliese, P.D., Kozlowski, S.W.J., Dansereau, F., Gavin, B., Griffin, M.A., Hofmann, D.A., James, L.R., Yammarino, F.J., & Bligh, M.C. (2000). Multi-level analytical techniques: Commonalities, differences, and continuing questions. In K.J. Klein & S.W.J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 512-533). San Francisco, CA: Jossey-Bass, Inc.

Klein, K.J., Dansereau, F., & Hall, R.J. (1994). On the level: Homogeneity, independence, heterogeneity, and interactions in organizational theory. *Academy of Management Review, 20,* 7-9.

Klimoski, R., & Mohammed, S. (1995). Team mental model: Construct or metaphor? *Journal of Management, 20,* 403-437.

Knoke, D., & Yang, S. (2008). *Social Network Analysis* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Knowles, E.S., & Brickner, M.A. (1981). Social cohesion effects on spatial cohesion. *Personality and Social Psychology Bulletin, 7,* 309-313.

Kozlowski, S.W.J., Gully, S.M., McHugh, P.P., Salas, E., & Cannon-Bowers, J.A. (1996). A dynamic theory of leadership and team effectiveness: Developmental and task-contingent leader roles. In G.R. Ferris (Ed.), *Research in personnel and human resource management* (Vol. 14, pp. 253-305). Greenwich, CT: JAI Press.

Kozlowski S.W.J., & Hults, B.M. (1987). An exploration of climates for technical updating and performance. *Personnel Psychology, 40,* 539-563.

Kozlowski, S.W.J., & Ilgen, D.R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest, 7,* 77-124.

Kozlowski, S.W.J., & Klein, K.J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K.J. Klein & S.W.J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3-90). San Francisco, CA: Jossey-Bass.

Kozub, S.A. (1993). *Exploring the relationship among coaching behavior, team cohesion, and player leadership.* Unpublished doctoral dissertation. University of Houston, TX.

Lanaj, K., Hollenbeck, J.R., Ilgen, D.R., Barnes, C.M., & Harmon, S.J. (in press). The double-edged sword of decentralized planning in multiteam systems. *Academy of Management Journal*.

Lance, C.E., Butts, M.M., & Michels, L.C. (2006). The sources of four commonly reported cutoff criteria: What did they really say? *Organizational Research Methods, 9*, 202-220.

Langfred, C.W. (1998). Is group cohesiveness a double-edged sword? An investigation of the effects of cohesiveness on performance. *Small Group Research, 29,* 124-143.

LeBreton, J.M., Burgess, J.R.D., Kaiser, R.B., Atchley, E.K.P., & James, L.R. (2003). The restriction of variance hypothesis and interrater reliability and agreement: Are ratings from multiple sources really dissimilar? *Organizational Research Methods, 6*, 80-128.

LeBreton, J.M., James, L.R., & Lindell, M.K. (2005). Recent issues regarding rWG, r*WG, rWG(J), and r*WG(J). *Organizational Research Methods, 8,* 128-129.

LeBreton, J.M., & Senter, J.L. (2008). Answers to 20 questions about interrater reliability and interrater agreement. *Organizational Research Methods, 11,* 815-852.

LePine, J.A., Piccolo, R.F., Jackson, C.L., Mathieu, J.E., Saul, J.A. (2008). A meta-analysis of teamwork processes: Tests of a multidimensional model and relationships with team criteria. *Personnel Psychology, 61,* 273-307.

Libo, M. (1954). *Measuring Group Cohesiveness.* Ann Arbor: University of Michigan Press.

Lindell, M.K., & Brandt, C. (1999). Assessing interrater agreement on the job relevance of a test: A comparison of the CVI, T, and indexes. *Journal of Applied Psychology, 84*, 640-647.

Lindell, M.K., Brandt, C., & Whitney, D.J. (1999). A revised index of agreement for multi-item ratings of a single target. *Applied Psychological Measurement, 23,* 127-135.

Lindsley, D.H., Brass, D.J., & Thomas, J.B. (1995). Efficacy-performance spirals: A multilevel perspective. *Academy of Management Review, 20,* 645-678.

Little, R.W. (1964). Buddy relations and combat performance. In M. Janowitz (Ed.), *The new military: Changing patterns of an organization* (pp. 195-224). New York: Russell Sage.

Lott, A.J., & Lott, B.E. (1961). Group cohesiveness, communication level, and conformity. *Journal of Abnormal and Social Psychology, 62,* 408-412.

Lott, A.J., & Lott, B.E. (1965). Group cohesiveness as interpersonal attraction: A review of relationships with antecedents and consequent variables. *Psychological Bulletin, 64,* 259-309.

Maas, C.J.M., & Hox, J.J. (2004). Robustness issues in multilevel regression analysis. *Statistica Neerlandica, 58,* 127-137.

Maas, C.J.M., & Hox, J.J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences, 1,* 85-91.

MacCoun, R.J. (1996). Sexual orientation and military cohesion: A critical review of the evidence. In G.M. Herek, J.B. Jobe, & R.M. Carney (Eds.), *Out in force: Sexual orientation and the military* (pp. 157-176). Chicago, IL: University of Chicago Press.

Mach, M., Dolan, S., & Tzafrir, S. (2010). The differential effect of team members' trust on team performance: The mediation role of team cohesion. *Journal of Occupational and Organizational Psychology, 83,* 771-794.

Manning, F.J. (1991). Morale, cohesion, and *esprit de corps.* In R. Gal & A.D. Mangelsdorff (Eds.), *Handbook of Military Psychology* (pp. 453-470). New York: Wiley.

Manning, F.J., & Ingraham, L.H. (1983). *An investigation into the value of unit cohesion in peacetime.* Washington, DC: Walter Reed Army Institute of Research.

Marks, M.A., DeChurch, L.A., Mathieu, J.E., Panzer, F.J., & Alonso, A.A. (2005). Teamwork in multiteam systems. *Journal of Applied Psychology, 90,* 964-971.

Marks, M.A., Mathieu, J.E., & Zaccaro, S.J. (2001). A temporally-based framework and taxonomy of team processes. *Academy of Management Review, 26,* 356-376.

Marshall, S.L.A. (1966). *Men Against Fire.* New York: Morrow.

Mathieu, J.E., Marks, M.A., & Zaccaro, S.J. (2001). Multiteam systems. In N. Anderson, D.S. Ones, H.K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of Industrial, Work, and Organizational Psychology (Vol. 2: Organizational Psychology)* (pp. 290-313. Thousand Oaks, CA: Sage Publications.

McGrath, J. (1984). *Groups: Interaction and performance.* Englewood Cliffs, NJ: Prentice-Hall.

McIntyre, R.M., Strobel, K., Hanner, H., Cunningham, A., & Tedrow, L. (2003). *Toward an understanding of team performance and team cohesion over time through the lens of time series analysis.* Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Mikalachki, A. (1969). *Group cohesion reconsidered.* London, Ontario: University of Western Ontario School of Business Administration.

Mitchell, T.R., & Silver, W.S. (1990). Individual and group goals when workers are interdependent: Effects of task strategies on performance. *Journal of Applied Psychology, 75,* 185-193.

Moos, R.H., & Humphrey, B. (1974). *Group Environment Scale, Form R.* Palo Alto, CA: Consulting Psychologists Press.

Moos, R.H., Insel, P.M., & Humphrey, B. (1974). *Preliminary Manual for Family Environment Scale, Work Environment Scale, and Group Environment Scale.* Palo Alto, CA: Consulting Psychologists Press.

Morgeson, F.P., & Hofmann, D.A. (1999). The structure and function of collective constructs: Implications for multilevel research and theory development. *Academy of Management Review, 24,* 249-265.

Moritz, S.E., & Watson, C.B. (1998). Levels of analysis issues in group psychology: Using efficacy as an example of a multilevel model. *Group Dynamics: Theory, Research, and Practice, 2,* 285-298.

Mullen, B., Anthony, T., Salas, E., & Driskell, J.E. (1994). Group cohesiveness and quality of decision making: An integration of tests of the groupthink hypothesis. *Small Group Research, 25,* 189-204.

Mullen, B., & Cooper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological Bulletin, 115,* 210-227.

Myers, J.L. (1972). *Fundamentals in experimental design* (2nd ed.). Boston: Allyn & Bacon.

Neubert, M.J. (1999). Too much of a good thing or the more the merrier? Exploring the dispersion and gender composition of informal leadership in manufacturing teams. *Small Group Research, 30,* 635-646.

Oliver, L.W. (1988). *The relationship of group cohesion to group performance: A research integration attempt.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Oliver, L.W., Harman, J., Hoover, E., Hayes, S.M., & Pandhi, N.A. (1999). A quantitative integration of the military cohesion literature. *Military Psychology, 11,* 57-83.

Paskevich, D.M., Brawley, L.R., Dorsch, K.D., & Widmeyer, W.N. (1999). Relationship between collective efficacy and team cohesion: Conceptual and measurement items. *Group Dynamics: Theory, Research, and Practice, 3,* 210-222.

Paskevich, D.M., Estabrooks, P., Brawley, L., & Carron, A. (2001). Group cohesion in sport and exercise. In R. Singer, H. Hausenblaus, & C. Janelle (Eds.), *Handbook of Sport Psychology* (2^{nd} ed., pp. 472-494). New York: John Wiley.

Prapavessis, H., & Carron, A. (1997). Cohesion and work output. *Small Group Research, 28,* 294-301.

Poole, M.S., & Contractor, N. (2012). Conceptualizing the multiteam system as an ecosystem of networked groups. In S.J. Zaccaro, M.A. Marks, & L.A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments* (pp. 193-224). New York: Routledge.

Quigley, N.R., Tekleab, A.G., & Tesluk, P.E. (2007). Comparing consensus- and aggregation-based methods of measuring team-level variables: The role of relationship conflict and conflict management processes. *Organizational Research Methods, 10,* 589-608.

Reise, S.P., & Duan, N. (2003). Design issues in multilevel studies. In S.P. Reise & N. Duan (Eds.), *Multilevel modeling: Multievel advances, issues, and applications* (pp. 285-298). Mahwah, NJ: Lawrence Erlbaum.

Rousseau, D.M. (1985). Issues of level in organizational research: Multi-level and cross-level perspectives. In L.L. Cummings & B. Staw (Eds.), *Research in Organizational Behavior* (Vol. 7, pp. 1-37). Greenwich, CT: JAI Press.

Saavedra, R., Earley, P.C., & Van Dyne, L. (1993). Complex interdependence in task performing groups. *Journal of Applied Psychology, 78,* 61-72.

Salas, E., Rosen, M.A., Burke, C.S., & Goodwin, G.F. (2009). The wisdom of collectives in organizations: An update of the teamwork competencies: In E. Salas, G.F. Goodwin, & C.S. Burke (Eds.), *Team effectiveness in complex organizations:*

Cross-disciplinary perspectives and approaches (pp. 39-79). New York: Taylor & Francis.

Salo, M. (2007). *The relation between group-level characteristics and group cohesion.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Sanders, K. (2004). Playing truant with organizations: Informal relationships, work ethics, and absenteeism. *Journal of Managerial Psychology, 19,* 136-155.

Sanders, K., & Hoekstra, S.K. (1998). Informal networks and absenteeism within an organization. *Computational and Mathematical Organizational Theory, 4,* 149-163.

Sanders, K., & Van Emmerik, H. (2004). Does modern organization and governance threaten solidarity? *Journal of Management and Governance, 8,* 351-372.

Savage, P.L., & Gabriel, R.A. (1976). Cohesion and disintegration in the American Army: An alternative perspective. *Armed Forces & Society, 2*, 340-376.

Schachter, S. (1959). *The Psychology of Affiliation.* Stanford, CA: Stanford University Press.

Schachter, S., Ellerston, N., McBride, D., & Gregory, D. (1951). An experimental study of cohesiveness and productivity. *Human Relations, 4,* 229-238.

Schank, J.F., Harrell, M.C., Thie, H.J., Pinto, M.M., & Sollinger, J.M. (1997). *Relating resources to personnel readiness: Use of Army strength management models.* Washington, DC: National Defense Research Institute.

Schermerhorn, J.R., Jr., Hunt, J.G., & Osborn, R.M. (1988). *Managing Organizational Behavior.* New York: John Wiley.

Schleicher, D.J., Hansen, S.D., & Fox, K.E. (2011). Job attitudes and work values. In S. Zedeck (Ed.), *APA Handbook of Industrial and Organiztional Psychology* (Vol. 3, ppp. 137-190). Washington, DC: American Psychological Association.

Scott, J. (1991). *Social Network Analysis: A Handbook.* Newbury Park, CA: Sage Publications.

Seashore, S.E. (1954). *Group cohesiveness in an industrial workgroup.* Ann Arbor, MI: University of Michigan, Institute for Social Research, Survey Research Center.

Seashore, S.E., Lawler, E.E., Mirvis, P., & Cammann, C. (1982). *Observing and measuring organizational change: A guide to field practice.* New York: John Wiley.

Seers, A., Keller, T., & Wilkerson, J.M. (2003). Can team members share leadership? Foundations in research and theory. In C.L. Pearce & J.A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 77-101). Thousand Oaks, CA: Sage.

Shamir, B., Brainin, E., Zakay, E., & Popper, M. (2000). Perceived combat readiness as collective efficacy: Individual- and group-level analysis. *Military Psychology, 12,* 105-119.

Shapcott, K.M., Carron, A.V., Burke, S.M., Bradshaw, M.H., & Estabrooks, P.A. (2006). Member diversity and cohesion and performance in walking groups. *Small Group Research, 27,* 701-720.

Shaw, M.E., & Gilchrist, J.C., (1955). Repetitive task failure and sociometric choice. *Journal of Abnormal and SocialPsychology, 50,* 29-32.

Shaw, M.E., (1981). *Group dynamics: Psychology of small groups* (3rd ed.). New York: McGraw-Hill.

Shepard, B.H., & Sherman, D.M. (1998). The grammars of trust: A model and general implications. *Academy of Management Review, 23,* 422-437.

Sherif, M., Harvey, O.J., White, B.J., Hood, W.R., & Sherif, C.W. (1961). *Intergroup conflict and cooperation: The Robber's Cave experiment.* Norman, OK: University of Oklahoma Press.

Shields, D., Bredemeier, B., Gardner, D., & Boston, A. (1995). Leadership, cohesion, and team norms regarding cheating and aggression. *Sociology of Sport Journal, 12,* 324-336.

Shils E.A., & Janowitz, M. (1948). Cohesion and disintegration in the Wehrmacht in World War II. *Public Opinion Quarterly, 12,* 280-315.

Siebold, G.L. (1999). The evolution of the measurement of cohesion. *Military Psychology, 11,* 5-26.

Siebold, G.L. (2006). Military group cohesion. In T.W. Britt, C.A. Castro, & A.B. Adler (Eds.), *Military Life: The psychology of serving in peace and combat* (pp. 185-201).

Siebold, G.L. (2007). The essence of military group cohesion. *Armed Forces & Society, 33*, 286-295.

Siebold, G.L. (2011). Key questions and challenges to the Standard Model of military group cohesion. *Armed Forces & Society, 37*, 448-468.

Siebold, G.L., & Kelly, D.R. (1988a). *Development of a Combat Platoon Cohesion Questionnaire.* Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Siebold, G.L., & Kelly, D.R. (1988b). *Development of a Platoon Cohesion Index.* Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Siebold, G.L., & Lindsay, T.J. (1999). The relation between demographic descriptors and Soldier-perceived cohesion and motivation. *Military Psychology, 11*, 109-128.

Simons, T.L., & Peterson, R.S. (2000). Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust. *Journal of Applied Psychology, 85*, 102-111.

Smith, M.D., & Hagman, J.D. (2006). *Pre- to middeployment assessment of Unit Focused Stability impact on cohesion.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Snijders, T.A. (2005). Power and sample size in multilevel modeling. In B.S. Everitt & D.C. Howell (Eds.), *Encyclopedia of statistics in behavioral science* (Vol. 3, pp. 1570-1573). Chichester, UK: Wiley.

Snyder, C.R., Lassegard, M., & Ford, C.E. (1986). Distancing after group success and failure: Basking in reflected glor and cutting off reflected failure. *Journal of Personality and Social Psychology, 51*, 382-388.

Stein, A.A. (1976). Conflict and cohesion: A review of the literature. *Journal of Conflict Resolution, 20*, 143-172.

Steiner, I.D. (1972). *Group processes and productivity.* New York: Academic Press.

Stogdill, R.M. (1972). Group productivity, drives, and cohesiveness. *Organizational Behavior and Human Performance, 8*, 26-43.

Stokes, J.P. (1983). Toward an understanding of cohesion in personal change group. *International Journal of Group Psychotherapy, 33*, 449-467.

Stouffer, S.A., Lumsdaine, A.A., Lumsdaine, M.H., Williams, R.M., Jr., Smith, M.B., Janis, I.L. et al. (Eds.). (1949). *The American Soldier: Combat and its aftermath* (Vol. 2: Studies in Social Psychology). Princeton, NJ: Princeton University Press.

Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology, 33,* 1-39.

Tajfel, H., & Turner, J.C. (1979). The social identity theory of intergroup behavior. In W.G. Austin & S. Worchel (Eds.), *The Social Psychology of Intergroup Relations* (pp. 7-24). Chicago, IL: Nelson-Hall.

Tekleab, A.G., Quigley, N.R., & Tesluk, P.E. (2009). A longitudinal study of team conflict, conflict management, cohesion, and team effectiveness. *Group Organization and Management, 34,* 170-205.

Thau, S., Crossley, C., Bennett, R., & Sczesny, S. (2007). The relationship between trust, attachment, and antisocial work behaviors. *Human Relations, 60,* 1155-1179.

Thompson, J.D. (1967). *Organizations in action.* New York: McGraw-Hill.

Tuckman, B.W. (1965). Development sequence in small groups. *Psychological Bulletin, 63,* 384-399.

Turner, J.C., Hogg, M.A., Oakes, P.J., Reicher, S.D., & Wetherell, M.S. (1987). *Rediscovering the social group: A self-categorization theory.* New York: Blackwell.

Tyler, T.R. (1999). Why people cooperate with organizations: An identity-based perspective. In R.I. Sutton & B.M. Staw (Eds.), *Research in organizational behavior: An annual series of analytical essays and critical reviews* (pp. 210-246). Stanford, CT: JAI Press.

Tyler, T.R., & Blader, S.L. (2000). *Cooperation in groups: Procedural justice, social identity, and behavioral engagement.* Philadelphia, PA: Psychology Press.

Tziner, A. (1982). Differential effects of group cohesiveness types: A clarifying overview. *Social Behavior and Personality, 10,* 227-239.

Urry, J. (2004). The “system” of automobillity theory. *Theory, Culture, and Society, 21,* 25-39.

Van Woerkem, M., & Sanders, K. (2010). The romance of learning from disagreement: The effect of cohesiveness and disagreement on knowledge sharing and behavior and individual performance within teams. *Journal of Business Psychology, 25,* 139-149.

Wageman, R. (1995). Interdependence and group effectiveness. *Administrative Science Quarterly, 40,* 145-180.

Wageman, R. (2001). The meaning of interdependence. In M.E. Turner (Ed.), *Groups at work: Theory and research* (pp. 197-217). Mahwah, NJ: Erlbaum.

Walsh, B.M., Matthews, R.A., Tuller, M.D., Parks, K.M., & McDonald, D.P. (2010). A multilevel model of the effects of equal opportunity climate on job satisfaction in the military. *Journal of Occupational Health Psychology, 15,* 191-207.

Weaver, J.L., Bowers, C.A., Salas, E., & Cannon-Bowers, J.A. (1997). Motivation in teams. In M.M. Beyerlein & D.A. Johnson (Eds.), *Advances in interdisciplinary studies of work teams* (Vol. 4, pp. 167-191). Greenwich, CT: JAI Press.

Webber, S., & Donahue, L. (2001). Impact of highly and less job-related diversity on work group cohesion and performance: A meta-analysis. *Journal of Management, 27,* 141-162.

Wech, B.A., Mossholder, K.W., Steel, R.P., & Bennett, N. (1998). Does work group cohesiveness affect individuals' performance and organization commitment? A cross-level examination. *Small Group Research, 29,* 472-494.

Weick, K.E., & Roberts, K.H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly, 38,* 357-381.

Weingart, L.R., & Cronin, M.A. (2009). Teams research in the 21st century: A case for theory consolidation. In E. Salas, G.F. Goodwin, & C.S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (pp. 509-524). New York: Taylor & Francis.

Weingart, L.R., & Weldon, E. (1991). Processes that mediate the relationship between a group goal and group member performance. *Human Performance, 4,* 33-54.

Westre, K., & Weiss, M. (1991). The relationship between perceived coaching and group cohesion in high school football teams. *The Sport Psychologist, 5,* 41-54.

Widmeyer, W.N., Brawley, L.P., & Carron, A.V. (1985). *The measurement of cohesion in sports teams: The Group Environment Questionnaire.* London, Ontario: Sports Dynamics.

Widmeyer, W.N., Brawley, L.P., & Carron, A.V. (1985). Group size in sport. *Journal of Sport and Exercise Psychology, 12,* 177-190.

Wilder, D.A. (1986). Social categorization: Implications for creation and reduction of inter-group bias. In L. Berkowitz (Ed.), *Advances in Experimental SocialPsychology* (Vol. 19, pp. 291-355). New York: Academic Press.

Williams, C.C., & Mahan, R.P. (2006). Understanding multiteam systems functioning. In W. Bennett, Jr., C.E. Lance, & D.J. Woehr (Eds.), *Performance Measurement: Current perspectives and future challenges* (pp. 205-224). Mahwah, NJ: Lawrence Erlbaum.

Williams, J.M., & Hacker, C.M. (1982). Causal relationship among cohesion, satisfaction, and performance in women's intercollegiate field hockey teams. *Journal of Sport Psychology, 4,* 324-337.

Wright, T.L., & Duncan, D. (1986). Attraction to group, group cohesiveness, and individual outcome: A study of training groups. *Small Group Behavior, 17,* 487-492.

Yagil, D. (1995). *A study of cohesion and other factors of major influence on Soldiers and unit effectiveness.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Zaccaro, S.J. (1991). Nonequivalent associations between forms of cohesiveness and group-related outcomes: Evidence for multidimensionality. *Journal of Social Psychology*, *131*, 387-400.

Zaccaro, S.J., Blair, V., Peterson, C., & Zazanis, M. (1995). Collective efficacy. In J. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment* (pp. 205-238).

Zaccaro, S.J., Heinen, B., & Shuffler, M. (2009). Team leadership and team effectiveness. In E. Salas, G.F. Goodwin, & C.S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (pp. 83-111). New York: Routledge.

Zaccaro, S.J., & Lower, C.A. (1988). Cohesiveness and performance on an additive task: Evidence for multidimensionality. *Journal of Social Psychology*, *128*, 547-558.

Zaccaro, S.J., Marks, M.A., & DeChurch, L.A. (2012). Multiteam systems: An introduction. In S.J. Zaccaro, M.A. Marks, & L.A. DeChurch (Eds.), *Multiteam systems: An organizational form for dynamic and complex environments* (pp. 3-31). New York: Taylor & Francis.

Zaccaro, S.J., & McCoy, M.C. (1985). *Different sources of group cohesiveness and group productivity on an interacting task.* Paper presented at the annual meeting of the Southeastern Psychological Association, Atlanta, GA.

Zaccaro, S.J., & McCoy, M.C. (1988). The effects of task and interpersonal cohesiveness on performance of a disjunctive group task. *Journal of Applied Social Psychology, 18,* 837-851.

Zaccaro, S.J., Rittman, A.L., & Marks, M.A. (2001). Team leadership. *The Leadership Quarterly, 12,* 451-483.

Zajonc, R.B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9,* 1-27.

Zedeck, S., & Cascio, W.F. (1982). Performance appraisal decisions as a function of rater training and purpose of appraisal. *Journal of Applied Psychology, 67,* 752-758.

CURRICULUM VITAE

Gia Adele DiRosa received her Bachelor of Science from The University of Georgia in 2007, and her Master of Arts in Industrial/Organizational Psychology from George Mason University in 2009. She is currently employed as a Research Scientist at the U.S. Army Research Institute for the Behavioral and Social Sciences in Fort Belvoir, VA.