A Longitudinal Examination of Collective Efficacy Dispersion Patterns in Sport Teams

by

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Table of Contents

List of Tables

List of Figures

Abstract

Collective efficacy is the belief in a team's ability to perform a task. Team members hold individual collective efficacy beliefs, which likely causes differing efficacy beliefs (dispersion) among teammates. **Purpose:** The purpose of this study was to examine collective efficacy dispersion patterns in sport teams, and explore the influence of cohesion on the development of dispersion patterns. **Methods:** Participants (n = 27) reported collective efficacy and cohesion beliefs via survey. Visual collective efficacy dispersion patterns were constructed. The dispersion patterns of each team were correlated with cohesion scores. **Results:** No change over time was found in collective efficacy dispersion patterns. There may be a negative correlation between efficacy dispersion and cohesion (r = -0.447). **Conclusion:** There is insufficient evidence concerning the cohesion/collective efficacy dispersion relationship. This study provides information on the limitations of theorized dispersion patterns, the difficulties in transitioning from theory to observation, and how dispersion patterns could be explored in future work.

Chapter 1 – Introduction

Teams are prevalent in almost every aspect of life regardless of context; be it academia, the workplace, sport or volunteer work. Nearly everything done in society is carried out by a team of people (Lim & Klein, 2006). Regardless of context, individuals want their teams to perform well and succeed (Shuffler, Diaz-Granados, & Salas, 2011). This desire for successful teams becomes a need in competitive domains such as research or academia, the workplace (such as health care providers) and sport organizations (McEwan & Beauchamp, 2014; Smith, Morin, Wallace, & Lake, 2018). To put it simply, more effective teams are able to complete tasks less effective teams cannot (Marks, Mathieu, & Zaccaro, 2001; McEwan & Beauchamp, 2014), or they are able to perform these tasks better. While the manner in which more effective teams succeed may differ, the main point is still that more highly functioning teams are imperative for success in one's given domain (Marks et al., 2001).

The success of these teams can be predicated on a multitude of factors, but they can be grouped into two categories: resources (e.g., personnel), and team processes (e.g., task and social behaviors; Beauchamp, McEwan, & Waldhauser, 2017; McEwan & Beauchamp, 2014). Resources are often much more difficult to alter, as they may include the financial resources of the team. Personnel and logistical changes which could benefit the team are typically dependent on the team's financial situation (Beauchamp et al., 2017), such as purchasing improved training facilities or spending money to recruit personnel. In some cases, making personnel changes or increasing logistics may not be feasible for improving the team. In this case, the processes (coordination of actions and communication, for example) and underlying interactions of the team must be improved in order for the team to be more effective (Beauchamp et al., 2017; McEwan, Zumbo, Eys, & Beauchamp, 2018; Shuffler et al., 2011). An improvement in team functioning is commonly referred to as improving the group's teamwork (McEwan et al., 2018). However, this is a misnomer; in fact, teamwork was operationalized by McEwan and Beauchamp (2014) as a dynamic set of behaviors, both interdependent and independent, that are carried out to achieve a goal. This definition of teamwork frames it as the processes a team carries out during a performance, rather than an outcome of team actions (McEwan & Beauchamp, 2014; McEwan et al., 2018). Improvements in group functioning can be attributed to much more than just teamwork (McEwan & Beauchamp, 2014). While improving the behaviors necessary for completing a task is certainly an effective way to improve performance (McEwan & Beauchamp, 2014; McEwan et al., 2018), other processes may be improved, such as team cognitions or mental models, essentially the manner in which a team perceives and strategizes about their task (Lim & Klein, 2006), communication or leadership (De Backer et al., 2014; Kim, Magnusen, & Andrew, 2016), or, the internal constructs which mediate the above processes and performance, called emergent states (Marks et al., 2001).

The conceptualization of emergent states, such as efficacy and cohesion, frame teams as dynamic and multilayered entities (Marks et al., 2001). Emergent states consist of the cognitive, motivational and affective components, which develop because of, and then drive physical team processes (Marks et al., 2001; McEwan & Beauchamp, 2014). Emergent states act as a predictor of the team's processes, (processes such as goal setting or strategizing for a competition), while simultaneously being developed by the same processes; that is, a team that has just been formed will have some positive or negative emotions and thoughts regarding their team, even without having completed any tasks yet (Marks et al., 2001). These existing states will influence the group's functioning and performance, and the resultant performance of a task and its relative success (or lack thereof) will change or shape the emergent states of the team, such as the group's motivational climate or cohesion (Lim & Klein, 2006; Martin, Bruner, Eys, & Spink, 2014). For example, a hockey team that has just been formed via tryouts for the upcoming season will have some sense of the group's potential playing ability among the new teammates. This will be most influenced by any knowledge the now teammates have of each other from past seasons (Bandura, 2000; Marks et al., 2001), such as if some players used to play against one another. The emergent state of collective efficacy within the team will be influential as the team begins to compete, and through experience with one another, the group's collective efficacy (among other emergent states) will change; thus, being a predictor and result of team processes. Emergent states show teams as multilayered social entities (Marks et al., 2001) giving credence to the popular notion of a team being more or less than the sum of its physical parts. The influence of emergent states on team processes and performance can allow a team to perform better than an observer may expect, based on the team's composition, or worse, depending on the formation of these states (Marks et al., 2001; McEwan & Beauchamp, 2014). Two of the most impactful emergent states within a team are cohesion and collective efficacy. Cohesion is a sense of unity within a group in relation to achieving goals and/or member satisfaction; and as seen from that description cohesion consists of both social and task aspects (Carron, Widmeyer, & Brawley, 1985). Collective efficacy is a process focused belief in a group's abilities to perform a task (Bandura, 1997; 2000).

Cohesion and collective efficacy have both received extensive attention in the team dynamics literature (Beauchamp et al., 2017; Bruner, Eys, Beauchamp, & Cote, 2013). Both have been correlated with team performance and improved intra-team functioning (Beauchamp et al., 2017; Bruner et al., 2013). Additionally, cohesion and collective efficacy were found to be reciprocally related. Higher levels of cohesion were found to predict higher collective efficacy, and higher collective efficacy predicted higher task cohesion (Heuze, Raimbault, & Fontayne, 2006). Furthermore, collective efficacy has been demonstrated to be a mediator through which cohesion acts on group performance (Medeiros & Edson, 2013). In addition to influencing performance, both of these emergent states being high has been shown to be beneficial for the social functioning of the group (Bandura, 2000; De Backer et al., 2014), including improved communication, conflict resolution, and resiliency (Bandura, 2000; Kim et al., 2016). Cohesion is important in the functioning of a team, especially in terms of within group interactions, but given the direct link to a team's performance, collective efficacy is the focus of this study. Despite the attention collective efficacy has received in the literature, there is a substantial oversight within collective efficacy research: to date, very little research has considered the within group variance, or dispersion, of collective efficacy (DeRue, Hollenbeck, Ilgen, & Feltz, 2010). Typically, collective efficacy is treated as a variable consisting only of magnitude (DeRue et al., 2010), with the within group dispersion being treated as a statistical by-product. Previous research on related constructs such as team cognitions and team mental models indicates that higher levels of within group variance in emergent states or related processes is very often detrimental to group performance (Cole, Bedeian, Hirschfield, & Vogel, 2011; DeRue et al., 2010; Ladbury & Hinsz, 2018; Lim & Klein, 2006) If members of a team have differing ideas on how to approach a problem, then the reaction or approach to the problem that is carried out will be less efficient because the selected solution is not seen as the most intuitive to the whole team (Lim & Klein, 2006). If higher levels of dispersion in constructs related to collective efficacy within the dynamic of the team (Lim & Klein, 2006) are detrimental to performance, then it is reasonable that a similar effect would be present with higher levels of collective efficacy dispersion.

Gaps in the Literature

Existing research on collective efficacy dispersion is very limited (Beauchamp et al., 2017). DeRue and colleagues (2010) raise the issue of collective efficacy dispersion as a topic of interest, but research following this paper led to mixed results on how collective efficacy dispersion influenced performance. A pair of studies conducted by Dithurbide, Chow and colleagues (2009; 2011) yielded inconclusive results due to sample size and team familiarity limitations on the influence of collective efficacy dispersion on performance. While these studies did not yield significant results regarding the potential for performance decrements associated with increased collective efficacy dispersion (Dithurbide, Chow, Sullivan, & Feltz, 2011), and furthermore provided evidence of the difficulty of capturing collective efficacy dispersion (Chow, Dithurbide, & Feltz 2009), there still exists a need to explore this topic. Chow and colleagues (2009) indicated that traditional measures of spread, such as standard deviation, and more specific measures, such as kurtosis, did not reliably describe the manner in which efficacy beliefs differed between team members. Dithurbide and colleagues (2011) found collective efficacy dispersion did not negatively influence performance, but stated their sample size was a limitation, and a lack of familiarity among the members of the a priori tug of war teams. This lack of familiarity could be indicative of less informed efficacy beliefs. A recent publication by McLeod and Orta-Ramirez (2018) found contrasting evidence to findings by Dithurbide and colleagues (2011); where McLeod and Orta-Ramirez (2018) demonstrated higher levels of collective efficacy dispersion (often caused by differing levels of experience within the group) led to lower performance in academic group work in undergraduates. This study drew on the work of Lim and Klein (2006), giving similar reasoning as the present study, that if dispersion in constructs related to collective efficacy is detrimental, there is reason to believe the same will be present in collective efficacy (McLeod & Orta-Ramirez, 2018). Reviews on collective efficacy have also stated a need to explore this area of research (Ede, Hwang, & Feltz, 2011), indicating that representation of collective efficacy as simply a measure of magnitude is insufficient (Beauchamp et al., 2017; DeRue et al., 2010; Ede et al., 2011). Thus, the present study sought to add to the literature on dispersion of collective efficacy, and to address this gap through a longitudinal lens. Team dynamics research aims to investigate constructs which are dynamic in nature. However, a significant portion of the team dynamics literature is comprised of cross-sectional study designs, limiting the amount of true dynamism of psychological constructs which can be measured (Bruner et al., 2013; McEwan et al., 2018).

Purpose and Hypotheses

This study aimed to fill two gaps in the team dynamics literature: the first being providing more insight into the manifestation and development of collective efficacy dispersion patterns. Second, the study aimed to provide more longitudinal research to the literature to the team dynamics field, adding to a portion of the literature which should receive greater attention, as well as having investigated collective efficacy in a dynamic fashion. The purpose of this study was to provide a longitudinal examination of collective efficacy dispersion patterns over the course of a competitive season in sport teams, and to explore the influence of cohesion on the manifestation and development of these dispersion patterns. Cohesion is a predictor of collective efficacy magnitude (Heuze et al., 2006) and because cohesion is a sense of unity within the team, and how united the team is in pursuit of a task (Carron et al., 1985), it may influence collective efficacy dispersion as well. Additionally, this study sought to determine how collective efficacy dispersion patterns change over the course of a competitive season within sports teams. Two hypotheses were proposed: 1) higher levels of cohesion will correlate with lower collective efficacy dispersion, or manifest in a pattern closer to shared beliefs, and 2) collective efficacy dispersion patterns will change over the course of the competitive season.

Study Design

This study intended to use a longitudinal design. The Principal Investigator recruited competitive athletes from any team sport. For the purpose of this study, a sport team was defined as a team that is either segregated or interdependent based on the typology developed by Evans, Eys and Bruner (2012). Both segregated and interdependent teams as described by Evans and colleagues (2012) would be considered traditional team sports; the difference in their classification typically lies in how sequencing of activities take place in the team's tasks. Interdependent teams consist of a group that has a goal and the task at hand requires active participation from all involved group members; for example a soccer team where every player on the field is contributing to the goal of scoring (Evans et al., 2012). A segregated team also has a group goal and often multiple team members involved at one time, but the order of task performances is sequential in nature. That is, in most instances in competition the task or objective is completed by athletes carrying out their own tasks in a specific order, rather than all performing their portion of the task simultaneously; an example of this being baseball (Evans et al., 2012). In addition to being competitive athletes, participants needed to be over 18 years of age. Teams of various sports and with varying numbers of athletes were targeted for recruitment to increase generalizability. Measures administered included demographics for the team, such as age and experience descriptors, as well as cohesion, using the Group Environment Questionnaire (GEQ; Carron, Widmeyer, & Brawley, 1985), and collective efficacy, using the Collective Efficacy Questionnaire for Sport (CEQS; Short, Sullivan, & Feltz, 2005). Both measures were taken at the same time to minimize the amount of time team activities were disrupted to fill out questionnaires. Following recruitment and informed consent, participants were asked to fill out both questionnaires anonymously three times throughout the season: a baseline measure early in the season, which was done after the team roster had been finalized, and again roughly one month after the first data point, and the final data collection point was scheduled roughly a month before the conclusion of the team's season.

The theoretical basis behind these dispersion patterns will be described in detail in the following chapter. The dispersion patterns were displayed using the scores of each individual's perceptions of collective efficacy, according to the CEQS. Hypothesis 1 (H1) was addressed by assessing the presence (or lack thereof) of a correlation between cohesion and each collective efficacy dispersion pattern. Hypothesis 1 stated that higher levels of cohesion would likely lead to a more shared perception of collective efficacy within the group. Hypothesis 2 (H2) was addressed by using visual sequences of collective efficacy beliefs, constructed for each team at each time point to show the team's collective efficacy dispersion pattern at each time point. The progression was used to demonstrate the change in dispersion patterns over time. The following chapter will describe in further detail the breadth of collective efficacy research and discuss the typology of collective efficacy dispersion patterns on which this study design is predicated.

Chapter 2 – Review of Literature

The existing literature on collective efficacy dispersion is sparse, and what does exist is relatively inconclusive. However, the literature on collective efficacy as a concept is quite vast (Ede et al., 2011), and the existing literature on cohesion is even more substantial (Bruner et al., 2013). Team dynamics as a whole is an expansively studied subject and has been for quite some time (Beauchamp et al., 2017; Bruner et al., 2013). Within the fields of industrial, organizational, and sport psychology the idea of improving team functioning has long been an important one. Typically, team dynamics interventions are done with the objective of becoming a more efficient unit, becoming more effective at accomplishing a goal, or being more fluid as a group and reducing conflict on the way to said goal (Beauchamp et al., 2017). This review will focus on research surrounding collective efficacy, its interactions with other psychological constructs, as well as dispersion of related constructs, and what research has been done on collective efficacy dispersion. This literature on dispersion of team dynamics variables will lead to discussion of the gaps, which the present study aims to address. Cohesion will also be discussed within this literature review, as it will be an independent variable within the current study, and the relation between cohesion and collective efficacy is an important one both in the wider context of the literature (Bandura, 2000; Heuze et al., 2006; Leo et al., 2016), and in relation to collective efficacy dispersion (DeRue et al., 2010). Prior to discussion of the extant literature, the theoretical framework of the proposed study will be explained, to give context to important points within the literature.

Theoretical Framework

This study is based on the typology of collective efficacy dispersion patterns created by DeRue and colleagues (2010). To discuss efficacy dispersion, the construct of collective efficacy must be examined first. The construct of self-efficacy stemmed from Bandura's Social Cognitive Theory (Bandura, 1997), and from this, collective efficacy emerged as a group level variable (Bandura, 1997; 2000). Self-efficacy is stated to be a domain and task specific confidence or belief in one's ability to accomplish said task in the given circumstance (Bandura, 1997). Collective efficacy, by extension, is the belief in a group's ability to accomplish a given task in a certain domain. This belief can be either an individual's belief in the group they are a part of, or an aggregated and shared belief of the group regarding the group's ability to accomplish the given task (Bandura, 2000). Efficacy, either self or collective, has been shown to have a strong positive correlation with task performance (Bandura, 1997; 2000; 2012). Efficacy is also related to various other psychological constructs which can be present within either a group or individual (Bandura, 1997; 2012). In terms of team settings, collective efficacy has strong links to resiliency, motivational disposition, fear of failure, cohesion, outcome confidence and performance (Bandura, 2000). In individuals within the team, higher efficacy regarding their team can reduce fear of failure and self-presentation concerns, while fostering a greater feeling of team identity (Bandura, 1997; 2000). All of the aforementioned constructs provide some benefit, be it to performance or group functioning, and have strong ties to collective efficacy, giving credence to the importance of collective efficacy.

As collective efficacy has been proven to have a role in improving performance (Fransen et al., 2017), decrements in collective efficacy are notable as they may be a detriment to the functioning of the group. With that being said, changes within the components of the group, or the components of the collective efficacy makeup, could be detrimental to performance, even while an aggregated collective efficacy measure shows a score that has not changed. Collective efficacy is a group level construct, and thus has an associated level of within group variance.

Typically, in collective efficacy literature, this is treated as insignificant (DeRue et al., 2010; Fransen, Mertens, Feltz, & Boen, 2017). This is in spite of research into related constructs, such as team mental models, demonstrating that increased within group dispersion is detrimental to the positive benefits of said construct (Lim & Klein, 2006). Treating collective efficacy as an overall magnitude score has yielded valuable information to the body of literature (DeRue et al., 2010; Ede et al., 2011) but shows an incomplete picture. Provided within group collective efficacy dispersion exceeds a level which would be considered the amount of agreement, which can be attributed to common agreement within the relevant community (Biemann, Ellwart, & Rack, 2014) this dispersion likely holds explanatory value in analysis of collective efficacy interactions (DeRue et al., 2010).

It has been demonstrated that simply using standard deviation of a group's collective efficacy does not provide an accurate or complete measure of the social effects dispersed collective efficacy will have (Biemann et al., 2014; Dithurbide et al., 2011). Furthermore, work by Dithurbide and colleagues (2011) demonstrated that the use of skewness, kurtosis, or Rwg index individually were not sufficient to fully depict how collective efficacy dispersed. It was found that using frequency charts or histograms (visual representation) is thus far the most accurate way of depicting the spread of collective efficacy, its pattern of dispersion, and the magnitude of the dispersion. Given the potential for complex social interactions within a group, especially a group under pressure, the shape of the dispersion is as, if not more important than statistical measures of spread (Ladbury & Hinsz, 2018; Loignon, Woehr, Loughry, & Ohland, 2018). Collective efficacy dispersion patterns were proposed by DeRue and colleagues (2010) to appear in four general shapes: shared beliefs, minority dissent, bimodal, or fragmented. Shared beliefs patterns present as a mostly unanimous or very even spread of collective efficacy beliefs;

or the variance within the group is very low. Minority dissent entails one member (or a small relative group) of the team to have significantly higher or lower collective efficacy compared to the rest of the group. Bimodal distributions are relatively straightforward, there are two nearly even groups with differing efficacy beliefs. Fragmented is the opposite of shared beliefs, where there is no agreement, and every member of the team (or several relatively small factions) have differing efficacy beliefs (DeRue et al., 2010). It is posited by DeRue and colleagues that different patterns of dispersion will have different consequences for the performance and social interactions of the team, and this was reinforced by findings from Loignon and colleagues (2018). It is also presented in the DeRue paper (2010) that cohesion is likely the variable that influences the manifestation and evolution of these different patterns, because higher levels of cohesion are thought to cause convergence in efficacy beliefs, as the team is more likely to remain united in performing their given task (DeRue et al., 2010). Given that cohesion is shown to be reciprocally related to collective efficacy (Heuze et al., 2006; Leo et al., 2016; Medeiros & Edson, 2013), and cohesion can predict collective efficacy, this makes logical sense (DeRue et al., 2010; Heuze et al., 2006; Medeiros & Edson, 2013). From this theory crafted by DeRue and colleagues comes the hypotheses for the present study: that higher levels of cohesion will correlate with lower collective efficacy dispersion, or a pattern closer to shared beliefs, and that dispersion patterns will change over the course of the competitive season. If higher levels of cohesion are correlated with higher levels of collective efficacy (Heuze et al., 2006; Leo et al., 2016; Medeiros & Edson, 2013), then it is plausible that they will also lead to less within group dispersion. This also follows a hypothesis presented by DeRue and colleagues (2010), stating that higher levels of cohesion will lead to convergence of efficacy beliefs over time. While this hypothesis has not been proven to date (Loignon et al., 2018), it aligns with current knowledge on the relationship between cohesion and collective efficacy. Additionally, the second hypothesis of the current study is that dispersion patterns will change over time. It is necessary to propose a more exploratory rather than explanatory hypothesis, given the relatively novel nature of this research. However, this hypothesis will allow for investigation into the hypothesis presented by DeRue et al., (2010), by testing to see if there is a difference in cohesion levels between teams with converging versus diverging efficacy beliefs. While Hypothesis 2 is non-directional, as opposed to the hypothesis of DeRue and colleagues (2010), it does align with collective efficacy research, given that collective efficacy is known to be dynamic in nature, thus it would be illogical for collective efficacy dispersion patterns to remain stagnant. By addressing these two hypotheses, the proposed study will address a significant gap in the team dynamics literature, which will be discussed in the following section.

Team Dynamics

As stated above, there already exists an expansive body of research regarding team dynamics, which is often miscast as teamwork in the literature (McEwan & Beauchamp, 2014). The primary goal of team dynamics research is to improve teamwork or team functioning, through reducing intra-team conflict, improving communication, increasing efficacy, aligning goals, etc. (Beauchamp et al., 2017). Within this domain of research, a significant amount of work has been done to explore the multitude of variables influencing team functioning. While this paper will focus on collective efficacy, it is important to note the value of constructs that influence or are influenced by collective efficacy to show its value to team processes. Team dynamics are comprised of the behaviors and emergent states within a team that control their overall output of tasks and the processes that achieve them (Marks et al., 2001). While team dynamics is a very broad subject area, there is a relatively high degree of generalizability across domains (McEwan & Beauchamp, 2014). While evidence across domains within team dynamics will not perfectly translate, the use of empirical evidence garnered from organizational psychology is still relevant to a sport psychology researcher, and vice versa (McEwan & Beauchamp, 2014).

Collective efficacy and cohesion are both emergent states (Marks et al., 2001; McEwan & Beauchamp, 2014), meaning they influence the physical processes within a team, such as teamwork behavior. Emergent states are described as being both mediators and moderators of the processes from which they are born (Marks et al., 2001; McEwan & Beauchamp, 2014). To elaborate, processes within a team, including team and task-based interactions, produce cognitive, affective and motivational states, or these states emerge from a team's actions (McEwan & Beauchamp, 2014). Following the manifestation of these states within a team (such as motivational climate, collective efficacy and cohesion), emergent states proceed to influence the performance of the team's physical behaviors and their respective outcomes (Marks et al., 2001). This is present in the description of both collective efficacy and cohesion interactions with other team-based variables, including teamwork, as both are shown to increase the coordination and task-based interactions needed for effective teamwork (Bandura, 2000; Bruner et al., 2013; Fransen et al., 2017; McEwan & Beauchamp 2014).

Given the need for a team to improve and be effective in order to achieve goals and satisfy its members, understanding how to optimize the processes of a team is important (Shuffler et al., 2011), and furthermore, it must be acknowledged that research into team dynamics has shown team performance is not merely the sum of the team's parts (Marks et al., 2001; McEwan & Beauchamp, 2014). The emergent states of a team can make said team more or less effective than the actual skill level of its members for the given task (Bruner et al., 2013), thus optimizing team performance, and improving teamwork itself, requires an understanding of the differing layers of team functioning (Beauchamp et al., 2017). Even teamwork itself, the behavior of performing actions (both interdependent and independent) to complete a task, is highly influenced by emergent states such as collective efficacy and cohesion (Beauchamp et al., 2017; McEwan & Beauchamp, 2014; McEwan et al., 2018). While teamwork (or other process focused) interventions, described by Shuffler and colleagues (2011) as team training, can significantly improve team performance (Beauchamp et al., 2017), process interventions are more focused on the current task and are often less generalizable than positively influencing the emergent states of a team (Shuffler et al., 2011). Process focused interventions are undoubtedly useful for becoming more proficient at whatever skill is necessary for the task at hand, but team building interventions, described as improving the emergent states and social functioning of a team, typically have a wider breadth of benefits to the team (Liu, Chen, & Tao, 2015; Nahrgang et al., 2013; Shuffler et al., 2011). Team building interventions, which are commonly described as targeting emergent states within teams (Beauchamp et al., 2017), not only improve objective based performance, but also the processes required to carry out these tasks (Liu et al., 2015).

The very definition of emergent states describes them as moderating and mediating processes within the team and overall output, with output being the performance of a task (McEwan & Beauchamp, 2014). This relationship between emergent states such as cohesion and collective efficacy is shown in the literature to improve several aspects of team functioning, such as goal setting (Nahrgang et al., 2013), communication (Kim et al., 2016), participation or buy-in (Benson, Eys, & Irving, 2016; De Backer et al., 2014; Smith et al., 2018), and problem solving (Liu et al., 2015; Patras & Klest, 2013). While cohesion and collective efficacy, the two emergent states pertinent to the present study, have differing constitutions and thus differing effects on group processes (Bandura, 2000; Bruner et al., 2013; Medeiros & Edson, 2013), there are similarities in the wide range of positive effects both emergent states have on group processes, the social climate of the group, and overall group performance (Bruner et al., 2013; Heuze et al., 2006; McEwan & Beauchamp, 2014). Positive changes in both collective efficacy and cohesion have been shown to improve performance, improve communication, and goal setting behaviors (Bruton, Mellalieu, & Shearer, 2016; Heuze et al., 2006; McEwan & Beauchamp, 2014). It is apparent that cohesion and collective efficacy are highly important emergent states to be studied, as evidenced by findings in the existing literature (Bandura, 2012; Bruner et al., 2013; Ede et al., 2011). To further understand these two states a deeper look into their respective bodies of literature will be provided, to provide a complete picture of the importance of collective efficacy and cohesion, and to place them in the context of the present study by identifying gaps and framing their relationship to one another.

Collective Efficacy

Collective efficacy is a domain specific, process focused belief in a team's ability to perform a given task (Bandura, 1997; 2000). Collective efficacy is integral to both team performance and team functioning (Bandura, 1997; 2000), and significantly predicts a plethora of team dynamics constructs associated with performance (Bandura, 2000; Fransen et al., 2017). Collective efficacy is not quite as prevalent in the team dynamics literature as cohesion, but given the direct link to performance, and the vast effects on within group functioning which collective efficacy is correlated with, is equally as worthy of study (Beauchamp et al., 2017; Fransen et al., 2017). The efficacy beliefs of a group are highly important in understanding how the group perceives their competency at the given task, much like self-efficacy is for individuals

(Bandura, 2000). Research has also shown that collective efficacy is very similar to self-efficacy in its construction (Bandura, 1997).

Construction of efficacy.

Self-efficacy is comprised of four underlying aspects: mastery experiences, vicarious experiences, verbal persuasion, and physiological/psychological adaptations (Bandura, 1997; 2012). Mastery experiences are achievements related to the task with which an individual's efficacy is concerned; achieving a goal or a success in the given task demonstrates the individual can in fact do that task well, thus increasing their self-efficacy. Additionally, mastery experiences are mentioned as perhaps the most important facet of self-efficacy (Bandura, 1997; 2012). Vicarious experiences involve models for the task. An individual observes someone (ideally someone they relate to) doing the given task and sees the task as more doable having observed it being done (Bandura, 1997; 2012). Verbal persuasion is receiving verbal motivation or instruction, improving their context specific confidence and thus their efficacy for that task (Bandura, 1997). Physiological/psychological adaptations refers to physically (or mentally) getting better at the task. An individual who has objectively improved is going to feel more efficacious because they can do the task more effectively (Bandura, 1997; 2012). Collective efficacy has all of these same underlying determinants as self-efficacy (Bandura, 2000), and is believed to form and be influenced similarly (Bandura, 1997). Work done by Bruton and colleagues (2016) indicated the collective efficacy in collegiate athletes was indeed predicted by past performances (mastery experiences) and observation of similar collegiate teams (vicarious experiences). However, as discussed previously, collective efficacy is also predicted by cohesion, or the unity within the group (Medeiros & Edson, 2013). Self-efficacy beliefs are likely still present in a team context, that is a member of a team will still have beliefs about their own abilities in a given context, including the context which the teams goal is placed in. However, belief in the abilities of each individual team member has a lower ability to predict performance than does belief in the group (Myers, Feltz, & Short, 2004). Collective efficacy is a perception of the group entailing more than the sum of its parts, whereas self-efficacy beliefs on a group level simply do aggregate the individuals' respective belief in their abilities (Bandura, 2000; Myers et al., 2004), which does not account for the interdependence of the task (Bandura, 2000; Fransen et al., 2017).

The differentiation between self-efficacy of each group member and collective efficacy as a group level measure is integral in understanding both the function of collective efficacy in the social environment of the team and its interactions with other group level variables, as well as the measurement of collective efficacy (Bandura, 2000; Fransen et al., 2017; Myers et al., 2004). The description of self-efficacy in terms of measuring it as a variable is relatively straightforward, as it concerns just a single individual and their own perceptions (Bandura; 1997). Collective efficacy, however, concerns the belief in a group, and their ability to collectively perform a task (Bandura, 2000). This can be elaborated on to include belief in the group's shared ability to both properly allocate, coordinate and perform the required behaviors to complete their task (Myers et al., 2004). Bandura (1997; 2000) proposed three different possibilities to measure collective efficacy. These included aggregated self-efficacy and aggregated collective efficacy, and collective efficacy as an agreed upon group variable.

Aggregation and measurement of efficacy.

Aggregated self-efficacy refers to the aggregation of each individual group member's efficacy regarding their ability to perform their specific role (Bandura, 1997). Ideally, a group with well-defined roles, which are occupied by individuals who are both satisfied with their role as well as competent at it, should perform quite well (Benson et al., 2016). In this scenario, group members who are efficacious regarding their specific role (leading to high efficacy in every role) should lead to high collective efficacy. However, this does not take into account any level of interdependence or coordination within the team (Bandura, 1997; Myers et al., 2004). Aggregated self-efficacy is a poorer predictor of performance when there is a level of interdependence to the task (Bandura, 2000), because it cannot account for belief in one's teammates. Work by Myers and colleagues (2004) demonstrated that in offensive football players (a very interdependent task) aggregated self-efficacy did not predict offensive performance, and previous offensive performance did not influence aggregated self-efficacy. Aggregated collective efficacy has been theorized and demonstrated to be a more effective measurement of group level efficacy beliefs (Myers et al., 2004), because it entails individuals reporting their belief in the group as a whole (Bandura, 2000), which can account for both interdependent tasks, as well as an individual's perception of the strengths and weaknesses of other group members, and an individual can also incorporate perceptions of the group's teamwork and social functioning into their efficacy beliefs (Bandura, 2000). Aggregated collective efficacy was objectively shown to be more effective at predicting performance and also provided a more valid measurement of collective efficacy than did aggregated self-efficacy (Myers et al., 2004).

There is a third potential measurement for collective efficacy, in which Bandura (2000) proposes measuring collective efficacy as a collectively agreed upon variable, likely obtained through group discussion and consensus. While this method would serve to measure collective efficacy as a more holistic and collective variable, it is rife with potential for inaccuracy (Bandura, 2000). Use of group discussion inadvertently gives significantly more influence on the group's efficacy beliefs to those who hold power or sway within the team. While it is likely that those in positions of power within a team are in said position due to their competency and value to the team (Aime, Humphrey, DeRue, & Paul, 2011), it is likely that some individuals will have less influence if they do not agree with the majority (DeRue et al., 2010). Ideally this discussion of beliefs regarding the team's collective ability would be one where rank or roles or positions of power are set aside, but this would likely not be the case in a real scenario. Additionally, it is true that flowing power structures typically increase performance, where the leader is one who is especially adept at whatever the current task is (Aime et al., 2011). However, this is not the norm, and hierarchical power structures are more common (Aime et al., 2011), as well as less lenient to those who side with a minority (DeRue et al., 2010). Due to this, an individual who believes the team's ability to be lower than either the actual or influential majority is likely to be given significantly less sway in how the efficacy is reported (Aime et al., 2011; DeRue et al., 2010). So, while a vocal discussion of efficacy beliefs of the group may be beneficial to a team in understanding how they perceive themselves, it will likely not yield the most accurate response in terms of their actual collective efficacy (Bandura, 2000). Finally, many individuals, especially those not in a position of power, will likely not feel comfortable openly remarking on their perception of the team as incompetent regarding important tasks (DeRue et al., 2010). Given that aggregated collective efficacy can be anonymous, minimizing social desirability bias and the influence of power structures (Bandura, 2000; DeRue et al., 2010; Myers et al., 2004) aggregated collective efficacy is often going to the most valid method of measuring a team's collective efficacy, and also includes interdependence and team level processes in its construction (Bandura, 1997; 2000; Myers et al., 2004).

Collective efficacy within team dynamics.

Aggregated collective efficacy includes the functioning of the team as perceived in the team's beliefs in the team's abilities (Bandura, 2000; Myers et al., 2004). This is relevant given the far-reaching influence of collective efficacy within a group's functioning and the social environment of the team (Bandura, 1997; Beauchamp et al., 2017; Fransen et al., 2017). Collective efficacy affects constructs such as resiliency (Bandura, 1997; 2000), motivational disposition (Bandura, 2000), team mental models (Lim & Klein, 2006; McLeod & Orta-Ramirez, 2018; Medeiros & Edson, 2013), and effort (Smith et al., 2018), to name a few. One of the most noteworthy associations of collective efficacy is with resiliency. Resiliency is a trait of perseverance in the face of challenges and is quite obviously beneficial for individuals or groups (Bandura, 2012). A resilient individual is one who is less likely to give up following a setback, and as well will exert more effort to challenging tasks, or tasks which the individual has previously failed (Bandura, 2012; Fransen et al., 2017). Resiliency encompasses both not giving up a task in the face of adversity, and also coming back to a task after a failed attempt. Resiliency is related to mastery experiences, as an individual will gain the most benefit from being thoroughly challenged, and persevering through a task to accomplish it, rather than easily succeeding (Bandura, 2012). The same can be said for a group; a group that easily accomplishes tasks will have an almost false sense of efficacy, as efficacy built on easy successes is much less robust than efficacy beliefs built on challenging tasks (Bandura, 2012). Similar to resiliency is effort, which collective efficacy is also correlated with (Fransen et al., 2017). A more efficacious team will exert more effort towards its goals than a group that has less belief in its abilities (Bandura, 2000). Effort put forth to accomplish the task is influenced by collective efficacy regardless of how performance of the task is being measured (Smith et al., 2018). It has been shown that healthcare practitioners with more collective efficacy in their team are more likely to complete assignments in a timely manner, and also complete extra, non-essential tasks for patients (Smith et al., 2018). This indicates that the collective efficacy-effort relationship does not require an objective, immediate measure of performance to manifest, but rather relies on the individual's perception of the efficacy of their group, and higher levels of collective efficacy produce feelings of competency in the group's work and reduces perceptions of tasks are difficult or tedious (Smith et al., 2018).

Also similar in scope to effort and resiliency are goal setting and motivation. Effective goal setting behaviors have been cited as potentially the most impactful teambuilding interventions that can be carried out across domains (Nahrgang et al., 2013; Shuffler et al., 2011). Proper goal setting is imperative both for actual performance and the evaluation of performance on either a group or individual scale (Nahrgang et al., 2013). A team with higher collective efficacy will set more challenging goals for themselves (Bandura, 1997; 2000), thus further increasing the effort which they put into the task, as the group legitimately believes they can accomplish these more challenging goals (Fransen et al., 2017). This also demonstrates that in addition to having increased process-focused belief in the group's abilities, the group has higher outcome expectations (Bandura, 2012; Fransen et al., 2017). A more efficacious group will not only tend to set more challenging goals, but also exert more effort into attaining these goals, and persevering through challenges experienced when pursuing these goals (Bandura, 1997; Edmonds, Tenenbaum, Kamata, & Johnson, 2009; Fransen et al., 2017). It should be noted that strong leadership, specifically from a coach or team captain, could also strongly influence the presence of challenging goals (Aime et al., 2011; Fransen, Decroos, Vande Broek, & Boen, 2016; Kim et al., 2016). However, collective efficacy was shown to be both a stronger predictor of effective goal setting behaviors, and was more easily controllable (Fransen et al., 2016). Similar to this is the notion that collective efficacy increases motivation, both in terms of a group's energy in completing the necessary processes to perform their given tasks (Edmonds et al., 2009), but also in terms of improving motivational disposition (Bandura, 1997; 2012).

Motivational dispositions can be either achievement or mastery focused, or outcome focused (De Backer et al., 2014), one of which is highly beneficial to group performance. The presence of a mastery or achievement focused motivational disposition is correlated with better performance and less fear of failure (De Backer et al., 2014). Ironically, a fear of failure is associated with increased incidences of failure, and an individual or group being more subject to pressure induced performance decrements, or choking (De Backer et al., 2014). A team that is more efficacious is likely to have a more achievement focused motivational disposition, leading to less fear of failure, and increased resiliency and willingness to try new solutions to problems (Bandura, 2012; De Backer et al., 2014; Liu et al., 2015). An achievement-focused climate within the team is highly beneficial both for performance and collective efficacy itself, as it indicates the focus of the team is on improving their abilities (Bandura, 2012). Given that collective efficacy is a process-focused belief, there is a connection between increasing an emphasis on mastery and also increasing efficacy of the group. A group which has a focus on improving their ability to perform a process related to the task is likely also putting more effort into analyzing how to best perform their task (Lim & Klein, 2006). Not only does this improve the group's actual ability to perform the task and increases the likelihood of a positive outcome, it also leads to increased innovation in how the task is approached (Liu et al., 2015). A team that has focused on improving the process is thus thinking about to conduct the process without excess focus on the outcome or end point, allowing for more creativity in how the problem or task is completed (Bandura, 2012). This is reinforced by a reduced fear of failure; a group which has a high fear of failure is less likely to try a creative or innovative solution to a problem as it may not work, leading to failure and thus negative consequences (Bandura, 2012; Fransen et al., 2017; Liu et al., 2015).

A team that employs more creative solutions to problem solving likely has a high degree of shared mental models or team cognitions, or both (Ede et al., 2011; Fransen et al., 2017; Lim & Klein, 2006). Team cognitions entail the process of how the team thinks about solving the problem or task at hand (Medeiros & Edson, 2013), while team mental models describe the shared knowledge and understanding the problem at hand (Lim & Klein, 2006). The two are similar, but slightly different; team cognitions involve the process of solving a problem, whereas team mental models are a perception of the problem, and the shared knowledge within the team that can be applied to the problem (Biemann et al., 2014; Lim & Klein, 2006). Both team mental models and team cognitions, when shared, are beneficial for team performance and the coordination of independent and interdependent behaviors necessary for accomplishing a task (Lim & Klein, 2006). Furthermore, high levels of agreement within mental models and cognitions in a team are also associated with more innovation and trust between individuals (Liu et al., 2015; Webster, Hardy, & Hardy, 2017). Collective efficacy has been shown to be correlated with more agreement in team mental models (Medeiros & Edson, 2013), and also more similarity in team cognitions (Liu et al., 2015; Smith et al., 2018). However, the idea that high degrees of similarity is beneficial is contended by some, citing that groupthink may occur if every member of the team views a problem in the exact same way (Cole et al., 2011). While the presence of groupthink is indeed a possibility in a team where everyone sees a problem in the same way, the increased ability to coordinate behaviors is undoubtedly still beneficial.

Agreement of mental models within a team to some degree is still necessary for optimal functioning (Cole et al., 2011). A team should challenge each other when trying to problem solve, but a team which spends all of their time challenging without being able to find a solution is no more effective than one which exhibits groupthink. Despite this point of contention in the team mental model literature, agreement in team cognitions is important for team functioning without cause for concern over groupthink.

Higher levels of collective efficacy have been shown to predict higher agreement in both cognitions and mental models (Liu et al., 2015; Medeiros & Edson, 2013). High levels of collective efficacy include each member of the team having a strong belief in their group members' ability to perform their tasks in coordination with the rest of the team (Liu et al., 2015; Myers et al., 2004; Webster et al., 2017). In this case, teams with high levels of collective efficacy may see communication become more succinct, as teammates require less explicit details to understand their next step, while still seeing increases in coordinated behavior and task performance as there is more trust in teammates, and it affords individuals the chance to increase effort and focus on their own tasks (Liu et al., 2015). Higher beliefs in the abilities of one's teammates leads to more confidence both in their abilities to perform their tasks, but also in the information those group members share, demonstrating another mechanism through which collective efficacy increases group performance through team cognitions and mental models (Patras & Klest, 2013).

As shown in this section, the effects of collective efficacy on team dynamics variables is far reaching throughout the many social interactions and task processes of a team (Beauchamp et al., 2017; Ede et al., 2011; Fransen et al., 2017). In the majority of the aforementioned constructs or processes with which collective efficacy is associated, the magnitude of collective efficacy is the main predictor of the dependent variable. It is seen in the discussion of team mental models that the actual construction of collective efficacy within the team may be of note to researchers, as it is already contended that team mental models of too much similarity could lead to groupthink (Cole et al., 2011). While this notion does hold merit, it is still necessary to have some agreement in team mental models for the team to be successful (Lim & Klein, 2006). The construction of collective efficacy is also noteworthy with regard to team cognitions. If an individual on the team does not have confidence in a teammate's ability which influences the former individual's specific task, they will have reduced shared cognitions, as the dissenting individual will not trust the other individual to perform their task (Bandura, 2000; Ladbury & Hinsz, 2018; McLeod & Orta-Ramirez, 2018). Thus coordination, information exchange, and sharing of cognitions will decrease in that specific link of the team (Liu et al., 2015; Loignon et al., 2018), while overall team collective efficacy may remain high. If this is the case, then it stands to reason that dispersion of collective efficacy will alter the collective efficacy-construct relationship for other constructs of processes that collective efficacy predicts or is associated with (DeRue et al., 2010). So while the magnitude of collective efficacy is certainly important, and has been proven to predict numerous within team processes and constructs (Bandura, 2000; DeRue et al., 2010; Ede et al., 2011), magnitude alone does not fully explain collective efficacy interactions as a group level variable (DeRue et al., 2010; Loignon et al., 2018). Before discussing the dispersion of collective efficacy itself, dispersion in general among team dynamics research must be discussed. Furthermore, as mentioned previously, collective efficacy has a significant relationship with cohesion, in that cohesion is a predictor of how collective efficacy emerges in a team (Medeiros & Edson, 2013). As such, cohesion will likely factor into the dispersion of collective efficacy (DeRue et al., 2010).

Cohesion

To reiterate, cohesion is a dynamic process concerning a group's tendency to remain united in pursuit of its task goals and member satisfaction (Carron et al., 1985). This definition provides three important details about the construction of cohesion. First, the central aspect of cohesion is a sense of unity among group members (Benson et al., 2016; Bruner et al., 2013; Carron et al., 1985); this sense of unity concerns the task and social behaviors of a team (Carron et al., 1985), and must exceed what would be considered a general agreement which would exist between individuals who are exposed to the domain encompassing the task in question (Biemann et al., 2014). Concerning the second and third important aspects of cohesion is the presence of social and task cohesion, or subsets of cohesion concerning a sense of unity in pursuing or completing a task, or a sense of unity concerning the member satisfaction and social interactions outside of a strictly task-based activities (Bruner et al., 2013; Carron et al., 1985; Martin, Bruner, Eys, & Spink, 2014).

Construction of cohesion.

Cohesion was established as one of integral aspects of the functioning of a group (Lewin, 1935), concerning the maintenance and development of the group as an entity. Cohesion was considered separate from any changes in the group's social properties. Cohesion was later shown to be dynamic itself (Carron et al., 1985), and was more aptly described with the present definition, remaining united for task goals and member satisfaction (Carron et al., 1985). It should be noted that social cohesion has been demonstrated to be less stable over time (Martin et al., 2014). Cohesion is divided into two subsets, task and social cohesion. Both task and social cohesion are further divided to reflect the group and individual perception of cohesion. These further divisions, group integration and individual attraction, frame cohesion as presenting an attractive force, or being in part a measure of this force (Carron et al., 1985). It should be noted that both group integration and individual attraction exist within both social and task aspects of cohesion (Carron et al., 1985), leading to four underlying aspects of constructs of cohesion. Group integration refers to the feeling of closeness or bonding within the group, which can exist either through social bonding or a sense of closeness or unity in pursuing a goal (Carron et al., 1985). Group integration is distinct from the construct of groupness, though the two are similar. Groupness is the collective agreement among group members that they are indeed a group or team (Martin et al., 2014). Essentially, groupness describes the presence of a group identity. Group integration describes the perception of bonds between members, either socially or bond over a task (Carron et al., 1985; Martin et al., 2014). Individual attraction describes the individual's desire or motivation to remain part of the group, and furthermore illustrates their perceptions of the group (Carron et al., 1985). That is, if the individual perceives the group as a place of social bonding or positive social interactions, there are higher levels of individual attraction social, or an individual can be highly attracted to the goal of a group, which can be present even if individual attraction social is low (Carron et al., 1985). The four constructs of cohesion are all related, but individuals may perceive certain constructs more or less than other constructs (Martin et al., 2014).

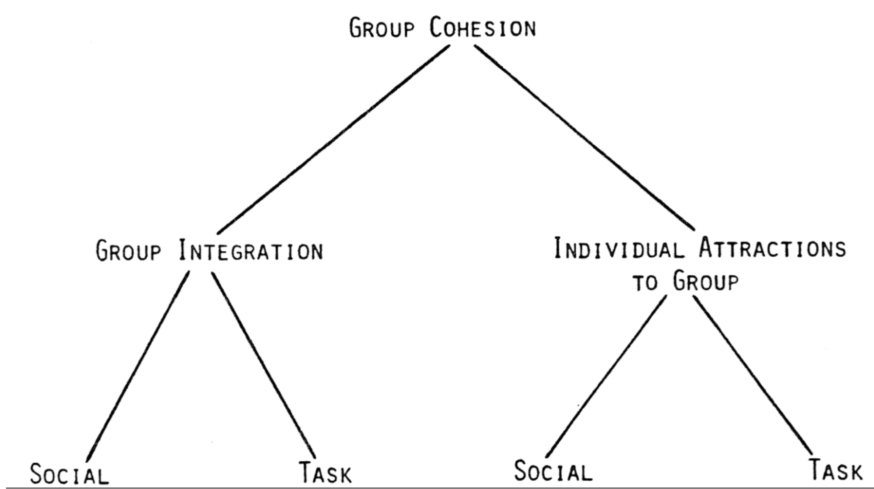

Figure 1: Conceptual depiction of the four aspects of cohesion (Carron et al., 1985).

Each construct of cohesion is important, but recent work has demonstrated that based on age or gender, certain constructs may be more beneficial in relation to group performance. It is contended currently that men are more impacted by task cohesion (Heuze et al., 2006; Martin et al., 2014), and also form cohesion (both social and task) through achieving goals (Martin et al., 2014). Women are more impacted by social cohesion in their performance, and also typically require cohesion to be present prior to a competition or performance to improve chances of success (Martin et al., 2014). Essentially, women tend to require more social bonding to optimize performance, whereas men tend to bond over a shared goal (Martin et al., 2014). Age is also a factor that influences how cohesion is observed, as younger individuals only perceive the presence of social and task cohesion, and do not demonstrate these being broken down further into group integration and individual attractions (Benson et al., 2016; Martin et al., 2014).

Study of cohesion and its antecedents, as well as its effects on group functioning and effectiveness is well established in the team dynamics literature (Bruner et al., 2013). Given that cohesion was initially believed to be half of all group dynamics processes, this does make sense.

While cohesion is not quite that substantial in terms of being half of all constructs in the group dynamics field, it is still highly important to understanding group functioning, and has many important relations both to group performance and various other constructs which improve group functioning (Benson et al., 2016; Martin et al., 2014). Cohesion is the most prominent topic in the team dynamics literature (Bruner et al., 2013). A citation pathway on team building literature conducted by Bruner and colleagues (2013) found cohesion to be the main focus of nearly all of the articles included in their timeline of research, which shaped the team dynamics and team building fields. The importance of cohesion on group performance is also well documented (Bruner et al., 2013; Heuze et al., 2006; Leo et al., 2016; Medeiros & Edson, 2013). Given that improving performance is typically the ultimate goal of team dynamics work, the cohesion performance relationship will be discussed prior to discussion of interactions within other team dynamics constructs and cohesion.

Cohesion and performance.

Cohesion is necessary for the performance of a team (Bruner et al., 2013; Carron et al., 1985). Recent work has demonstrated the mechanism through which cohesion acts on performance; to wit, cohesion does not directly influence performance, rather collective efficacy mediates the cohesion performance relationship (Heuze et al., 2006; Leo et al., 2016; Medeiros & Edson, 2013). The relationship between collective efficacy and cohesion is reciprocal (Bandura, 2000; Heuze et al., 2006), indicating that higher levels of cohesion will lead to higher collective efficacy, and higher collective efficacy will lead to higher levels of cohesion, and vice-versa (Bandura, 2000; Heuze et al., 2006; Medeiros & Edson, 2013). However, work by Heuze and colleagues (2006) stated that this relationship was predicated on the levels of task cohesion, and high collective efficacy would only predict higher levels of task cohesion. Given the construction of collective efficacy as a task-based, process focused confidence (Bandura, 1997; 2000) this is logical. Despite not directly acting on group performance, cohesion has still been shown to be integral in increasing performance, as well as social functioning of the team (Bruner et al., 2013; Kim et al., 2016; Martin et al., 2014). Both the social climate and functioning of a team are important predictors of success both in the short and long term (Beauchamp et al., 2017; McEwan & Beauchamp, 2014). Collective efficacy is also proven to be a significant predictor of short term and maintained success (Bandura, 2000; Beauchamp et al., 2017; Ede et al., 2011), indicating cohesion serves a very important role in the maintenance of the team because of the role cohesion plays in predicting higher efficacy (Carron et al., 1985; Heuze et al., 2006). High cohesion is related to higher perceived performance potential (Medeiros & Edson, 2013), which is a further predictor of team success. Additionally, cohesion is correlated with belief in a teammate's abilities (Medeiros & Edson, 2013), which is an integral part of collective efficacy (Bandura, 2000). This relationship indicates a close, and therefore highly influential relationship between the two, and serving to reinforce the effect of cohesion on performance through collective efficacy. While the relationship with collective efficacy, and the link to performance in this relationship is clear, cohesion very strongly influences performance with a less direct pathway by maintaining the social climate of a team (Carron et al., 1985; Kim et al., 2016; Martin et al., 2014). The interactions of cohesion and other constructs within team dynamics cannot be understated in their importance.

Cohesion within team dynamics.

Cohesion, being a sense of unity, is a key indicator of the social closeness within a team (Martin et al., 2014). This is particularly the case in a team that is not consistently winning, cohesion is required to maintain the team as a unit and resolve conflict (De Backer et al., 2014;

Martin et al., 2014). While its underlying constructs have varying relations to other psychological variables, cohesion overall is associated with goal setting, team mental models and cognitions, teamwork, communication, and conflict resolution (Bruner et al., 2013; Kim et al., 2016; Martin et al., 2014; McEwan & Beauchamp, 2014; Medeiros & Edson, 2013). There is also, predictably, a strong link between cohesion and groupness, or the perception of increased team member coordination and teamwork (Martin et al., 2014). Given that cohesion is itself a perception of unity and synchronicity, it is very close to the construct of groupness (Martin et al., 2014), however the two are distinct, and both play a role in a positive and satisfactory climate for the team. Another similar yet distinct concept related to cohesion is that of team identity, sometimes referred to as buy-in to the team (De Backer et al., 2014).

Increased team identity further reinforces communication, trust and conflict resolution within a team (De Backer et al., 2014; Martin et al., 2014; Webster et al., 2017), but also improves resiliency (De Backer et al., 2014), and fosters a mastery or achievement focused climate (Benson et al., 2016; De Backer et al., 2014; Kim et al., 2016). Mastery focused environments are extremely beneficial to the group, both in terms of resilience and performance (De Backer et al., 2014). A focus on achieving goals and improving both as individuals and as a collective significantly reduces fear of failure (consequently reducing both actual incidences of failure and the psychological detriments of failing), but also greatly improves athlete satisfaction and their ability to improve (Bandura, 2000; McEwan & Beauchamp, 2014). Regarding the perception of being a part of a group, cohesion is linked with trust within these groups, an integral aspect of strong interdependent performances (Webster et al., 2017). A team that does not trust between members, be it trust in each other as individuals, or trust in each other's abilities to perform the task, is detrimental to performance, as a lack of trust will lead to either trying to overcompensate for a teammate's performance, or a conflict (arising from a social cause or a task cause), or both. Cohesion, or a sense of unity and mutual satisfaction socially and/or with the task, improves trust in one another both in task and social domains (Martin et al., 2014; Webster et al., 2017). Trust was cited as one of the most important aspect of team sports by rugby players in work by Webster and colleagues (2017), so the positive influence of cohesion on trust is significant in relation to both functioning socially and on the playing field. It is highly evident that cohesion plays a vital role in the maintenance of social functioning in a group, hence its original definition (Carron et al., 1985; Webster et al., 2017). The multitude of team dynamics variables which cohesion is positively related to explains its prevalence in the literature. However, both in terms of performance research and for the present study, the direct link to performance from cohesion through collective efficacy is the one of primary interest.

Collective Efficacy and Cohesion

Cohesion is seen to predict collective efficacy (Heuze et al., 2006; Leo et al., 2016; Medeiros & Edson, 2013), especially task cohesion. Cohesion is the sense of unity required to have a shared belief in the team's collective ability. A team cannot demonstrate a collectively agreed upon belief of their abilities without exhibiting a high perception of togetherness in how the task is approached. This relationship is also reciprocal, with high collective efficacy predicting high levels of task cohesion (Heuze et al., 2006). An aggregated perception of being proficient at a given task bonds individuals over that task, even when social bonds between individuals within the group are lacking (Heuze et al., 2006). Two individuals who may have had zero social commonalities now have a specific context or thing to bond over, being their shared perception (perhaps accompanied by actual success) of ability to perform a certain task.

The relationship between collective efficacy and cohesion is best explained by referencing Bandura's (2012) paths of influence of self-efficacy diagram (Figure 2). This diagram can be adapted from self to collective efficacy very easily, as they have similar interactions and outputs, just on differing levels (Bandura, 1997; 2000; 2012). The diagram illustrates self-efficacy as directly influencing goal setting behaviors, sociocultural factors and outcome expectations. These three factors all converge into behaviors, and furthermore, self-efficacy has a fourth output arrow which skips over the three aforementioned constructs, and directly influences behavior (Bandura, 2012). As described by Bandura (2000), collective efficacy acts very similar to self-efficacy, but on a group level, thus containing a degree of within group variance or dispersion. As well collective efficacy is described as being slightly more complex in its construction, being either an agreed upon, aggregated measure of efficacy amongst the group, or a collection of individual perceptions of the group's abilities (Bandura, 2000; Fransen et al., 2017). Adding cohesion to this visual depiction of collective efficacy is relatively simple; cohesion is simply inserted before collective efficacy, as cohesion is a predictor of collective efficacy and influences performance through collective efficacy (Medeiros & Edson, 2013). A reciprocal arrow would be added to collective efficacy back to cohesion, indicating that collective efficacy can also predict cohesion (Heuze et al., 2006; Medeiros & Edson, 2013).

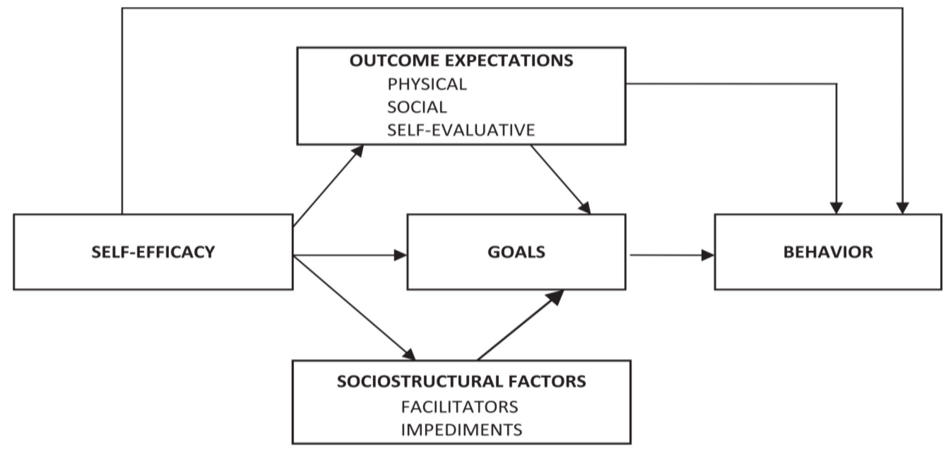

Figure 2: Diagram of self-efficacy influence on behavior and behavioral determinants (Bandura, 2012).

From this evidence it is evident that collective efficacy and cohesion have a strong relationship (Heuze et al., 2006; Medeiros & Edson, 2013), and cohesion is a predictor of collective efficacy, and by extension, cohesion likely influences how collective efficacy influences other constructs. Cohesion is likely to indicate higher levels of agreement within collective efficacy, and as such a closer to magnitude observation of collective efficacy, or closer to how collective efficacy is portrayed in the literature (DeRue et al., 2010), given that collective efficacy is nearly always described as simply a value of magnitude. From this it is seen that not only does cohesion play a vital role in team dynamics but is also highly influential on the team's collective efficacy, and likely is influential beyond the magnitude of collective efficacy (DeRue et al., 2010).

Dispersion in Team Dynamics Variables

Within-group disagreement, depending on the construct in question, may be positive or negative. Despite contentions that too much within-group agreement may lead to groupthink

(Cole et al., 2011), it is generally agreed upon that higher levels of within-group dispersion are detrimental to team processes (Biemann et al., 2014; Lim & Klein, 2006; McLeod & Orta-Ramirez, 2018). All group-level variables will have some form of within group variance or dispersion (DeRue et al., 2010). This is often treated as a statistical by-product and not given much consideration (DeRue et al., 2010), especially in collective efficacy research. However, this within-group variance likely holds a significant amount of explanatory power in interpreting results including the variable(s) in question (Biemann et al., 2014; DeRue et al., 2010; Lim & Klein, 2006).

Research from Biemann and colleagues (2014) provided a baseline for how within group-dispersion or variance (which will be used interchangeably in this paper, though dispersion will be preferred given its use outside of statistics) may be detrimental to team functioning. As described by Biemann and colleagues (2014), there will exist both common disagreement as well as disagreement caused by an actual schism within the group. This idea of common disagreement provides a baseline for what amount of dispersion may actually be detrimental. Assessing the actual within team agreement or disagreement on a certain topic, or in a certain team dynamics variable should consist of removing what could be described as common knowledge within the community or domain of the team (Biemann et al., 2014). This study was conducted on team mental models, a construct concerning shared knowledge, and demonstrated that in each group there will exist a certain amount of common knowledge in any team mental model. This common knowledge is anything that someone in that context would likely know, or something that would be included in the large majority of team mental models across teams (Biemann et al., 2014). For example, the common knowledge in ice hockey could include all players forming a box formation to defend their zone when killing a penalty. Once this common agreement is controlled for, there remains the agreement on the specific mental model specific to that team, where the variance within that model can be properly interpreted. Team mental models have received some attention regarding the within group dispersion of mental models in the literature (Lim & Klein, 2006). Given the construction of team mental models they are an ideal construct to begin examining dispersion. The concept of across team agreement regarding efficacy may be of interest in future collective efficacy studies, but in the context of the current study the work by Biemann and colleagues (2014) is noteworthy given its advancement of dispersion in team dynamics, and acceptance of dispersion as more than a statistical by-product.

As mentioned previously, work by Lim and Klein (2006) demonstrated dispersion within team mental models to be detrimental to team performance, especially in high-pressure situations. While sport competitions may not be quite as high-pressure environments as the combat teams assessed by Lim and Klein, there is still a huge magnitude of pressure to perform, nonetheless. Given the association between team mental models and collective efficacy, there is a plausible chance that dispersion of collective efficacy will have similar detriments to team performance. The two constructs are distinct in their makeup, but still have a significant relationship (Medeiros & Edson, 2013). Lim and Klein (2006) showed similarity of team mental models to be beneficial to performance, which was opposed by later work done by Cole and colleagues (2011). Despite the contention form Cole and colleagues (2011), it is accepted that some degree of similarity is necessary for proper functioning so teams are not subject to constant within group conflict over which course of action will be most effective (Lim & Klein, 2006). This work has been expanded a little, with some studies investigating the effects of within group dispersion on team performance or within group social interactions (Loignon et al., 2018; McLeod & Orta-Ramirez, 2018). While the area of dispersion research in collective efficacy is lacking, it has begun to be explored, and has been referenced as meriting further study by several studies (Beauchamp et al., 2017; DeRue et al., 2010; Ede et al., 2011; Fransen et al., 2017).

Dispersion of Collective Efficacy

Research on within-group dispersion of most team dynamics variables is lacking. Collective efficacy is included in this group, with very little work existing on this topic to date. Given the significance of collective efficacy in the field of team dynamics, this is a limitation in the existing body of literature. Collective efficacy dispersion to date has received very little research, aside from a theoretical paper by DeRue and colleagues (2010), a pair of studies by Chow and colleagues (2009), as well as Dithurbide and colleagues (2011), and a small sample of recent studies (Loignon et al., 2018; McLeod & Orta-Ramirez, 2018). Despite this, multiple studies have indicated that collective efficacy dispersion is indeed an important aspect of the construct requiring further study (Beauchamp et al., 2017; Ede et al., 2011; Fransen et al., 2017). There have been some difficulties with attempting collective efficacy dispersion research. Namely, measurement of collective efficacy dispersion is not as clear as it might seem (Chow et al., 2009). As discussed earlier in this chapter, collective efficacy can be constructed properly in two different ways, though assessing collective efficacy through a shared group discussion has several issues with validity (Bandura, 1997; 2000; Myers et al., 2004). So, to measure dispersion, collective efficacy would need to be assessed using the aggregated collective efficacy method (Myers et al., 2004). While this does provide an easily workable raw data set, work by Chow and colleagues (2009) demonstrated that a single statistical measure yielded an incomplete understanding of collective efficacy dispersion. Standard deviation, skewness, kurtosis, and Rwg index independently did not give enough information to understand collective efficacy dispersion (Chow et al., 2009), and while certain statistical measures could sometimes indicate the presence of a certain pattern, determining the pattern of dispersion using statistical measures was not always accurate. For example, use of Rwg was unable to differentiate between shared and minority dissent patterns (Chow et al., 2009). While these two dispersion patterns are quite close together in terms of level of discord, the distinction is potentially an important one in terms of the social climate of the team (DeRue et al., 2010). Furthermore, use of kurtosis, stated by DeRue and colleagues (2010) as a way to determine bimodal or fragmented groups, proved unable to capture the magnitude of dispersion (Chow et al., 2009). Indeed, the most accurate way to determine the pattern of dispersion was by using bar charts (Chow et al., 2009). Visual displays of collective efficacy dispersion were deemed most effective as the shape of the collective efficacy dispersion is likely just as important, if not more, than the actual within group variance (DeRue et al., 2010).

In addition to the measurement of collective efficacy dispersion and the determination of specific dispersion patterns being challenging, results thus far on dispersion or dispersion patterns of collective efficacy have been inconclusive. The notion of dispersion patterns posited by DeRue and colleagues (2010) was presented as integral for understanding the construct of collective efficacy, and increasing what can be extrapolated from collective efficacy measurements. However, this was not demonstrated in work by Dithurbide and colleagues (2011), who found no relationship between dispersion of collective efficacy and tug of war performance in teams who were formed for the basis of the study. Dithurbide and colleagues (2011) reference sample size and lack of familiarity as limitations in their study, and state that dispersion should be investigated further. Recent work by McLeod and Orta-Ramirez (2018) did find that higher levels of collective efficacy variance within academic teams to be detrimental to group performance, measured through grades of a semester long project. Recent reviews of collective efficacy also encourage future research to investigate the interactions of collective efficacy dispersion or dispersion patterns (Beauchamp et al., 2017; Fransen et al., 2017).

There is lacking foundational work concerning collective efficacy dispersion, especially in specific patterns. Much of the work the present study is based on did not comprise an experimental component, such as work by DeRue and colleagues (2010), and work by Chow and colleagues (2009). Both of these studies focused on conceptualizing how collective efficacy dispersion could be characterized and quantified (Chow et al., 2009), and in the case of DeRue and colleagues (2010), the potential effects of these likely dispersion patterns were hypothesized. DeRue and colleague (2010) discussed the issues with mathematically depicting the aforementioned dispersion patterns. Chow and colleagues (2009) also presented work on the difficulty using statistics to capture collective efficacy dispersion using mock data for example teams. Specifically, Chow and colleagues (2009) demonstrated that traditional measures of spread were insufficient at displaying how efficacy beliefs were dispersed within a group. Measures such as standard deviation and Rwg were unable to capture differences in the shape of a group's collective efficacy dispersion (Chow et al., 2009). Kurtosis, a measure of the shape of a distribution, was theorized to indicate specific collective efficacy dispersion patterns with specific kurtosis scores. For example, a kurtosis of -2 would indicate a bimodal distribution (DeRue et al., 2010); this was found to not be consistently true, and kurtosis could not reliably indicate the shape of a dispersion pattern (Chow et al., 2009).

Recently, McLeod and Orta-Ramirez (2018) and Loignon and colleagues (2018), using data available from university student groups both assessed within group variance of efficacy beliefs and the associated impact on grades. Both research teams used similar methods, of using data collected across American university students in groupwork based classes to determine levels of within group variance in multiple emergent states (including collective efficacy, cohesion, and task conflict), and the correlation with final grades in those classes/on the group's projects. Both studies found increased levels of dispersion across emergent states, especially those concerning the unity or the task of the group (such as task conflict, cohesion and CE) to be particularly detrimental to group performance when dispersion was high. While prior work done by Dithurbide and colleagues (2011) indicated difficulty in discerning the impacts of collective efficacy dispersion in teams formed specifically for a task, the aforementioned studies done by McLeod and Orta-Ramirez (2018), and Loignon and colleagues (2018) both accounted for a limitation pointed out by Dithurbide and colleagues (2011), being the need for a longer period of behavior to be measured to have a more accurate interpretation of collective efficacy dispersion patterns. While both recent studies concerning collective efficacy dispersion patterns took place in an academic setting, there is precedent for emergent state research, such as collective efficacy, being applicable across domains (McEwan & Beauchamp, 2014). As such, the present study attempted to apply an observational lens, in a sport context, to the dispersion patterns theorized to occur by DeRue and colleagues (2010).

The theory of the present study is predicated upon DeRue and colleagues' (2010) discussion of the four patterns of collective efficacy dispersions. The four patterns of dispersion were presented as: shared beliefs, minority dissent, bimodal, and fragmented. This typology of collective efficacy dispersion is based on the aggregated collective efficacy model (Bandura, 1997; Myers et al., 2004). With each member of the team indicating their belief in the group's ability. Furthermore, Bandura (1997) stated that collective efficacy beliefs are rarely unanimous, despite collective efficacy being nearly always classified as a unanimous construct containing only magnitude (DeRue et al., 2010).

A shared beliefs pattern of collective efficacy is the closest a group would get to a unanimous grouping of efficacy beliefs (DeRue et al., 2010). Shared beliefs consist of a group with efficacy beliefs that are equal among each member of the group, or are very closely packed in their magnitude. This pattern of collective efficacy has very low measures of spread, and is the closest to a simple expression of magnitude, which collective efficacy is commonly expressed as in the literature. Minority dissent is the next progression in terms of spreading collective efficacy beliefs out. Minority dissent is represented by a single individual (or a very small proportion of the group) being significantly higher or lower than the majority of the group. This dissenter will have significantly different effects based on if the dissenter has higher or lower collective efficacy than the majority of the group (DeRue et al., 2010). Bimodal distributions consist of two evenly sized groups with significantly different collective efficacy scores within the team. Fragmented teams consist of no significant agreements within the collective efficacy of the team (DeRue et al., 2010). Fragmented teams involve each member of the team (or a collection of very proportionately small groups) each having significantly different collective efficacy levels. In addition to these four patterns, there is an associated magnitude of spread; that is, a bimodally distributed team may be moderately bimodal, where the two groups are just significantly different, or extremely bimodal, where there is a very large difference between the collective efficacy of the two groups (Chow et al., 2009).

Each of the four aforementioned patterns are theorized to have differing implications for the social functioning and task performance of the team (DeRue et al., 2010), hence the need for determining which pattern is present, rather than just how much variance is present within the team’s collective efficacy. It was posited by DeRue and colleagues (2010) that bimodal or fragmented patterns of dispersion would actually be the most beneficial for the functioning of the team, whereas minority dissent would likely be the most detrimental. Shared belief exhibiting teams present an almost unanimous collective efficacy score, therefor have very similar perceptions of the group's abilities. According the collective efficacy and some dispersion literature this would have benefits but could also lead to a lack of innovation in problem solving (Cole et al., 2011; DeRue et al., 2010). Furthermore, if collective efficacy is low in a shared beliefs team, then the team will experience performance decrements because there are consensus low beliefs in the group's abilities (DeRue et al., 2010). Minority dissent is likely detrimental to team performance if the dissenter has lower efficacy than the rest of the team. In this case the dissenting individual will be seen as not belonging to the team (DeRue et al., 2010), and is likely to either conform (willingly or by simply not voicing their beliefs) or remove themselves from the team. Neither is particularly beneficial to the social climate of the team. However, a dissenting individual may have much higher efficacy than the rest of the group, in which case they may also be forced to conform, or if the individual has a position of power on the team, may be able to raise the low collective efficacy of the group (DeRue et al., 2010). Bimodal distributions are hypothesized as being beneficial (DeRue et al., 2010), given that a sizable group around individuals in a disagreement provides social insulation (DeRue et al., 2010; Martin, Evans, & Spink, 2016). Discussion regarding the ability of the team to perform a task, and the problem of the task itself can be held with no individual being singled out, attacked or disregarded because there are evenly sized groups which disagree on the team's efficacy. Fragmented patterns of dispersion are theorized to behave in a similar manner, that is the lack of groups in general means individuals will still have the same number of teammates (zero) on their side as all the other group members do (DeRue et al., 2010). The complete lack of agreement means no single individual is considered an outsider, thus the same discussions regarding the task that could occur with a bimodal distribution can occur in a fragmented team, just with significantly more differing efficacy beliefs (DeRue et al., 2010). The caveat with fragmented teams is there must be high cohesion for fragmented collective efficacy to be a positive. A team with social unity and disagreements regarding their collective efficacy can have constructive dialogue about the task and how to perform said task (DeRue et al., 2010). However, a team with no social bonds, which also disagrees regarding efficacy is a negative conflict waiting to happen, the lack of social bonds indicates dialogue is far less likely to be constructive, and this team will have significantly reduced performance because of severely lessened collective efficacy (DeRue et al., 2010).

Finally, collective efficacy is a dynamic construct (Bandura, 1997; 2000). Due to this, it is likely that collective efficacy dispersion is also dynamic, following changes in efficacy due to increased familiarity with the task or the team (Fransen et al., 2017). Additionally, it is hypothesized that cohesion will play a role in the changing of collective efficacy dispersion patterns (DeRue et al., 2010). Cohesion is shown to predict collective efficacy (Medeiros & Edson, 2013), and given that cohesion involves unity about a task (Carron et al., 1985) it is likely that high levels of cohesion predict converging collective efficacy beliefs, or patterns approaching shared beliefs, the most unified dispersion pattern. Additionally, it is expected that teams with low levels of cohesion will experience divergence of collective efficacy beliefs (DeRue et al., 2010). Given that familiarity with the task and team is guaranteed to increase over the course of time, it is likely that cohesion will increase as well, barring a significant and unresolved conflict (Benson et al., 2016), and due to this, it is expected collective efficacy dispersion patterns are more likely to converge. Again, this is barring some form of significant negative conflict (DeRue et al., 2010; Fransen et al., 2016).

Gaps in the Literature

Two major gaps exist in the collective efficacy literature. The variance or dispersion of collective efficacy within a group is relatively unexplored, as many studies focus simply on the relationship of the magnitude of collective efficacy beliefs and performance in a variety of domains (Beauchamp et al., 2017; Ede et al., 2011; Fransen et al., 2017). Less research has examined collective efficacy dispersion patterns in a non-theoretical setting. Those studies that have examined collective efficacy dispersion or dispersion patterns have yielded mixed results (Dithurbide et al., 2011; McLeod & Orta-Ramirez, 2018), but there exists precedent for increased dispersion within group level constructs being detrimental for team functioning and performance (Ladbury & Hinsz, 2018; Lim & Klein, 2006; Loignon et al., 2018). Furthermore, despite collective efficacy being a dynamic construct, similar to many other constructs within the team dynamics field, much of the research is cross-sectional in nature (Beauchamp et al., 2017; McEwan et al., 2018). This study aimed fill two gaps in the literature, by adding a longitudinal study to research a dynamic construct, and how said construct changes over time. This study also intended to increase understanding of the manifestation and progression of collective efficacy dispersion patterns, allowing for future research to take a more informed and in-depth look at how collective efficacy dispersion patterns may influence performance.

Chapter 3 – Methods

Participants

The inclusion criteria for this study were: age, athletic status, and participation rate of the team, as well as team size. Participants were required to be over 18 years of age for ethical and logistical reasons. Participants also needed to be part of a competitive sport team. For the purpose of the present study, competitive teams were any team that indicated winning matches as a goal, and whose athletes identified as competitive athletes. Teams included varied in level of competitiveness, but prior research has demonstrated that cohesion and collective efficacy act similarly regardless of competition level (Benson, Eys, & Irving, 2016; Benson et al., 2016). The competition inclusion criteria indicated that teams must identify winning as a primary goal. Teams needed to provide a substantial (at least 50%) response rate to the questionnaires provided in this study in order to be eligible for data analysis at each time point. Teams also needed to include at least four members in order to fit into any particular dispersion pattern (DeRue et al., 2010).

Teams that did not have at least half of the team members consent to participate and provide data at any time point were excluded from the study, as the missing half of data likely held substantial explanatory value for that team's social climate. An athlete could have at any time anonymously chosen to withdraw from the study, and their identity was not disclosed to the team. This study aimed for a sample size of at least 20 teams, based on prior research involving similar constructs (McLeod & Orta-Ramirez, 2018; Medeiros & Edson, 2013), as well as a power analysis. The power analysis was done using GPower to calculate sample size with power set to 0.80, alpha set to 0.05, and expected effect size of 0.5. The effect size is large but given the lack of observational or experimental research in this domain, the large effect size was selected to indicate meaningful associations in order to guide future work. Recruitment for this study was done through current connections and convenience sampling, advertisements at common Halifax Regional Municipality sport arenas and training facilities (such as the Canada Games Centre), and snowball sampling.

Recruitment efforts were met with a poor response rate. Specifically, nearly 500 team and league organizations were contacted (recruitment information was sent to individual teams, and when those did not have publicly available contact info, the organization or league was contacted, so the total number of teams that received notice of the study likely exceeded 500). Of the approximate 500 teams and leagues contacted, only 15 replied, and of those 15, only three provided data. With this response rate, an amendment was made to the data collection methods in an effort to increase the sample size of data points relevant to the analysis of Hypothesis 1. Shortly after this amendment was approved by the Dalhousie University Research Ethics Board, a state of emergency was declared in Nova Scotia, where this research was taking place, due to the COVID-19 pandemic. The quarantine measures put in place effectively ended any further opportunities for data collection. Three teams participated in the present study, one of which completed the longitudinal aspect of the study, providing three time points. As such, there were five data points available for use when examining the relevant measures for Hypothesis 1, and one team available for analysis of Hypothesis 2.

Measures

Demographics. Non-identifying demographic information was collected at baseline from each team member in participating teams to provide group level descriptors. Included was age, sex, experience with the sport, amount of time with the team, familiarity with teammates (using a 10-point Likert scale), and average number of weekly meetings with the team.

Collective efficacy. Collective efficacy was measured three times throughout the season for Team 1, while Teams 2 and 3 were measured once, using the Collective Efficacy Questionnaire for Sport (CEQS; Appendix A). The CEQS is a validated instrument in the field of team dynamics, shown to have good psychometric properties (Short et al., 2005). The CEQS has been used often in studies assessing collective efficacy since its development (Medeiros & Edson, 2013), and has been shown to capture the beliefs of athletes in their team's abilities (Medeiros & Edson, 2013; Short et al., 2005). The CEQS uses a Likert-scale ranging from 1 (not at all confident) to 10 (extremely confident). The CEQS is comprised of five factors with 20 total items. The five factors are: ability, effort, preparation, persistence and unity (Short et al., 2005), all of which play a role in predicting team performance and also the perception of how the team will perform (Short et al., 2005). Each of the five factors have been shown to be correlated with collective efficacy as a whole and also with team performance (Medeiros & Edson, 2013; Short et al., 2005). Sample questions from the CEQS include: "Rate your team's confidence, in terms of the upcoming game or competition, that your team has the ability to outplay the opposing team" (ability); "Rate your team's confidence, in terms of the upcoming game or competition, that your team has the ability to mentally prepare for this competition" (preparation); "Rate your team's confidence… to demonstrate a strong work ethic" (effort); "Rate your team's confidence… to perform under pressure" (persistence); and "Rate your team's confidence… to resolve conflicts" (unity).

In order to properly measure collective efficacy, the CEQS is intended to be administered immediately prior to a competition, when an athlete is preparing mentally to compete and has as much information as they will have to construct a belief in how their team will perform (Short et al., 2005). The CEQS was designed and validated as a measure specific to sport teams but is usable across sports as a measure of collective efficacy, thus making it effective across athlete populations (Short et al., 2005). Furthermore, the CEQS incorporates belief in other team processes related to performance aside from just ability, including preparation (Short et al., 2005). The CEQS significantly correlated with a different, single sport (baseball) collective efficacy questionnaire when given to the same team ($r=0.85$ individual level, $r=0.98$ team level; Short et al., 2005). Higher scores on the CEQS were also correlated with higher performance (Short et al., 2005). All CEQS subscales were shown to have significant correlations between them, as well as with the CEQS as a whole, with correlations ranging from 0.62-0.94, and all correlations significant at $p<0.05$ (Short et al., 2005). The CEQS also is reliable, with Cronbach's alpha ranging from 0.81-0.96 between all subscales and the entire CEQS (Short et al., 2005). The CEQS is intended as a state measure, given its instruction to be done immediately prior to a competition, and all items should be answered in reference only to the upcoming competition (Short et al., 2005). This fits with the conceptualization of collective efficacy, given its dynamism and potential to change relevant to the parameters of an upcoming competition (Bandura, 1997; Short et al., 2005). Collective efficacy is process focused and task specific (Bandura, 1997; 2000), so it is unlikely to be static across competitions against differing opponents. Furthermore, the CEQS weights factors of efficacy such as preparation equally to ability (Short et al., 2005), something which could only be accomplished in a state measure, as preparation is also likely to be different across competitions. Regardless of this, the CEQS has been shown to predict team performance repeatedly for teams (Short et al., 2005). To assess dispersion patterns using the CEQS, dispersion patterns were constructed for each team based on each team member's collective efficacy score and presented using bar charts, ordered from least to greatest collective efficacy score for each team member.

Cohesion. Cohesion was also measured three times throughout the year for Team 1, while Teams 2 and 3 were measured once, using the Group Environment Questionnaire (GEQ; Appendix B). This instrument is well known and well used in the field of team dynamics and has been shown to have very high reliability and validity (Bruner et al., 2013; Carron et al., 1985). The GEQ also uses Likert-scales, ranging from 1 (strongly disagree) to 9 (strongly agree) with 18 items (Carron et al., 1985). These items capture the four dimensions of cohesion, being group integration – task, group integration – social, individual attraction to group – task, and individual attraction to group – social (Carron et al., 1985). Example questions include "I'm unhappy with the amount of playing time I get" (individual attraction to group – task); "Our team is united in trying to reach its performance goals" (group integration – task); "I do not enjoy being part of the social activities of this team" (individual attraction to group – social); and "our team would like to spend time together in the offseason" (group integration – social).

The GEQ has been extensively used in group dynamics research (Bruner et al., 2013; Short et al., 2005). It should be noted that the GEQ is a general measure of cohesion and is not state specific like the CEQS (Carron et al., 1985). Despite this, for the convenience of the participants and the reliability of the data, the two questionnaires were administered together. Like the CEQS, the GEQ is valid across sports (Carron et al., 1985). The GEQ has been shown to maintain strong content validity and reliability over time (Short et al., 2005). The GEQ demonstrates internal consistency with Cronbach's alphas between scales and the GEQ as a whole ranging from 0.64-0.76, and interscale correlations ranging from 0.30-0.40. Subsequent studies have confirmed the content validity and reliability of the GEQ (Carron & Hausenblas, 1998; Medeiros & Edson, 2013; Short et al., 2005).

Procedures

Participants were recruited using publicly available contact information (e.g., club email addresses available online), advertisements placed around common high-level sporting arenas and practice facilities (such as the Canada Games Centre), and snowball sampling. Email was primarily used, and administrators and organizers of local competitive sport leagues were approached to present the study to their affiliated teams. Following a team expressing interest, the PI set up a date to meet with the team to present the informed consent documents and provide more detail on the study (pre-COVID-19, after the social distancing measures began informed consent was done via email for Team 3). Informed consent forms were only given to teams once their roster has been finalized. Teams of any sport were recruited to increase generalizability across sports and to increase likelihood of achieving a sufficient number of participants.

Additionally, to be included the team needed to be considered interdependent or segregated, according to the team sport typology created by Evans and colleagues (2012). Concisely put, a team that is either interdependent or segregated relies on a series of actions carried out in pursuit of the task, and the actions of one athlete will directly influence the actions of their teammates (Evans et al., 2012). Given that team dynamics are relatively consistent across sports (Beauchamp et al., 2017; Myers et al., 2004; Short et al., 2005), this served both to increase sample size and maximize the implications of the findings of the study. Following consent of the athletes the baseline measures were administered, where the demographic questionnaire, GEQ, and CEQS were administered. This baseline assessment took place early in the team's season, after roster finalization and in the first month of meaningful competitions for Teams 1 and 2 (Team 3 was recruited towards the end of their season).

The originally planned procedure included three data collection points. The informed consent process and first meeting would be done in person using paper copies, and the latter two data collection points were done using Opinio online survey software. At time point one, the demographic questionnaire, CEQS and GEQ were all administered on paper, and at time points two and three the CEQS and GEQ were administered via an online survey link. The online survey was accessible using mobile phones and was deemed to be more convenient for most of the athletes compared to a paper copy. Should athletes have required a paper copy, the team contact was given the option to inform the researchers of this to obtain the required amount of paper questionnaires. The study procedure intended for questionnaires to be given roughly a month after the first data collection point for timepoint two, and within one month of the team's final competition for timepoint three. Within one month of the end of the season was originally selected as the final time point, as teams in a playoff race or facing a string of highly important competitions at the end of the season were thought to be more likely to provide answers to the questionnaires if given flexibility in when the questionnaires could be filled out, rather than strictly set at the final competition. Three time points were originally selected so as not to induce questionnaire fatigue from the participants, while still providing adequate data to map the change in efficacy dispersion patterns.

The three data point procedure was amended in early March 2020 to just one data collection point. Teams 1 and 2 were recruited under the original procedure, while Team 3 was recruited using the amended procedure. The amendment passed as social distancing practices began, so recruitment and informed consent for Team 3 were done via email. Team 3 also provided demographic data over email and used the Opinio software to at their one time point to provide CEQS and GEQ data. Also, the original procedure required teams to be recruited at the beginning of their season, which was the case for Teams 1 and 2. The timing of the recruitment was not specified in the amendment as only a single data point was being collected, and Team 3 was recruited towards the end of their season.

Statistical Analysis

Data were collected from participants' surveys from each time point. Most items in the GEQ are required to be reverse scored (Carron et al., 1985). Items that did not need to be reverse scored are: 5, 9, 10, 12, 15, and 16. The total scores for each team member for the two measures were calculated by summing the items in the respective questionnaires. This process was also done to find each team member's scores for the subscales of the two questionnaires. The items that are included in the subscales of either questionnaire can be seen in Appendix A (CEQS) and Appendix B (GEQ). Once each member of the team had a corresponding total collective efficacy score and cohesion score, collective efficacy dispersion patterns were constructed using their total collective efficacy scores. The rules used in this study to define dispersion patterns are explained below.

The bar charts that depict collective efficacy dispersion patterns at each time point were constructed to mimic the patterns described by DeRue and colleagues (2010) as closely as possible. For each athlete that provided data at a given time point, total collective efficacy was determined and then the athletes' collective efficacy scores were sorted smallest to greatest. These scores were displayed as bars, with each participant getting their own individual bar, and the graph depicting the athletes' increasing collective efficacy scores left to right. Graphs were categorized as one of the aforementioned four dispersion patterns described by DeRue and colleagues (2010) based on their shape. Examples of these shapes can be seen in Figure 3.

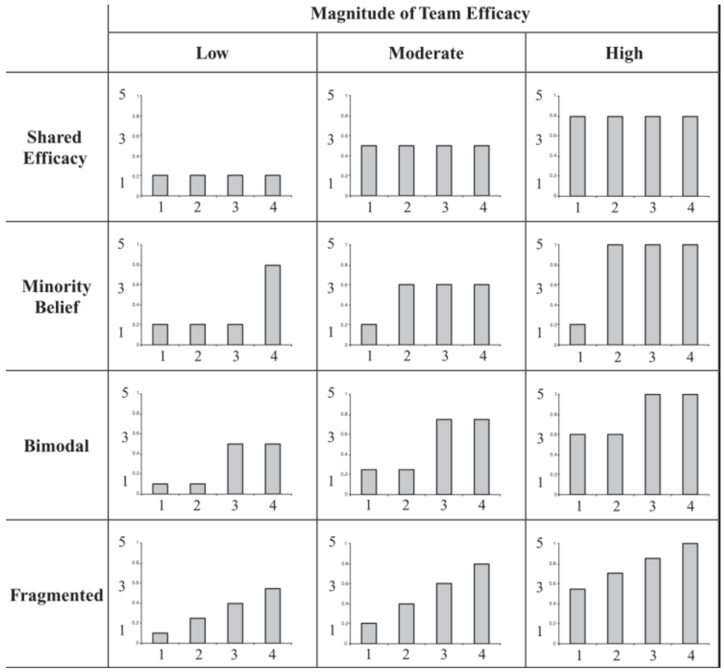

Figure 3: Example graphs for each collective efficacy dispersion pattern, of varying magnitudes (DeRue et al., 2010).

It should be noted that the graphs presented by DeRue and colleagues (2010) in Figure 3 are of theoretical teams, and therefore cleanly fit one of the dispersion categories, but this was not the case in actual teams. In the examples above, a four-point scale was used to depict a team members' hypothetical collective efficacy beliefs. While there is some merit in terms of validity with using fewer items to capture efficacy beliefs (Bandura, 2006, Bruton et al., 2016), the CEQS provides a more robust measurement of the construct of collective efficacy, as well as capturing the different dimensions of collective efficacy, rather than simply the state as a whole (Short et al., 2005). However, while the CEQS succeeds in providing a deeper view into collective efficacy, it is a 20-item questionnaire where total scores can range from zero to 200. As such, while the hypothetical four-point scale presented by DeRue and colleagues (2010) always had the example teams fall neatly into a dispersion pattern, real teams measured with a more extensive questionnaire were not able to always fit distinctly into one of the proposed dispersion patterns.

Since the teams sampled for the present study did not always fit neatly into one of the dispersion patterns proposed by DeRue and colleagues (2010), the rules for a team to fit into one of the four dispersion patterns had to be defined. The rules used to fit teams into this typography are by no means definitive at this juncture, and require validation in order to hold greater explanatory value in future research, however they serve well for presenting descriptive results for the purpose of this thesis.

Classifying dispersion patterns.

It should be noted that in order to fit any particular dispersion pattern, a team must comprise of at least four members (DeRue et al., 2010). This point was also used in the inclusion criteria for the present study. The rationale behind this number is similar to why collective efficacy dispersion patterns merit examination; the presence of differing dispersion patterns of collective efficacy, independent of the actual collective efficacy variance of the team, is essentially creating subgroups within the team along the lines of differing efficacy beliefs. The presence of clusters of similar collective efficacy beliefs may act to influence the social climate of the team and other emergent states (DeRue et al., 2010; Loignon et al., 2018) similar to how subgroups formed for other reasons (i.e. within team social groups or role groups) can influence the functioning of the team (Martin et al., 2016). In order for this theory to apply, a team must be able to divide into more than one group, and each subgroup based on efficacy must also have the potential to consist of more than one member, hence teams must have at least four members to fit into a dispersion pattern.

Shared beliefs.

A shared beliefs dispersion pattern is a near unanimous belief in a team's efficacy. Each member holds almost identical collective efficacy beliefs, and the construct can be interpreted as essentially just containing magnitude, as is common in the team dynamics literature (Bandura, 2000; DeRue et al., 2010; McEwan & Beauchamp, 2014). In terms of categorizing shared beliefs using the CEQS, the most intuitive method is effectively eliminating any of the other dispersion patterns. Given the wide variety of potential scores when using the CEQS, it is highly unlikely that a large cluster of individuals, let alone the entire team (especially in larger groups) would share identical scores. Using a measurement tool with a wide array of potential scores rather than the minimum four item scale makes categorizing collective efficacy dispersion patterns much more difficult in practice than in theory. In a visual representation, shared beliefs would be presented as a relatively flat graph, with little variation between the least and greatest collective efficacy scores. The data for a shared beliefs pattern would present as having no significant jumps in the data, or no large differences between any two members of the team. The jumps between two adjacent members of the team are what are used to categorize more dispersed patterns.

Minority dissent.

Minority dissent patterns present as either a single member of the team, or a small group (relative to team size) having significantly lower or higher collective efficacy beliefs than the majority of the team. This paper will refer to the significant difference between adjacent efficacy scores as a jump. The dissenting minority must consist of less than or equal to a quarter of the total team. The one quarter rule was made to fit with a team having the minimum or four members to fit within a dispersion pattern. In order to maintain consistency when categorizing dispersion patterns, the mark of less than or greater than 25 percent of the must be the differentiation between minority dissent and bimodal/fragmented distributions, because with only four members, any dissenting cluster with more than a quarter of the team is just half of the team. To classify what makes a dissenting cluster, standard deviation and range were taken into account as a measure of distance between clusters. While these measures may lack the ability to identify dispersion patterns within the team, (Biemann et al., 2014; DeRue et al., 2010; Lim & Klein, 2006), they can be used to identify subgroups within the whole team. As such, a jump in the collective efficacy scores within the team, or a difference between two adjacent team members' efficacy scores, was deemed significant if it was at least one standard deviation away, and the difference between the two adjacent teammates was greater than or equal to the range of either group surrounding said jump in the data. The use of both standard deviation and the range of clusters were used in tandem to account for groups which exhibited a more shared distribution, thus having a relatively smaller standard deviation. Conversely, the incorporation of the range qualifier also ensures teams that exhibit fragmented distributions with a strong outlier are not grouped into the minority dissent category, given the two are hypothesized to influence a team quite differently (DeRue et al., 2010).

Bimodal distribution.

Bimodal teams would show two distinct groups in their visual representation. Bimodal teams show one group with between 26 and 74 percent of the team's membership, or to put it simply, neither of the two groups should qualify as a minority dissenter. The two groups are thus likely to be similar in size, though this is not required. Similar to minority dissent, the rules for defining a cluster remain the same: the groups must be at least one standard deviation apart, and the range of the clusters must be less than the value of the difference between groups. It should be noted that it is possible for data points to lie in between the major clusters in an otherwise bimodal pattern, which could violate the spacing rules set forth above. For the purposes of this study, if a single data point is the cause of the violation to an otherwise bimodal data set, the team would still be considered bimodal, as the two distinct groups likely hold more influence on the functioning of the team than does a single individual with beliefs in the middle of two groups. This middle point could warrant consideration in future work but will be categorized as bimodal for the present study.

Fragmented distribution.

Fragmented dispersion patterns are characterized by having no substantial clusters within them (DeRue et al., 2010), or little shared agreement between teammates regarding collective efficacy beliefs. This would be shown in a graph as a gradual upward trend when collective efficacy scores are ordered least to greatest, with no large clusters of agreement. Similar to shared beliefs, fragmented distributions are most easily identified using a visual test, as the defining characteristic is a lack of agreement, but also a lack of substantial jumps in collective efficacy beliefs relative to the other members of the team. Fragmented teams will be identified in this study by not meeting the requirements of either the minority dissent or bimodal dispersion patterns, nor would it be a shared belief.

Data analysis.

Dispersion patterns were defined in this study according to the rules described previously, and thus ranked based on level of dissent to be analyzed in relation to the proposed hypotheses. The first hypothesis, which stated that higher levels of cohesion would correlate with lower collective efficacy dispersion, or that collective efficacy would manifest in a pattern closer to shared beliefs, was tested using Spearman's Rho correlation to determine the correlation between cohesion scores and particular collective efficacy dispersion patterns. Collective efficacy dispersion patterns were created using bar charts and presented as ordinal variables based on progressing levels of dissent. Cohesion was a continuous variable. The dispersion patterns were ranked from one (shared beliefs) to four (fragmented), to enumerate the level of dissent seen.

The second hypothesis stated that collective efficacy dispersion patterns would change over the course of the competitive season. This hypothesis was non-directional because the presence of cohesion (or another variable) has not yet been shown to correlate with convergence or divergence of efficacy beliefs (Loignon et al., 2018). This was intended to be examined using visual sequences to map out if teams experienced convergence or divergence of collective efficacy dispersion patterns, based on the dispersion patterns seen at each time point. Only Team 1 completed the longitudinal aspects of the study. As such, the dispersion patterns of Team 1 were compared at all three time points to determine if there was a change in dispersion pattern over time. Following this, as there could be no comparison between converging and diverging groups, the cohesion scores of Team 1 were also compared at each time point to assess if there was a change in cohesion over time. This was done using a Friedman's ANOVA. Friedman's ANOVA was selected as it is a non-parametric test and did not need to meet assumptions of normality.

Chapter 4 – Results

The purpose of this study was to provide a longitudinal examination of collective efficacy dispersion patterns over the course of a competitive season in sport teams, and to explore the influence of cohesion on the manifestation and development of these dispersion patterns. Additionally, this study sought to determine how collective efficacy dispersion patterns change over the course of a competitive season within sports teams. Two hypotheses were proposed for this study, first, Hypothesis 1 stated that higher levels of cohesion would correlate with less collective efficacy dispersion and was expected to manifest in a pattern closer to shared beliefs; and Hypothesis 2 stated that collective efficacy dispersion patterns would change over the course of the competitive season.

Demographic Information

Three teams participated in the present study, giving collective efficacy and cohesion data across five instances. Between the three teams, 27 individuals participated (24 female, 3 male). Both Teams 1 and 3 were all female teams, with Team 2 being the only mixed group (four females, three males). Each team included in this study competed in a different sport, those sports being volleyball, field hockey and ice hockey. The participants across all three teams had an average age of 19.4 years (SD = 2.46 years), ranging from 18-28. Participants had an average of 8.1 years of experience in their respective sports (SD = 4.99 years), ranging from two to 22 years, and an average of two years of experience with their current teams (SD = 2.02), with time spent with their current team ranging from one to nine years. The teams sampled met an average of 2.83 times per week (for organized team activities only), with one team meeting four to five times per week, one team met once weekly, and the third team met twice weekly. Familiarity with teammates was measured using a Likert-type scale ranging from 1 (not familiar at all) to 10 (very familiar, friends). An average familiarity with teammates of 7.1 was found (SD = 1.16), ranging from five to nine. Team 1 was the only team to complete all three time points. As such, Team 1 was the only team with participants drop out of the study between time points. Team 1 had all 11 possible members provide data at time point one, and eight members provide data at time points two and three. In terms of timing for the data collected from Teams 2 and 3, Team 2 was surveyed early in their season, while Team 3 was surveyed near the end of their season, not long before the state of emergency in Nova Scotia.

Due to factors resulting in a lower sample size than needed for sufficient statistical power, this results chapter will focus on describing the data obtained and how they can inform future studies concerning collective efficacy dispersion patterns. Furthermore, due to the difference in scales used to measure collective efficacy in the present study and the theory laid out by DeRue and colleagues (2010), the present study demonstrates the challenges in translating collective efficacy dispersion from theory to application, as seen in work by Dithurbide, Chow and colleagues (2009; 2011).

Hypothesis 1

Hypothesis 1 stated that higher levels of cohesion would correlate with less collective efficacy dispersion, or manifest in a pattern closer to shared beliefs. This was tested using Spearman’s rho correlation, with total score from the GEQ (the total cohesion score) being correlated with the collective efficacy dispersion pattern shown by each team at each time point. For this analysis, each time point was treated as a data point, therefore nesting was ignored during this analysis. Due to the limited sample size and subsequent lack of power, any conclusions that could be drawn from the nested analysis would have little meaning. More usable information could be gleaned from the present sample by treating the three points within Team 1 as separate.

The aforementioned dispersion patterns were represented as ordinal variables based on progressing levels of dissent, with shared beliefs being ranked a 1 (least dispersion) and fragmented beliefs being ranked a 4 (most dispersion) in the Spearman's correlation calculations. Below, each team is presented as a bar chart with each bar representing a member of the group, and the height of the bar representing their respective collective efficacy scores on the CEQS. Bar charts were used because that is how dispersion patterns were displayed by DeRue and colleagues (2010) and this study aimed to remain consistent with existing work. The bars are ordered from lowest collective efficacy score to greatest, with the intent of displaying which groups within the team would appear based on clusters in collective efficacy scoring.

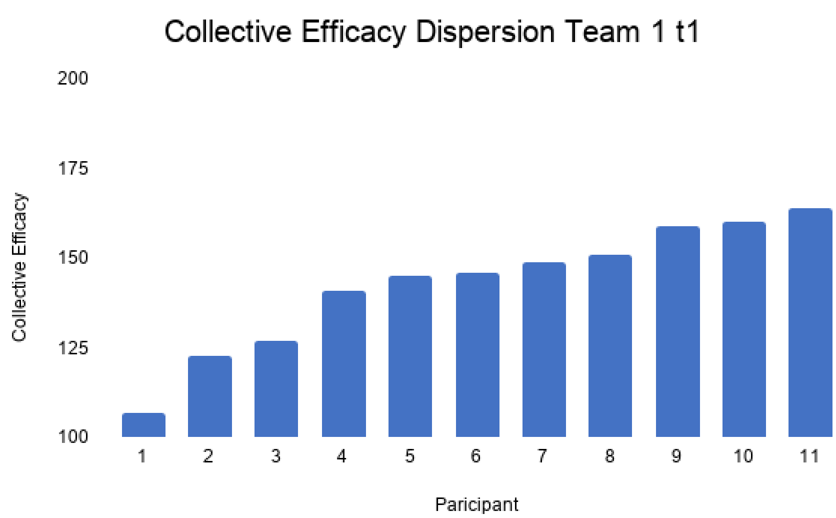

Figure 4: Collective efficacy dispersion pattern for Team 1 at time point one, exhibiting as a fragmented pattern.

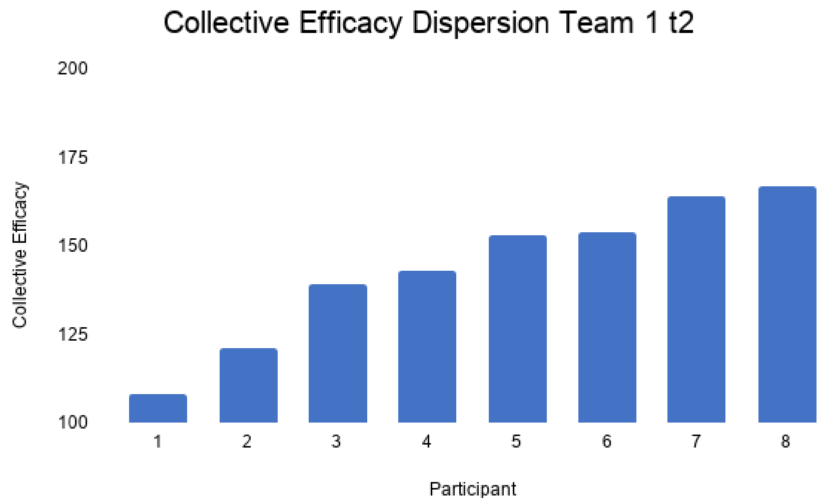

Figure 5: Collective efficacy dispersion pattern for Team 1 at time point two, exhibiting as a fragmented pattern.

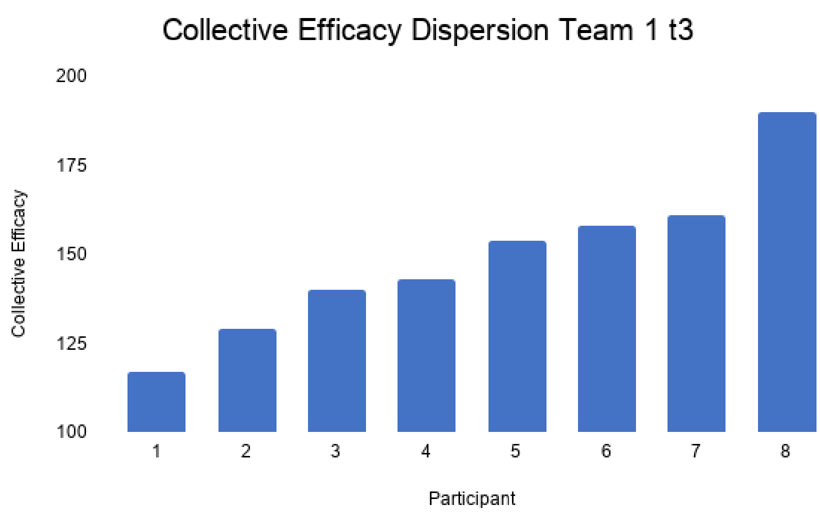

Figure 6: Collective efficacy dispersion pattern for Team 1 at time point three, exhibiting as a fragmented pattern.

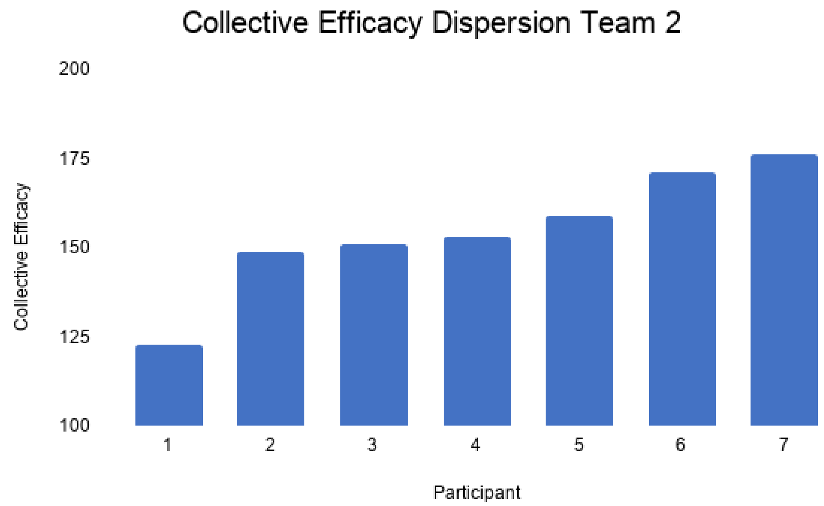

Figure 7: Collective efficacy dispersion pattern for Team 2, exhibiting as a minority dissent (low) pattern.

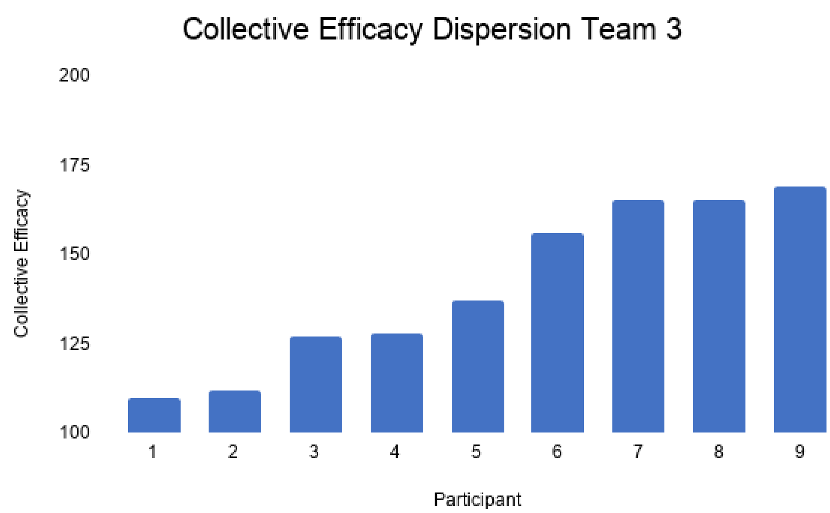

Figure 8: Collective efficacy dispersion pattern for Team 3, exhibiting as a bimodal pattern.

To demonstrate that typical measures of spread often do not indicate the dispersion pattern of a team, descriptive statistics for each teams' collective efficacy scores are presented below.

Team	Mean CE	CE SD	CE Range	CE Skewness	CE Kurtosis	Average GEQ Score	GEQ SD
Team 1 (t1)	142.91	17.48	57	-0.89	0.23	115.84	11.84
Team 1 (t2)	143.63	20.56	59	-0.74	-0.37	99.75	14.94
Team 1 (t3)	149.00	22.27	73	0.51	0.77	108.75	14.89
Team 2	154.57	17.28	53	-0.78	1.29	116.28	16.10
Team 3	141.00	23.30	59	0.08	-1.82	105.56	19.43

Table 1: Descriptive statistics and spread measures of collective efficacy and cohesion.

As seen in Table 1, the means for all teams in terms of both collective efficacy and cohesion are relatively similar. The same is true of the measures of spread for each team's collective efficacy, despite differences in dispersion of collective efficacy. These measures are secondary to the analysis concerning the relationship between a team's cohesion and collective efficacy dispersion pattern, but it is noteworthy that measures such as standard deviation and range are not necessarily different for differing dispersion patterns. As mentioned in prior work on dispersion patterns, the standard deviation of the group does not capture which dispersion pattern is exhibited (Chow et al., 2009; DeRue et al., 2010; Dithurbide et al., 2011). Team 1 at time one (seen in Figure 4) is a fragmented dispersion pattern, with rather small differences between adjacent scores, aside from the wider disparity seen from the team members with the lowest efficacy beliefs (left side of the graph). This would not qualify as minority dissent because the lower efficacy beliefs are not far enough removed from the rest of the team. However, this group has a nearly equal standard deviation and range when compared to Team 2 (Figure 7), a minority dissent presenting team. The same can be seen when comparing Team 1 at time 3 (Figure 6) to Team 3 (Figure 8). While this comparison is not as close, these two groups have very similar (as well as the greatest) standard deviations, despite being fragmented and bimodal, respectively. It should be noted that Team 1 at time 3 is very close to being categorized as a minority dissent team due to the single very high collective efficacy score of the right most participant. The spread between the other data points keeps Team 1 at time 3 in the fragmented category, but the similarities between the two groups, one containing relatively consistent, moderate jumps in efficacy scores, and one with more closely knit but distinct groups, serves to reinforce existing literature about the statistical difficulties of capturing collective efficacy dispersion patterns (Chow et al., 2009). With regard to kurtosis values, DeRue and colleagues (2010) suggest using a benchmark of -2 to indicate bimodal distributions and -1.2 for fragmented distributions as a basic guideline. This assumption was challenged by Chow and colleagues (2009), stating that this was only the case in equally distributed collective efficacy scores within the team. The data presented here supports the assertion made by Chow and colleagues, as the only team with a bimodal pattern of dispersion (Team 3) did have a kurtosis of -1.82, or relatively close to the benchmark of -2 (DeRue et al., 2010), but none of the fragmented presenting teams (Team 1 at all three time points) had a kurtosis value close to -1.2, with the closest being -0.37 (Team 1 time two).

The sample that was gathered for this study lacks sufficient size to use the results from the Spearman's rho analysis with statistical power. Rather, the results will be presented with little mention to p-values, in order to present more descriptive data on the emergent states that were measured in order to inform future research. Each team's average cohesion was correlated with the team's collective efficacy dispersion pattern. Given the lack of size in the present sample, the underlying factors of cohesion (group integration task and social, individual attraction to group task and social) were also correlated with collective efficacy dispersion pattern. To add more richness to the descriptive results of the present study, cohesion was also presented as a dispersion pattern following the same rules described previously. All of the following correlations may be similar to what would be seen in a sample with adequate power, but this cannot be said for certain. As such, the correlations are presented in a ranked format. The present sample violates assumptions of normality but would still fit into nonparametric analysis. Furthermore, the correlations that were the largest also had the smallest p-values.

This analysis centered on average cohesion and collective efficacy dispersion pattern. The correlation coefficient between these two was ($r = -0.447$). This would be normally be a medium strength relationship, and furthermore, the negative slope of the cohesion-collective efficacy dispersion pattern correlation indicates that higher levels of average cohesion are seemingly related to lower levels of dispersion, or a pattern closer to shared beliefs. The dispersion patterns were ranked one through four, with shared beliefs being the lowest valued or ranked pattern. In terms of noteworthy correlations with regard to strength, collective efficacy dispersion patterns were related to average attraction to group social ($r = -0.447$), but correlations with the other facets of cohesion (averages of attraction to group task, group integration task, and group integration social) had correlation coefficients of ($r = -0.112$), ($r = -0.112$), and ($r = -0.224$) respectively. The stronger relationship with attraction to group social may be because of the predominantly female sample, given the importance of social cohesion to female athletes (Martin et al., 2014). Interestingly, the correlations involving the two task-based facets of cohesion were always equal, regardless of what the other variable was. When dispersion patterns of cohesion scores, as well as the four underlying facets were constructed, they were also correlated with collective efficacy dispersion patterns. These correlations are displayed below.

	CE DP	**Cohesion DP**	**Attraction to group (S) DP**	**Attraction to group (T) DP**	**Group integration (S) DP**	**Group integration (T) DP**
CE DP	1.000	-0.884	0.177	0.530	-0.968	0.177
Cohesion DP	-0.884	1.000	0.250	-0.583	0.913	-0.250
Attraction to group (S) DP	0.177	0.250	1.000	0.250	0.000	0.000
Attraction to group (T) DP	0.530	-0.583	0.250	1.000	-0.456	0.250
Group integration (S) DP	-0.968	0.913	0.000	-0.456	1.000	0.0000
Group integration (T) DP	0.177	-0.250	0.000	0.250	0.000	1.000

Table 2: Correlation coefficients for collective efficacy dispersion patterns, and dispersion patterns of cohesion components.

Collective efficacy dispersion patterns had a very large correlation coefficient with the dispersion patterns of group integration social, this is unexpected as the relationship with average group integration social was much lower. Collective efficacy dispersion patterns showed equal correlations with both group integration task and attraction to group social, a difference from the relationships involving average scores; when using the average scores of these variables, it was attraction to group task and group integration task which were equal. Interestingly enough, when examining the correlations between collective efficacy dispersion patterns and the dispersion patterns of cohesion and its respective components, the strongest correlations were still negative, while the smaller correlations were positive. In the available data, more dispersed perceptions of cohesion were, for the most part, not associated with more dispersed collective efficacy beliefs. Based on the available data, observed levels of average cohesion did indeed have a negative correlation with collective efficacy dispersion patterns, though the statistical significance of these correlations is unclear. The negative direction can be seen as a positive, as that direction indicates higher levels of cohesion are associated with less dispersed efficacy dispersion pattern, or in other words, a team with higher cohesion scores would exhibit a dispersion pattern closer to shared beliefs, or have less separation of efficacy beliefs among members.

Hypothesis 2

Hypothesis 2 stated that collective efficacy dispersion patterns would change over the course of the competitive season. It was hypothesized that it would be unlikely that collective efficacy would remain stable throughout a team's season, and by extension, the way collective efficacy beliefs were dispersed throughout the team would also be dynamic. This hypothesis was intended to be analyzed by constructing the dispersion patterns of each team at all three measured time points, where a change in the dispersion patterns would be seen in the graphs. The original procedure stated that teams would then be sorted into converging, static, or diverging categories, and a one-way, between-subjects ANOVA would be used to determine if there was a difference in mean cohesion between the three groups. As only one team completed the longitudinal aspect of the study, that team's scores for cohesion would be tested to see if there was a difference between time points. Because there is only one team, and some members of the team dropped out of the study between data points, a Friedman's ANOVA was used instead, given that it is a non-parametric test. Team 1 presented as a fragmented collective efficacy dispersion pattern at each of the three time points (Figures 4, 5, 6), so despite the dynamism of collective efficacy, the dispersion patterns may not change. Team 1 was analyzed using a Friedman's ANOVA, to determine if there was a difference in cohesion scores between time points. The same process was also performed to determine if there was a difference in collective efficacy scores between time points. For the comparison between collective efficacy scores, the Friedman's ANOVA found a $X^2(2) = 2.889$, using a sample of seven participants who provided data at all three time points. This was not significant, with an asymptotic significance value ($p = 0.236$), which is greater than the alpha of 0.05. For the comparison between cohesion scores, a similar result was found, with a $X^2(2) = 2.00$, and an asymptotic significance value ($p = 0.368$), which is greater than the alpha of 0.05. As such, it does not appear that either collective efficacy scores for the group, nor cohesion scores of the group, were different across time points. While this seems to stand in opposition to Hypothesis 2, the dispersion pattern of Team 1 never changed, thus the lack of change in collective efficacy and cohesion scores is to be expected.

Chapter 5 – Discussion

This study aimed to fill two gaps in the team dynamics literature. First, the study aimed to explore the manifestation and development of collective efficacy dispersion patterns in sport teams, specifically in a practical context. Second, the study aimed to add to the body of longitudinal studies regarding collective efficacy; a portion of the relevant literature that is lacking considering the established dynamism of collective efficacy and other emergent states (Beauchamp et al., 2017; McEwan et al., 2018). The purpose of this study was to provide a longitudinal examination of collective efficacy dispersion patterns over the course of a competitive season in sport teams, and to explore the influence of cohesion on the manifestation and development of these dispersion patterns. Additionally, this study sought to determine how collective efficacy dispersion patterns change over the course of a competitive season within sports teams.

The results of this study are meant to be descriptive in nature and provide valuable information about how research on collective efficacy dispersion patterns could be carried out in future studies. Analysis of Hypothesis 1 found a medium strength negative correlation between cohesion and level of collective efficacy dispersion. While the validity of the correlation coefficient is unknown (and therefore the actual strength of this correlation may be different), the negative correlation is in accordance with existing literature (Beauchamp et al., 2017). Hypothesis 1 stated that higher average cohesion would correlate with lower levels of collective efficacy dispersion, based on existing literature showing a positive correlation between a group's cohesion and collective efficacy, meaning that if efficacy scores are increasing, the within group dispersion is likely decreasing (Heuze et al., 2006; McEwan & Beauchamp, 2014; Medeiros & Edson, 2013). Analysis of Hypothesis 2 aimed to determine if collective efficacy dispersion patterns changed over the course of a competitive season in sport teams, and to compare mean cohesion levels in teams with converging or diverging efficacy beliefs. Because only one team completed all three time points, I was unable to compare converging or diverging teams. Team 1 did not show a change in dispersion pattern across time points. Furthermore, a Friedman's ANOVA revealed there was no significant change in Team 1's cohesion or collective efficacy scores between time points. While the shape of the dispersion pattern remained fragmented at each time point, the dispersion pattern shifted slightly within the fragmented category, especially at Time Point 3 (Figure 6) to the point of almost shifting into a minority dissent pattern. However, given there was no significant difference in collective efficacy scores at each time point, the collective efficacy dispersion pattern for Team 1 did not change. The result for this hypothesis is not in accordance with existing literature; it is well known that efficacy is a dynamic construct, both in itself and collective forms (Bandura, 1997; 2000; 2012). However, the scores within the team did not remain stagnant, there was just not enough change to be deemed significant by the Friedman's ANOVA.

Relationship of Cohesion and Collective Efficacy Dispersion

The relationship between cohesion and collective efficacy is well established (Heuze et al., 2006; McEwan & Beauchamp, 2014; Medeiros & Edson, 2013). This relationship was the basis for Hypothesis 1, that higher levels of cohesion would correlate with lower levels of dispersion in collective efficacy beliefs. Specifically, task-based aspects of cohesion have also predicted levels of collective efficacy (Heuze et al., 2006; Medeiros & Edson, 2013). If cohesion is a predictor of collective efficacy levels, it was reasonable to presume cohesion could be associated with how collective efficacy is dispersed. Each member of a given team has a perception of the group's level of cohesion (Carron et al., 1985), which would then serve to influence their respective collective efficacy beliefs (McEwan & Beauchamp, 2014; Medeiros & Edson, 2013). As any group likely does not have unanimous beliefs regarding cohesion or collective efficacy (Bandura, 2000; DeRue et al., 2010; Fransen et al., 2017), then each group member's respective sense of cohesion could interact with their specific collective efficacy beliefs. This consensus surrounding the lack of unanimity in collective efficacy in the literature indicates there is some form of dispersion within these emergent states (Heuze et al., 2006; Loignon et al., 2018). Given the results of this study, there are some noteworthy findings that raise interesting questions. The correlation found between collective efficacy dispersion pattern and average cohesion was a negative relationship, and in this analysis was found to be of medium strength. While the strength of the correlation requires further examination, the direction of the correlation is in agreement with existing literature (Heuze et al., 2006; Medeiros & Edson, 2013). Interestingly, the strength of the correlation found between cohesion and collective efficacy dispersion patterns is similar in strength to correlations found between subscales of the GEQ and CEQS by Medeiros and Edson (2013) in a sample of 340 collegiate athletes. Medeiros and Edson found correlations ranging from ($r = 0.29$)-($r = 0.64$) when examining the relationships between the four subscales of the GEQ and five subscales of the CEQS. If the findings of this current study were to be replicable in a larger sample, this may support the claim that higher levels of mean cohesion within a team are related to lower levels of collective efficacy dispersion.

To further explore the data, the dispersion patterns of the subscales of the GEQ were also correlated with collective efficacy dispersion patterns. This revealed some interesting values, which could be noteworthy in future work if the results are consistent with the results found here. These results are seen in Table 2, and most notably was the correlation between the GIS (group integration social) dispersion pattern, and the dispersion patterns of collective efficacy and cohesion. These two correlations show very strong positive relationships. The strength of correlation between GIS dispersion and cohesion and collective efficacy dispersion are the strongest correlations seen among all values. The scale used to model dispersion patterns was an ordinal one, with four possible outcomes (1 being the lowest level of dissent or dispersion, shared beliefs, 4 being the highest level of dispersion, fragmented), given the low number of possible outcomes, the very strong correlations seen with regard to GIS dispersion patterns could be just due to chance from the low number of possible outcomes. There is a possibility that GIS plays a role in explaining collective efficacy dispersion patterns, though that cannot be said definitively at this juncture. This relationship is made more difficult to interpret by the difference in magnitude between the correlations of average GIS and the dispersion pattern of GIS with collective efficacy dispersion pattern. This discrepancy could be as simple as there are far fewer possible outcomes when examining the dispersion patterns, however, the higher correlations between the averages of the social aspects of cohesion with collective efficacy dispersion could be noteworthy in future work.

Speculatively, GIS could be related to the dispersion of collective efficacy. GIS (group integration social) is the factor of cohesion describing the sense of connectedness or unity within the group as a whole, with regard to the social bonds and interactions of the group (Bruner et al., 2013; Carron et al., 1985). In terms of the correlation strength between total cohesion and GIS dispersion patterns, the strong correlation coefficient is in line with existing literature (Bruner et al., 2013; Medeiros & Edson, 2013), and the construction of the GEQ itself (Carron et al., 1985). Furthermore, from a layperson’s perspective, there is a high degree of similarity between GIS and cohesion as a whole. GIS describes the sense of social unity within the group (Carron et al., 1985). Indeed, this could be used to describe cohesion as a whole to an individual without an understanding of the underlying factors of cohesion, and the nuances of the construct, including attraction to the group in both social and task contexts (Carron et al., 1985), the dynamism of cohesion (Carron et al., 1985), and the interactions of cohesion with other team dynamics constructs (Bruner et al., 2013). As such, it is possible that a layperson may perceive questions on the GEQ specific to GIS to be very similar to their perception of cohesion proper. Given the validity of the GEQ (Bruner et al., 2013; Carron et al., 1985), this would explain the strong relationship between the dispersion of cohesion and GIS, if the relationship is later deemed significant. In terms of collective efficacy dispersion, a similar logic could apply. As discussed above, the dispersion of GIS could be reflective of each individual's perception of the team's social dispersion, as lower GIS scores would indicate a lower degree of connectedness within the team's social structure. It should be noted that the correlation between GIS dispersion patterns and collective efficacy dispersion patterns is a negative one. The idea that lower levels of dispersion in GIS would be related to higher levels of efficacy dispersion at first appears backwards, given what is known about cohesion and collective efficacy (Heuze et al., 2006; McEwan & Beauchamp, 2014; Medeiros & Edson, 2013). However, the dispersion of GIS is idiosyncratic; an individual who scores low for GIS is indicative of that individual believing the team to be socially disconnected (Carron et al., 1985). If the whole team believes the team to be socially disconnected, and thus scores low on GIS, the dispersion of GIS will actually be low, or closer to shared beliefs, because the team is actually in agreement about being socially disconnected. Essentially, the team presents a shared belief about being in social disagreement. Therefore, given the high prevalence of fragmented teams with regard to collective efficacy in this sample, most teams presented a low level of GIS dispersion. Specifically, the majority of

GIS dispersion patterns were minority dissent, or the second lowest level of dispersion. That means that each team presenting a minority dissent pattern of GIS was either mostly in agreement about being socially connected or was mostly in agreement about being socially disconnected. The same could be said for cohesion dispersion patterns, which when correlated with efficacy dispersion patterns also had a strong negative correlation. Average GIS score had a much lower correlation with collective efficacy dispersion patterns but did match the negative (and intuitive) direction seen in the relationship between average cohesion and collective efficacy dispersion patterns. As mentioned, GIS may appear to be the most influential subscale of the GEQ due to its possible perceived similarity to cohesion proper. GIS may also be more prominent in this study, as the sample was mostly female athletes. Research has indicated that female teams typically require a higher degree of cohesion in order to perform optimally, while male teams tend to need to perform to form cohesion (Bruner et al., 2013; Martin et al., 2014). Females also tend to place more emphasis on social bonds (Martin et al., 2014), and thus social integration may be of more importance in terms of converging efficacy beliefs when compared to a more mixed sample, or a sample of predominantly males.

When examining the other subscales of the GEQ and how they relate to collective efficacy dispersion, the correlations between average attraction to group task and group integration task were equal. Given that task cohesion was seen to be more predictive of collective efficacy (Heuze et al., 2006), it is interesting that when considering efficacy dispersion, social aspects of cohesion may be more influential. This could be supported by findings from Martin and colleagues (2014), indicating fault lines formed within groups based on social or task conflicts or disagreements. As the task of a sports team typically is stable over the course of a season, there exists much more potential for faults within the group to stem from social discord.

Furthermore, social cohesion was found to be less stable over time (Martin et al., 2014). This equality between the two subsets of task cohesion could also be explained by the sample demographics. A study by Benson and colleagues (2016) found that youth perceive cohesion in fewer dimensions than adults, using a sample of 13 to 19-year-old athletes. Younger or adolescent individuals only perceived cohesion in two dimensions, task and social (Benson et al., 2016), rather than the four measured here. Given the average age of the sample used here was 19.4 years, with the majority of the sample being under 20 years of age, these individuals likely did not differentiate attraction to group and group integration, leading to similarity in the task aspects of cohesion.

Dynamism of Collective Efficacy Dispersion

Similar to the relationship between cohesion and collective efficacy, the fact that collective efficacy is a dynamic construct is also well established (Bandura, 1997; 2000; Beauchamp et al., 2017). Collective efficacy is an emergent state, and emergent states are known to be dynamic entities (Marks et al., 2001; McEwan & Beauchamp, 2014). This was the basis of Hypothesis 2. If collective efficacy is dynamic, then it is plausible that the dispersion of collective efficacy would also be dynamic. One team completed more than one time point for this study (Team 1 completed all three timepoints). Given only one team was used as the sample for this analysis, no reliable conclusions can be drawn. It can be noted that the shape of the fragmented dispersion patterns did change, specifically at time point three, just not enough to shift into a different dispersion pattern. The dispersion patterns for Team 1 at each time point can be seen in Figures 4, 5, and 6, respectively. Team 1 exhibited a fragmented dispersion pattern at each time point, so there was no change in dispersion pattern. Furthermore, a Friedman's ANOVA revealed no significant change in average collective efficacy scores between time points. This is interesting when compared to existing literature on collective efficacy, which has established that collective efficacy tends to change over time (Bandura, 2000; Beauchamp et al., 2017; Fransen et al., 2017). Due to the sample of one used in this analysis, it cannot be inferred that collective efficacy dispersion patterns do or do not change. However, I can speculate on why dispersion patterns may not change, based on the parameters of the current study.

The first aspect to consider is this study measured collective efficacy on a wider scale than was used by DeRue and colleagues (2010) to describe their typology of dispersion patterns. In this case, wider means there were a greater number of intervals, as this study used the CEQS, rather than a four-point Likert type scale to measure CEQS (DeRue et al., 2010). Furthermore, all of the teams measured for this study had more than four members, the number used by DeRue and colleagues (2010) to describe example dispersion patterns. The fact that there were more individuals in a group, and these individuals could provide a far wider range of scores meant dispersion patterns would be more resistant to change. In the examples given by DeRue and colleagues (2010), one team member changing their response by one point would have completely changed the dispersion pattern, making those hypothetical groups much more volatile in terms of their collective efficacy dispersion. In this study, individuals could change their responses by quite a substantial amount without changing their team's dispersion pattern, as is seen between Figures 5 and 6. Not only are the dispersion patterns presented here more resistant to change due to the wider range of responses they could contain, but Team 1 presented as a fragmented pattern, a pattern that may be the most resistant to change. Fragmented patterns are the most loosely defined pattern in this study, using the definitions presented in Chapter 4 fragmented patterns may resist change because they are the least stringently defined.

Fragmented patterns are patterns with the greatest level of dispersion, described as a group that has no significant agreement, or agreement only in small clusters in a more populous team (DeRue et al., 2010). For the purposes of this study, this definition was expanded to include an important note: fragmented teams had no substantial clusters of agreement, but also did not contain substantial jumps in collective efficacy beliefs relative to other team members. To elaborate, a fragmented team could have each member relatively close to one another, but with no substantial clusters of agreement, but also no substantial gaps warranting subgroups to be defined, seen in Figure 5. This appears as a gradual upward slope on the dispersion pattern bar charts. Alternatively, there could be a large jump between team members, if the rest of the team is sufficiently dispersed that no cluster within the team could be defined as a subgroup, as seen in Figure 6. Figure 6 approaches a minority dissent pattern, with the large gap between Team Member 7 and Team Member 8. It is not considered minority dissent because the difference between the rest of the team members is too large to deem the group a majority. Due to how fragmented patterns are defined, they appear to be quite resistant to change into another dispersion pattern. Whether this is a definitive property of fragmented teams is unclear. One aspect of this could be the fact that fragmented patterns are, for the purposes of this study, the highest level of dispersion, so there is no way to capture increasing dispersion. Additionally, it may be possible that dispersion patterns do not move strictly through the levels of dispersion. That is, a fragmented pattern may not reliably converge into a bimodal pattern. There are many difficulties translating the theory of emergent state dispersion patterns into the real world (Chow et al, 2009; Dithurbide et al., 2011; Loignon et al., 2018), so more inquiry is needed. Given that fragmented groups are characterized more so by a lack of clusters, than the presence of a specifically sized subgroup, it is also possible that fragmented teams will emerge as the most prevalent form of dispersion pattern. This claim would also require further research; in terms of the prevalence of certain dispersion patterns, all that can evidently backed is that shared belief groups are likely the least common (Bandura, 2000).

While it is accepted that there is rarely unanimity in terms of efficacy beliefs (Bandura, 2000; Fransen et al., 2017), the prevalence of the other patterns is unknown, and along with that, how these patterns may or may not change. Ideally, this study would have given insight into how dispersion patterns change, and potentially which were more common. While it is not yet known in what ways collective efficacy dispersion patterns move, it is known that collective efficacy beliefs do change over time (Bandura, 2000; Beauchamp et al., 2017; DeRue et al., 2010). Specifically, barring discord, collective efficacy tends to converge as a team gains experience performing the given task (DeRue et al., 2010; McEwan & Beauchamp, 2014). Despite this, it is also known that not every group will behave exactly as the literature says. It is quite possible that is the case here; most, but not all, teams will have changing collective efficacy beliefs, but Team 1 did not at this time, and the significance of this result is not known at this time.

However, knowing that cohesion and collective efficacy do tend to change over time (Bruner et al., 2013; Fransen et al., 2017), the timing of data collection points may have an impact on how these constructs disperse. Collective efficacy beliefs within a team are expected to converge over time (DeRue et al., 2010), barring discord or uncharacteristically poor performance. Cohesion as well tends to converge over time, though social cohesion is less stable and therefore more likely than task cohesion to diverge (Martin et al., 2014). Consequently, it should be expected that a team towards the end of their season, such as Team 3, would exhibit higher efficacy beliefs than a team closer to the beginning of their season (like Team 2). While these claims are not unjustified, there are many other factors that influence the degree of agreement within the group than just the timing of measurement within the season. One important aspect is if the team has been together for multiple seasons. A team at the beginning of their season that also played together the previous season may have more time spent together than a team that has only played one season together. In the case of this study, the two teams with only a single data point were measured at opposite ends of their season (Team 2 at the beginning, Team 3 at the end). A comparison is difficult because there are no equivalent reference points. Team 3 was measured later in the season, yet still appeared to have a higher degree of dispersion compared to Team 2. Team 3 also has members that returned from prior seasons, which may be a potential explanation for why only one of the two subgroups is in agreement, while the other is not. Team 2 was formed for this sport season, but the members indicated they all knew each other beforehand, which could explain their higher level of agreement, save for the dissenting individual.

Treatment of Outliers

As noted previously, one of the predominant themes of this study was the difficulty in translating theoretical work concerning efficacy dispersion patterns to real world observation. This study drew heavily on the theoretical work of DeRue and colleagues (2010). Also, a major discrepancy between the theoretical and observational work was the difference in scale of the collective efficacy measurement tools. The dispersion patterns presented by DeRue and colleagues (2010) were constructed for ease of interpretation, and when compared to using the CEQS to construct similar patterns, very much simplify dispersion patterns. Unfortunately, in observation the patterns were not so clean cut, and how emergent state dispersion patterns are defined will require further research (Loignon et al., 2018). Defining these dispersion patterns both in terms of visual representation, and if possible, with statistical measures would be of great use to future researchers looking to explore their explanatory value with regard to a team's social climate and processes. However, with any statistical representation of a group there will be outliers, and one issue that will need to be addressed is that of the treatment of these outliers.

Outliers are a natural part of research, and how they are treated (i.e. included or removed) is typically dependent on the research being conducted; the hypotheses being tested, statistical analyses being done, and so on. With regard to dispersion patterns though, the presence of an outlier within the team in terms of their collective efficacy beliefs is seemingly already accounted for. The minority dissent dispersion pattern is exactly that, a relatively close-knit group in terms of efficacy beliefs, with one, or a small cluster of individuals who hold significantly higher or lower efficacy beliefs than the rest of the group. For the purposes of this section, a minority dissent pattern will be defined as containing a single dissenter, as in order for a cluster of individuals to still fit the minority dissent category the team would have to be relatively large, because to be considered a minority, the subgroup must be equal to or less than a quarter of the team. In that case, a single dissenter, with much higher or lower efficacy scores compared to their teammates is the definition of an outlier, doubly so if said dissenter is multiple standard deviations away from the majority. In some studies, it would be acceptable to remove the outlier, as an outlier is typically not representative of the data set.

While this would not be pertinent to the scope of this study, the treatment of outliers draws an interesting comparison to one of DeRue and colleagues' hypotheses regarding minority dissent (2010). When examining a construct heavily intertwined with the social climate of a team, such as collective efficacy (Beauchamp et al., 2017; McEwan & Beauchamp, 2014), removing outliers, especially when the outlier exists within a team, is detrimental to the understanding of said team. That outlier, in this case, is a unique person who in turn contributes to the social climate of their team, and their position within the team contributes to how they perceive the climate (Aime et al., 2011). As well, said individual's perception of the emergent states of the team is influenced by their position within their team (Aime et al., 2011; Myers et al., 2004), meaning individuals who are the dissenting member of the team in terms of collective efficacy beliefs, while technically an outlier, also have substantial explanatory value to the social interactions of the team (Aime et al., 2011; DeRue et al., 2010). Furthermore, a hypothesis proposed by DeRue and colleagues (2010) stated that in minority dissent presenting teams, the most likely outcomes were for the dissenter to assimilate to the team (possible with a higher or lower efficacy individual), or, particularly harmful in lower efficacy individuals, for the dissenter to be silenced by the team or remove themselves (DeRue et al., 2010). Particularly for this reason it is vital to include and analyze outliers in future dispersion pattern work. While, to date, this hypothesis has not been confirmed or rejected, removing outliers in data sets such as the ones in this study would serve to confirm the negative aspects of DeRue and colleagues' (2010) hypothesis. Treating dissenting scores, and thus the dissenter, as an outlier in terms of data analysis in work such as this study, would confirm the notion that their lower collective efficacy beliefs will lead to the dissenter being removed from the social climate of the team, by their own volition or not. Even though the results of studies such as this one may not ever be known to the specific dissenting individual in an anonymized team, removing them in the eyes of the scientific community creates a self-fulfilling prophecy where the experience of the dissenter with regard to emergent states is an unknown one, propagating a cycle of erasing dissenting individuals.

Undefined Dispersion Patterns

DeRue and colleagues (2010) presented four distinct collective efficacy dispersion patterns. These four patterns (i.e., shared beliefs, minority dissent, bimodal, and fragmented) were used when designing the methodology of this study. In observing collective efficacy in real teams, it quickly became apparent that these four patterns may not always capture the dispersion of a team's collective efficacy perfectly. As has been a recurring theme in the results and discussion of this work, real world teams, specifically measured with the CEQS, are not always going to fit perfectly into one of the four dispersion patterns. This is due to the variable number of individuals in a given team, and the wide range of potential CEQS scores. Of course, using the rules described in Chapter 4 for categorizing dispersion patterns, it is still very possible to fit teams of four or more individuals into one of the dispersion patterns described by DeRue and colleagues (2010), while allowing for some variability in efficacy scores even in clusters, which would be described as in agreement. The patterns described by DeRue and colleagues (2010) may be prominent in future research, but it is also possible that their typology did not account for all potential patterns that could appear in observed teams. The focus of this section will be on addressing shapes that seem not to fit cleanly into one of the four dispersion patterns.

The undefined shapes that do not seem to fit any of the aforementioned four dispersion patterns cannot yet be explained either in their manifestation, evolution, or their influence on the state of collective efficacy within the team. It is possible that shapes that seem in between two dispersion patterns may be transitory states, or a specific dispersion pattern not considered in previous work (Loignon et al., 2018). One example of this could be a pseudo-bimodal pattern, as is seen in Team 3 (Figure 8). Team 3 was labelled bimodal for the analysis of this study, but in fact, only half presents as a bimodal team. A bimodal team is defined by having two distinctly separate groups, with the subgroups having relatively high agreement (DeRue et al., 2010). Additionally, an important hypothesis regarding bimodal teams is that subgroups separated by a significant difference in collective efficacy beliefs, while having a high degree of efficacy agreement within the subgroup, would serve to insulate the members of both groups, lessening the potential for ostracization in the group with lower efficacy beliefs (DeRue et al., 2010). What was seen in Team 3, was the high efficacy group was indeed in agreement, while the low efficacy group was quite dispersed. The group was still labelled as bimodal because half the team is in agreement concerning their collective efficacy beliefs, and therefore cannot be fragmented. In a team with only one group in agreement, and thus only one group ostensibly receiving social insulation, it could become problematic to label said team as bimodal. First and foremost is that fact that the term “bimodal” describes a team with two modes, or most common values. Team 3, while considered here a bimodal team, does not have two modes. Team 3 appears in two groups, but with only one group having agreement, there is not a second mode. Second, when considering social implications of a team’s dispersion pattern, a bimodal pattern of efficacy beliefs as seen in Team 3 likely does not have the same social ramifications from its collective efficacy dispersion than does a truly bimodal team (DeRue et al., 2010). This is of course speculative, as to date there no evidence describing how a bimodal pattern of collective efficacy dispersion influences a team’s social or task functioning. It is not implausible however, to suggest that the pseudo-bimodal pattern seen in Team 3 would not influence the team’s functioning in the same way as a truly bimodal team.

Other dispersion patterns not described by DeRue and colleagues (2010) seem to be in between a fragmented pattern and minority dissent pattern. As can be seen in Team 1 time three (Figure 6), this graph has the appearance of both a minority dissent pattern and fragmented team. The majority of the team is fragmented, with no substantial clusters of agreement, however, the individual with the largest collective efficacy score has a far larger score than the next highest individual. Due to the lack of agreement in the majority of the team, it could not be deemed an agreeing majority, thus this team was not considered to be a minority dissent presenting group. This fragmented-dissenter pattern could be a more pragmatic take on the minority dissent pattern. Given that efficacy beliefs are rarely unanimous (Bandura, 2000), it may be possible that even with a dissenting individual, the rest of the team would have a high amount of agreement in their efficacy beliefs, thus a dissenting individual is more commonly seen in otherwise fragmented teams. In comparing this to DeRue and colleagues' (2010) hypotheses, a lack of agreement among the majority of the team may reduce the odds of a dissenter with lower collective efficacy beliefs being silenced or removing themselves from the team, as there would be less social insulation among the "majority" of the team (DeRue et al., 2010). In a pattern like the one seen in Team 1, Time 3, (a fragmented team with a highly efficacious dissenter) where the dissenter has much higher collective efficacy than the rest of the team, it may be possible that it is easier for said dissenter to elevate the efficacy of their teammates (DeRue et al., 2010) because the rest of the team is fragmented, when compared to a high efficacy dissenter in a minority dissent team where the majority exhibits agreement in their low efficacy beliefs. More so, it may be possible that it would be less likely for the dissenter to be brought down to the rest of the low efficacy majority if said majority did not agree (DeRue et al., 2010). All of this is of course, contingent on the dissenting individual's position within the power structure of the team (Aime et al., 2011; DeRue et al., 2010). Another possibility not seen in this study is that of a minority dissent presenting team, with dissenters in both directions (i.e. an individual with much higher efficacy, and another with much lower efficacy in comparison to the rest of the group), which could have interesting social effects based on which dissenter the group moves towards.

In addition to dispersion patterns not fitting cleanly into one of the four proposed by DeRue and colleagues (2010), another consideration to dispersion pattern shape that must be given is the team size. In a four-person team, one individual can alter the team's dispersion pattern. As the team size increases, the impact of a single individuals change in efficacy beliefs is lessened. However, with higher numbers within the team comes the potential for further unseen dispersion patterns. For example, in an American football team of up to 50 athletes, it may be possible for more than two modes to emerge, and a team that large could present as trimodal. The prevalence of fragmented collective efficacy dispersion patterns may also increase in larger teams, as the larger a team is, there is simply less chance that the team will have large clusters of agreement. Along with team size, the amount to which collective efficacy dispersion patterns are transitory is unknown. It is possible that the undefined shapes discussed above were simply captured as a team was in between dispersion patterns. Given the dynamism of collective efficacy (Bandura, 2000; Beauchamp et al., 2017), this could be the case, but this study could not provide information to support this claim.

On the topic of transitioning dispersion patterns, while this study could not answer the question of if or how they do change, one note is that dispersion patterns may not change linearly. That is to say, a linear transition would entail dispersion patterns converge and diverge from shared beliefs, to minority dissent, to bimodal and to fragmented, and vice versa. Given the possible similarities between fragmented patterns and minority dissent patterns, it may be that teams do not in fact, converge or diverge in a specific manner. Also possible is a reliable pattern of transition between dispersion pattern based on the social events within a team, which would indicate where clusters of agreement or fragmenting would occur. Team 3 and the pseudo-bimodal pattern could indicate fragmentation and convergence of efficacy beliefs in subgroups as an intermediary between other patterns. Minority dissent patterns may also be closer than originally thought to fragmented patterns (DeRue et al., 2010). When categorizing teams into a dispersion pattern, fragmented and minority dissent were typically the hardest to distinguish from one another (as can be seen in Team 1, time 3, or even Team 2).

Issues with Translating Theory to Practice

As is common in research, initially transitioning a theory into observational or experimental work comes with challenges. Even the most well-crafted theories and rigorously constructed methodologies can experience issues when introduced to real populations. This is a part of science, and necessary for understanding the real world and how theory can be implemented in practice. As mentioned throughout the results and discussion of this paper, many of those challenges were found. The primary issue, mentioned throughout Chapters 4 and 5, was the difference in team size and measurement tool when comparing this study to the hypotheses laid out by DeRue and colleagues (2010). While single-item scales, or other abbreviated efficacy scales can be used to assess collective and self-efficacy (Bandura, 2006; Bruton et al., 2016), the CEQS is very common in collective efficacy research (Beauchamp et al., 2017; Fransen et al., 2017), and is a strong choice for assessing a team's collective efficacy (Short et al., 2005). Using the CEQS in collective efficacy dispersion research is pragmatic, and the wider range of possible collective efficacy scores when using the CEQS did indeed make categorizing a team's dispersion pattern less clear cut, but this was a necessary challenge to expand dispersion research into the observational domain. Along with the wider range of possible collective efficacy scores, the team size was also not consistent, further complicating how dispersion patterns were categorized. As the dispersion patterns were mainly categorized based on visual representations of the data, this is more of a minor issue than the scoring discrepancy found between theory and observation but is still noteworthy. The teams in this sample were actually quite close in terms of size, ranging from seven to 11 members. This may not be the case in future work with a larger sample, and as mentioned in the previous section, large teams may present their own unique dispersion patterns.

Team size may influence what dispersion patterns can manifest, in part because team size dictates the possible number of subgroups within a team. In a four-person team, as shown in DeRue and colleagues' (2010) example patterns, there can only be a maximum of two subgroups within the team. Using the team sizes sampled in this study, from seven to 11 members, there is a possibility for more than two subgroups to form. In a very large team of 50 individuals, there could be a dozen, and the subgroups may not be consistently sized. In fact, in a large enough team, there may be several relatively small clusters of agreement regarding their respective collective efficacy beliefs, but the team would still appear to be fragmented in terms of efficacy beliefs. One could reasonably expect smaller teams to be more cohesive, simply because there is more interaction between all of the team members, which could lead to lower levels of efficacy dispersion. The presence of task or role-based subgroups in larger teams may indicate areas where collective efficacy beliefs could converge or display pockets of agreement. In an American football team, for example, there is an offensive and defensive unit, which do not have much task-based interaction. These units are further divided into groups like the offensive line, or the defensive backs for example. These nested groups may be represented in the whole team's collective efficacy dispersion pattern, or, also possibly may exhibit their own distinctive dispersion patterns given the lack of task overlap. Considerations for team size is something not included in the methodology of this study in an effort to increase generalizability, but team size appears to be more of a confounding variable, at least when team size also corresponds with separation of task roles and interdependence.

In hindsight, this study may have drawn too heavily on the typology of dispersion patterns proposed by DeRue and colleagues (2010). While well-reasoned and logically sound, the dispersion patterns described by DeRue and colleagues (2010) have been examined in very few observational or experimental studies. As Loignon and colleagues (2018) mention, an overreliance on theoretical approaches to dispersion patterns may overlook nuances found only in practice, or hinder assessment of patterns which emerge in practice. This study drew very heavily on the four patterns described by DeRue and colleagues (2010) and left little room to allow new patterns to emerge, or to document patterns and define what was found. In future work, an expansion of the typology of dispersion patterns, or perhaps even forgoing a presumption of how collective efficacy will disperse, is necessary to fully understand the concept.

Visual depiction of efficacy dispersion patterns.

In addition to potentially changing how collective efficacy dispersion is approached in future work, it may also be presented differently. In following with DeRue and colleagues (2010), I constructed visual representations of collective efficacy dispersion patterns using bar charts. While efficient in displaying DeRue’s theoretical efficacy dispersion patterns, bar charts are limited in how they display efficacy dispersion in real teams, and teams with more than four individuals.

Histograms, however, are intended to display the distribution of a variable, and may be better suited to display dispersion patterns. Conversely, bar charts capture the quantity of a variable, which does not optimally show the dispersion pattern of a variable. While the bar charts used by DeRue and colleagues (2010) as seen in Figure 3, as well as this study (Figures 4-8), can show distribution through differences in bar height across the team members, a histogram would more effectively show gaps between efficacy scores. Gaps between efficacy scores displayed in a histogram would be seen as a gap between bins, making it easier to identify where team members may diverge in their efficacy beliefs.

Bar charts were initially used in this study in order to stay consistent with the framework developed by DeRue and colleagues (2010). Bar charts could easily show dispersion when the data was theoretical, because the data was created in a way that perfectly fit a specific dispersion pattern. In actual observed data, the dispersion patterns are unlikely to fit a particular shape. Consequently, interpreting the gaps between team members' efficacy scores may be more efficient with histograms. Additionally, the hypothetical teams described by DeRue and colleagues (2010) only contained four members (seen in Figure 3). This simplified the process of presenting an example dispersion pattern, and four members would not make for an informative histogram. However, a large proportion of teams, both in sport and other contexts, contain more than four members. To demonstrate the use of histograms to depict efficacy dispersion patterns, histograms constructed of the teams sampled in this study are included below. The histograms represent the collective efficacy dispersion patterns seen in Chapter 4 (Figures 4-8). The differences in how each pattern is identified in histograms will be described following the graphs.

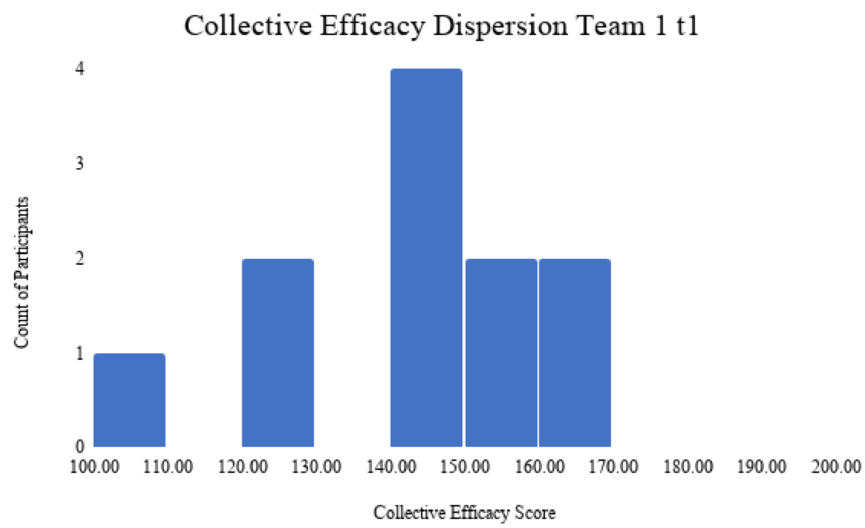

Figure 9: Histogram depicting collective efficacy dispersion pattern for Team 1, time 1 (fragmented).

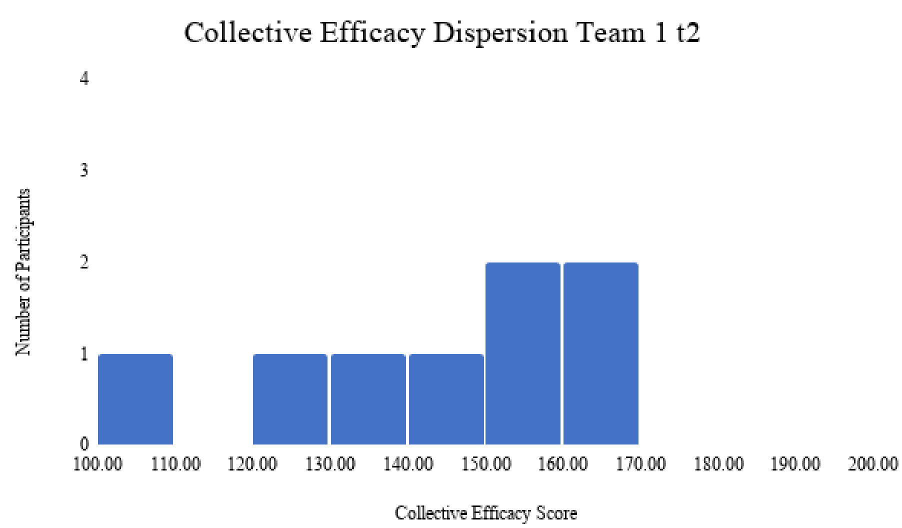

Figure 10: Histogram depicting collective efficacy dispersion pattern for Team 1, time 2 (fragmented).

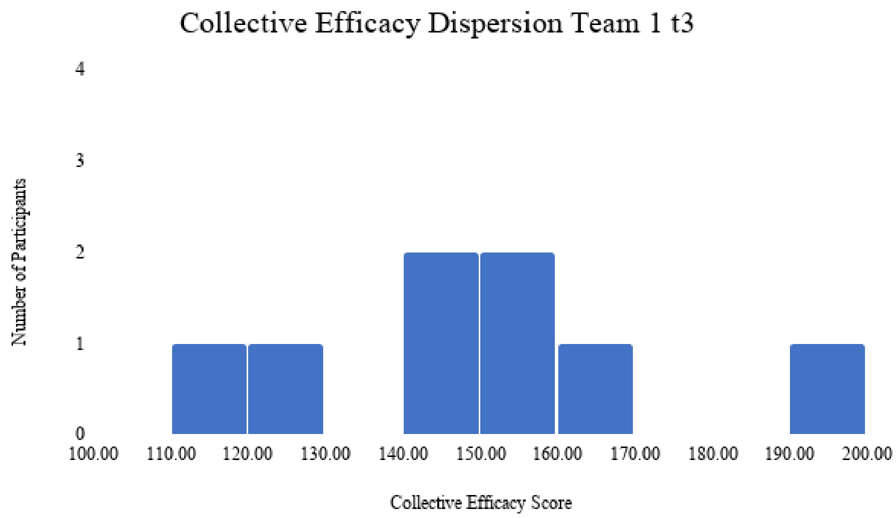

Figure 11: Histogram depicting collective efficacy dispersion pattern for Team 1, time 3 (fragmented).

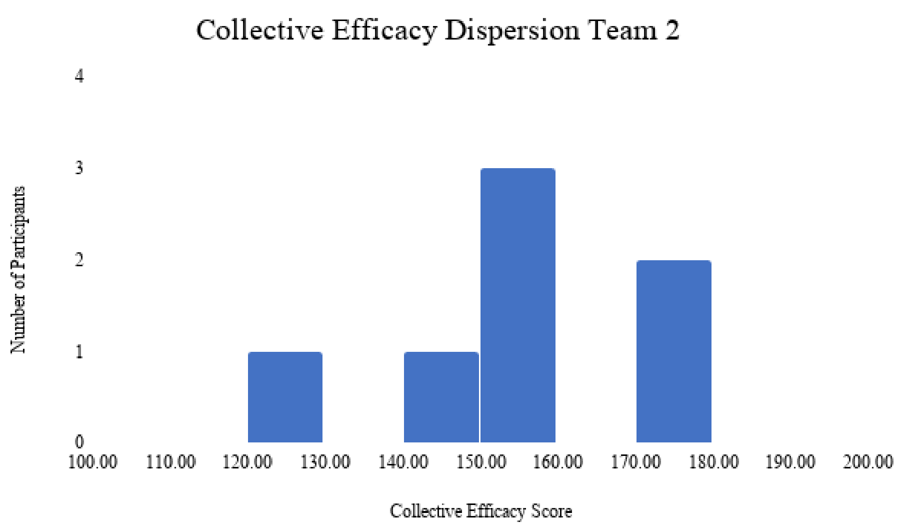

Figure 12: Histogram depicting collective efficacy dispersion pattern for Team 2 (minority dissent).

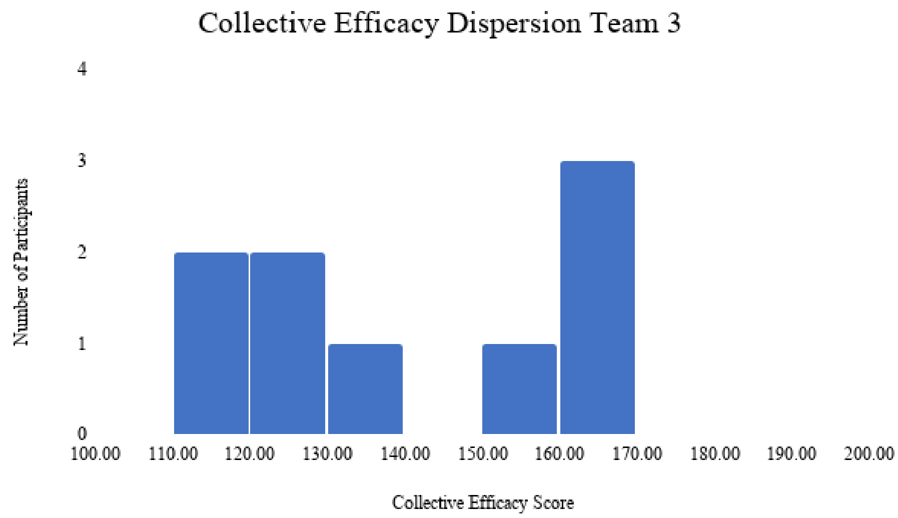

Figure 13: Histogram depicting collective efficacy dispersion pattern for Team 3 (bimodal).

At first glance, the histograms seem to present a very different pattern than the bar charts seen in Figures 4 through 8. However, discerning patterns becomes more objective when compared to the bar charts. When dispersion patterns are visualized as bar charts, the pattern is based on the bars' heights relative to one another. When using histograms, the dispersion patterns are seen through the distribution of scores within the bins. For example, Team 3, a bimodal presenting team, showed two clusters of bars with significantly different bar heights (Figure 8). Using a histogram, the two clusters or subgroups are separated by an empty bin that lies between two similarly sized groups. In future work, a bimodal team could be categorized using a histogram by the presence of two evenly sized groups separated by at least one empty bin.

While bimodal teams should be relatively straightforward to identify, one potential concern with using histograms to represent collective efficacy dispersion patterns is the similarity between fragmented and bimodal teams. Fragmented teams are identified by a lack of clusters of agreement rather than a specific appearance. In the bar charts, this looked like an upward slope from left to right, however, in a histogram, a fragmented pattern would be represented by several bins with relatively few points within each bin, representing a higher level of dispersion of efficacy scores. The potential for confusion between fragmented and bimodal patterns comes from the fact that fragmented patterns in histograms can also contain empty bins at any point (this is seen in Figures 9-11). Fragmented teams can contain substantial gaps in the efficacy scores of adjacent teammates (as shown by Team 1 at time 3) but are still considered fragmented if there is otherwise a general lack of agreement. In the fragmented teams seen in this study, the majority of the data is on one side of the empty bin, but the data is still spread throughout several bins. In the bimodal team (Team 3), there are similar counts of team members on either side of the empty bin.

On a similar note, minority dissent teams (Team 2, Figure 12) would also show at least one empty bin. The difference between a minority dissent team and a fragmented team in this case would be a cluster of data. That is, in Figure 12, one bin contains a large amount of the team members, while all the other bins (including the dissenter) contain relatively small counts of data. The presence of one bin containing a substantial portion of the data is not seen in Figure 11 (Team 1, time 3), which supports the previous claim that is indeed a fragmented team, despite the two-bin separation between the highest scoring individual. While not seen in this study, shared beliefs patterns would likely remain fairly easy to identify. A shared belief team would entail most of the data being in one bin (as the collective efficacy scores would be very close together), with small bins to either side.

Histograms are more intuitive for examining distribution, and this does not change with regard to collective efficacy dispersion. The use of histograms also removes much of the guesswork from categorizing dispersion patterns, and simplifies the criteria used to differentiate dispersion patterns. Simplifying the classification process of observed dispersion patterns will aid future research in this area and reduce the potential for arbitrary rules dictating dispersion patterns.

Strengths and Limitations

While there were challenges associated with transitioning a social dynamics theory into real world observation, there were still strengths of the study, or benefits to the body of collective efficacy and dispersion literature. Likewise, as with all studies, there also limitations with this study in what information can be gleaned.

Strengths.

The main strength of this study lies in its novelty. To date, very little research has been conducted on collective efficacy dispersion patterns (DeRue et al., 2010; Fransen et al., 2017; Loignon et al., 2018; McEwan & Beauchamp, 2017). This study was one of the first to examine collective efficacy dispersion in an observational context and provides valuable information about how future work could improve upon the framework and methodology used here. This study used a common measurement tool, the CEQS, which is frequently used within team dynamics research. Applying the CEQS to collective efficacy dispersion pattern research is crucial to furthering said research within the collective efficacy literature as a whole. Additionally, discovering some of the issues which come with connecting to CEQS to existing theories of collective efficacy dispersion is a necessary step to furthering this body of research.

Using a real-world measurement tool that is already popular in the extant literature is an important step in integrating dispersion theory into practical programs of research. This study also provided some tangible data involving collective efficacy dispersion patterns. Given the lack of observational data in this area (Fransen et al., 2017; Loignon et al., 2018) this data could be beneficial in operationalizing the rules by which collective efficacy dispersion patterns are defined. As noted throughout Chapters 4 and 5, defining the collective efficacy dispersion patterns throughout future research is necessary in order to fully discuss the concept, and analyze it with the appropriate rigor. This study presented some initial classifications that may be helpful to future research in how collective efficacy dispersion patterns are defined. Identifying the difficulties associated with defining dispersion patterns is necessary, and this study has introduced that discussion. This study has also introduced the idea of using histograms, rather than bar charts, to display dispersion patterns. This is valuable, as histograms appear to be a more effective way to differentiate dispersion patterns and are more intuitive to display distribution. A major strength of histograms is that they display small to moderate jumps in efficacy scores more prominently than bar charts do, which makes differentiating dispersion patterns easier.

Furthering the notion that defining dispersion patterns will require further observational work, this study has also provided some indication that dispersion patterns within collective efficacy may not be what was originally theorized. The four patterns proposed by DeRue and colleagues (2010) may be insufficient to truly capture how collective efficacy disperses within a sports team. Additionally, as was noted in Chapter 2, the collective efficacy literature is lacking in longitudinal studies (Fransen et al., 2017; McEwan & Beauchamp, 2014). The fact that dispersion patterns may manifest differently, or in more/different patterns, means more longitudinal work is necessary in the collective efficacy literature, and especially so in the dispersion literature. In fact, the trajectory of the dispersion patterns may be just as important as the dispersion patterns themselves (DeRue et al., 2010; Loignon et al., 2018). Identifying whether or not a particular pattern, such as the pseudo-bimodal or fragmented-dissenter patterns are transitory states, or consistent collective efficacy dispersion patterns will be important in furthering this body of research. On the topic of currently undefined or un-labelled dispersion patterns, this study does provide some evidence to their existence outside of the typology proposed by DeRue and colleagues (2010).

Limitations.

The two foremost limitations of this study were simply a matter of unfortunate circumstance. The sample size of this study was smaller than ideal, for two reasons. The recruitment efforts for this study were met with a very low response rate, with three participating teams out of the roughly 500 who were invited to participate. This was compounded by the COVID-19 pandemic causing a state of emergency in Nova Scotia where this research took place, effectively ending recruitment early. The state of emergency came shortly after an amendment was filed with the Research Ethics Board of Dalhousie. This amendment changed the study procedure to only include one data collection point in an attempt to increase participation. The PI could have also more effectively used their current connections in the local sport community to try to increase participation, rather than mostly cold emailing teams/organizations. The study did have issues within the methodology and framework, as all studies do, but the two aforementioned circumstances certainly hindered what could be learned from this study. Due the poor response rate to recruitment efforts and the pandemic, this study had a very small sample size available for data analysis. This removed any statistical power from the analyses performed, and so no concrete inferences can be made regarding the data analysis done in this study.

In terms of limitations within the study, the theoretical framework and methods drew heavily on the typology of efficacy dispersion patterns presented by DeRue and colleagues (2010). The reliance on the four dispersion patterns described by DeRue and colleagues (2010) may have been a narrow view of the topic. Since collective efficacy dispersion is a sparsely researched aspect of the team dynamics literature, this study may have benefitted from a more open and exploratory approach. The four patterns were quite cleanly represented in DeRue and colleagues' (2010) work, but this clear differentiation was not found in actual observation of collective efficacy dispersion. While a limitation when considering the hypotheses and methods proposed and carried out in this study, the lack of clear dispersion pattern differentiation could be a very fruitful avenue in future research; but did still limit this study from its conception. Furthermore, because the dispersion patterns seen in Chapter 4 did not always cleanly fit one of the four dispersion patterns described by DeRue and colleagues (2010), rules had to be set forth to define the dispersion patterns in an observational context. The rules presented in Chapter 4 could be argued to be relatively arbitrary, and inarguably need further refinement and evidential support.

While poor response rates and the COVID-19 pandemic led to a small sample size, meaning no inferences could be made regarding the data, there were some further limitations associated with the small sample. The small sample hindered the analysis of both hypotheses. With regard to Hypothesis 1, there was a lack of dispersion pattern representation. That is, three of the five data points were fragmented patterns, and there was one team each that presented bimodal and minority dissent patterns. No teams presented a shared beliefs pattern. With a larger sample, there would have been more representation of different dispersion patterns, or the trend of which dispersion patterns could have been shown more clearly. Either scenario would have been beneficial to what this study will provide to the literature. Future research may provide information regarding the prevalence of specific dispersion patterns. In fact, future research may find fragmented patterns to be the predominant collective efficacy dispersion pattern, and shared beliefs patterns to be rare; but that is, at this point, unfounded speculation. Concerning Hypothesis 2, only one team was available for analysis, which was problematic. At this point there is insufficient evidence to make a claim regarding the dynamism of collective efficacy dispersion patterns, or even certain dispersion patterns.

Implications and Future Directions

It is clear that more research is needed concerning collective efficacy dispersion patterns. While it is challenging to infer implications based on descriptive analyses, there are many aspects of emergent state dispersion patterns which should be studied in future work. One of the main findings here was supporting the difficulty in measuring emergent state dispersion patterns, specifically in observation. Dispersion patterns are more clear in theory, so an exploratory approach to future work could be beneficial. In future work, a useful approach may be to examine collective efficacy dispersion in a similar visual manner to the approach used here, but to define dispersion patterns after the data collection, based on observed patterns rather than theoretical ones. As noted above, regardless of whether future work defines dispersion patterns before or after data collection, said future work would likely benefit from using histograms to display emergent state dispersion patterns. Qualitative work would also be helpful, once a basic understanding of dispersion patterns as emergent patterns is found, in determining how dispersion patterns influence the social functioning of a team. Understanding how the dispersion of emergent states influence the social functioning of a team is a primary reason for researching dispersion patterns, rather than treating emergent states as a shared belief within the team. Future research could retest the hypotheses presented in this study, as they were based in a solid, if untested, theory. This may not be the direct next step though; as mentioned above, understanding the practical difficulty in classifying dispersion patterns, as well as dispersion patterns relative to team size, or previously undefined patterns, would have informed the methodology of this study greatly. Considerations such as allowing undefined dispersions to manifest should be given if the hypotheses presented here are to be retested. Finally, qualitative work could also inform on the trajectory of dispersion, with or without the assumption of a team transitioning between particular dispersion patterns. Understanding how the dispersion of collective efficacy changes over time would only benefit how future research categorizes dispersion patterns, and theorizes about their social and performance implications (DeRue et al., 2010; Loignon et al., 2018).

Conclusion

The purpose of this study was to provide a longitudinal examination of collective efficacy dispersion patterns over the course of a competitive season in sport teams, and to explore the influence of cohesion on the manifestation and development of these dispersion patterns. This study assessed a team’s cohesion and collective efficacy beliefs using surveys given to each team member during their season. An amendment was passed following poor responses to recruitment efforts shortening the procedure to just one data collection point. Due to unfortunate circumstances, the sample size for this study was still below what was required to proceed with inferential statistical analyses. Using the collective efficacy scores from each team member, a dispersion pattern was constructed based on the typology described by DeRue and colleagues (2010). The hypotheses presented in this study cannot be supported or rejected at this time. This study provides useful information on how future research could be conducted in the field of collective efficacy dispersion, specifically by demonstrating the difference between theory and observation with regard to constructing collective efficacy dispersion patterns. Ultimately, this study did not explain the manifestation of collective efficacy dispersion, nor add a longitudinal examination of efficacy dispersion. This study did provide some insight into the difference between theoretical approaches to examining dispersion and observational work. Within the team dynamics literature, this study fits with other work aimed at introducing or exploring how dispersion patterns in emergent states can be studied in real teams.

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Appendix A – CEQS

Collective Efficacy Questionnaire

Rate your team's confidence, in terms of the upcoming game or competition, that your team has the ability to …

0= not at all confident 10= extremely confident

1. Outplay the opposing team

0 1 2 3 4 5 6 7 8 9 10

2. Resolve conflicts

0 1 2 3 4 5 6 7 8 9 10

3. Perform under pressure

0 1 2 3 4 5 6 7 8 9 10

4. Be ready

0 1 2 3 4 5 6 7 8 9 10

5. Show more ability than the other team

0 1 2 3 4 5 6 7 8 9 10

6. Be united

0 1 2 3 4 5 6 7 8 9 10

7. Persist when obstacles are present

0 1 2 3 4 5 6 7 8 9 10

8. Demonstrate a strong work ethic

0 1 2 3 4 5 6 7 8 9 10

9. Stay in the game when it seems your team is not getting any breaks

0 1 2 3 4 5 6 7 8 9 10

10. Play to its capabilities

0 1 2 3 4 5 6 7 8 9 10

11. Play well without your best player

0 1 2 3 4 5 6 7 8 9 10

12. Mentally prepare for this competition

0 1 2 3 4 5 6 7 8 9 10

13. Keep a positive attitude

0 1 2 3 4 5 6 7 8 9 10

14. Play more skillfully than the opponent

0 1 2 3 4 5 6 7 8 9 10

15. Perform better than the opposing team(s)

0 1 2 3 4 5 6 7 8 9 10

16. Show enthusiasm

0 1 2 3 4 5 6 7 8 9 10

17. Overcome distractions

0 1 2 3 4 5 6 7 8 9 10

18. Physically prepare for this competition

0 1 2 3 4 5 6 7 8 9 10

19. Devise a successful strategy

0 1 2 3 4 5 6 7 8 9 10

20. Maintain effective communication

0 1 2 3 4 5 6 7 8 9 10

Factors: Ability (1, 5, 14, 15), Preparation (4, 12, 18, 19), Effort (8, 10, 16, 17), Persistence (3, 7, 9, 11), Unity (2, 6, 13, 20).

Appendix B – GEQ

The GEQ is a general, rather than situation specific, measure of cohesiveness in sport teams.

Administration

Complete independently, away from distraction, and not immediately before or after a game.

Scoring

Individual attraction to group, social (ATGS)

Item	Score
1*	
3*	
5	
7*	
9	
Sum	
Mean	

Individual attraction to group, task (ATGT)

Item	Score
2*	
4*	
6*	
8*	
Sum	
Mean	

Group Integration, social (GIS)

Item	Score
11*	
13*	
15	
17*	
Sum	
Mean	

Group Integration, task (GIT)

Item	Score
10	
12	
14*	
16	
18*	
Sum	
Mean	

(*) items are reverse scored

Each factor is summed and then an average taken for individuals, and then the team.

Group Environment Questionnaire (GEQ)

Name:

Team:

Date:

This questionnaire is designed to assess your perceptions of your team. There are no right or wrong answers, so please give your immediate reaction. Some of the questions may seem repetitive, but please answer ALL questions. Your personal responses will be kept in strictest confidence.

The following statements are designed to assess your feelings about YOUR PERSONAL INVOLVEMENT with this team. Pleas circle a number from 1 to 9 to indicate your level of agreement with these statements.

1. I do not enjoy being part of the social activities of this team.

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

2. I am not happy with the amount of playing time I get

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

3. I am not going to miss the members of this team when the season ends

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

4. I am unhappy with my team's level of desire to win

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

5. Some of my best friends are on this team

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

6. This team does not give me enough opportunities to improve my personal performance

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

7. I enjoy other parties rather than team parties

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

8. I do not like the style of play on this team

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

9. For me, this is one of the most important social groups to which I belong

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

10. Our team is united in trying to reach its goals for performance

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

11. Members of this team would rather go out on their own than get together as a team

1 2 3 4 5 6 7 8 9

Strongly Disagree | Strongly Agree

12. We all take responsibility for any loss or poor performance by our team

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree

13. Our team members rarely party together

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree

14. Our team members have conflicting aspirations for the team's performance

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree

15. Our team would like to spend time together in the offseason

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree

16. If members of our team have problems in practice, everyone wants to help them so we can get back together again

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree

17. Members of our team do not stick together outside of practice and games

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree

18. Our team members do not communicate freely about each athlete's responsibilities during competition and practice

1 2 3 4 5 6 7 8 9

Strongly Disagree ... Strongly Agree