

Relationships Among Team Cohesion and Performance, Anxiety, Retention, and Satisfaction

by

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April 28, 2015

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In addition to the Group Environment Questionnaire (GEQ), Social Networking Analysis (SNA) has recently emerged as a promising research approach to measuring team cohesion. However, little to no research has simultaneously used both measures to compare and contrast their unique benefits. Thus, the present study sought to examine the relationship between SNA (friendship and efficacy) and the GEQ, as well as their relationships with team performance, anxiety, retention, and satisfaction. Players and coaches from four NCAA Division-I Women's Volleyball teams ($N = 49$) completed an online survey at preseason, midseason, and postseason. Findings indicated that the GEQ and SNA are likely measuring different constructs. While the GEQ was a better global measure of team cohesion, SNA was able to offer unique contributions in exploring how specific dyadic relationships among team members evolve over the course of the season and contribute to performance, anxiety, retention, and satisfaction. Visual inspections of the SNA networks revealed that the team with fewer friendship connections was more successful in terms of team performance. In addition, SNA efficacy was associated with lower levels of competitive somatic anxiety. The GEQ subscales that focused on individual attractions to the group (ATG-T and ATG-S) and SNA friendship and efficacy were moderately related to later intentions of returning to the team the following season. Finally, lower levels of cohesion, as measured by both the GEQ and SNA, were associated with lower levels of satisfaction later in

the season. The results of this study help to highlight the positive outcomes variables associated with team cohesion, while also further positioning SNA and the GEQ as important, yet unique, tools for athletic administrators and coaches to use to better understand the functioning, or lack thereof, of their teams. Acknowledgements of practical applications and recommendations for future research are provided.

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A Thesis

Presented To the Faculty of the Department of Kinesiology

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Masters of Science in Kinesiology

by

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April 28, 2015

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Chapter 1: Introduction

Throughout history, people have joined together in groups to accomplish an array of goals. In order to understand the factors that facilitate group success, it is important to investigate the development and maintenance of a group, or the cohesion process. Initially, cohesion was explained as the totality of forces causing members to remain in a group or the resistance of the group to disruptive forces (Festinger, Schachter, & Back, 1950; Gross & Martin, 1952). Later, Carron (1982) defined cohesion as “a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives.” Thus, Carron (1982) evolved the definition to reflect that a cohesive group is unified and task-oriented.

As proposed by Carron’s (1982) conceptual framework of cohesion, the consequences of cohesion are divided into group (e.g., team stability, team performance) and individual (e.g., behavioral consequences, individual performance, and individual satisfaction) outcomes. A variety of outcomes of increased cohesion have been examined. These outcomes include performance (Carron, Colman, Wheeler, & Stevens, 2002; Mullen & Copper, 1994; Williams & Widmeyer, 1991), adherence/retention patterns (Carron, Widmeyer, & Brawley, 1988; Spink, Wilson, & Odnokon, 2010; Spink, 1995), athlete satisfaction (Kamphoff, Gill, & Huddleston, 2005; Widmeyer & Williams, 1991), and efficacy (Heuze, Raimbault, & Fontayne, 2006; Leo Marcos, Sanchez Miguel, Sanchez Oliva, & Garcia Calvo, 2010; Paskevich, Dorsch, Brawley, & Widmeyer, 1999; Ramzaninezhad, Keshtan, Shahamat, & Kordshooli, 2009; Spink, 1990; Vesković, Valdevit, & Ilić, 2008). In addition, research has supported the fact that cohesion is significantly associated with an athlete’s competitive anxiety (Borrego, Cid, & Silva, 2012; Eys, Hardy, Carron, & Beauchamp, 2003; Prapavessis & Carron, 1996). Thus, team cohesion is

particularly important in sport, because it enables athletes and the team as a whole to reach peak performance and fosters athlete satisfaction and overall well-being.

Consequently, a variety of fields including psychology, kinesiology, and sport studies have investigated the antecedents and consequences of cohesion using various measures. In particular, the sport psychology field has seen slight variations in the operationalization and measurement of cohesion. Of the few measures developed to assess cohesion, the Group Environment Questionnaire (GEQ) has emerged as the prominent cohesion instrument (Carron, Widmeyer, & Brawley, 1985), while the other measures utilize adapted items from the GEQ (Leeson & Fletcher, 2005). Using Carron's conceptual framework of cohesion (Carron & Hausenblas, 1998), Carron, Widmeyer, and Brawley (1985) developed the GEQ in an effort to understand the factors related to sport team cohesion.

The conceptual framework of cohesion from which the GEQ was developed is divided into two major categories: *group integration* and *individual attractions to the group*. The *group integration* category includes a member's perceptions of the group as a whole, and the *individual attractions to the group* consists of a member's personal attractions to the group. *Group integration* represents the closeness and bonding within the group as a whole. On the other hand, *individual attractions* to the group describe a member's "feelings about the group, their personal role involvement, and involvement with other group members" (Carron, et al., 1985). The next level of this model reveals that group integration and individual attractions to the group can be focused on either task or social characteristics. The social focal point constitutes developing and maintaining social relationships within the group, while the task component involves orientation toward achieving the goals and objectives of the group. Therefore, four constructs can be identified: individual attractions to group-task (ATG-T), individual attractions to group-social

(ATG-S), group integration-task (GI-T), and group integration-social (GI-S) (see Figure 1). Based upon the conceptual model, the final version of the GEQ consists of 18 items and utilizes a 9-point Likert scale: ATG-T, 4 items (e.g., “I do not like the style of play on this team.”); ATG-S, 5 items (e.g., “Some of my best friends are on this team.”); GI-T, 5 items (e.g., “Our team is united in trying to reach its goals for performance.”); GI-S, 4 items (e.g., “Members of our team do not stick together outside of practice and games.”) (Carron et al., 1985).

In addition to the GEQ, social network analysis (SNA) has recently emerged as a promising research approach for measuring cohesion. “Network cohesion deals with whether an individual is connected to people who are in turn tied to many others, constituting a highly interconnected or cohesive social network” (Ho, Rousseau, & Levesque, 2006). SNA can be used to map and understand social relations, structure, and change. It has been used in a variety of disciplines and is based upon the field of measurement called sociometry, which provides a means for illustrating the interpersonal structure of groups using sociograms (Quatman & Chelladurai, 2008). Sociograms represent individuals within a network as points and the relationship between two individuals as a line, or tie, connecting the points to one another creating a web-like graphical output (Quatman & Chelladurai, 2008). Using SNA software, this sociogram is then used to calculate additional network analyses including the frequency of incoming and outgoing ties from one individual to another, the peripheral or central nature of an individual within the network, the presence of subgroups or cliques, and the size of the entire network (Quatman & Chelladurai, 2008). Quatman and Chelladurai (2008) even identified one of the whole network considerations of SNA as cohesion or the degree to which a network can remain connected when various individuals are removed from the network.

Wellman (1988) identified five characteristics that distinguish SNA from traditional research approaches, such as survey instruments. First, behavior is interpreted in terms of structural constraints on activity, rather than inner forces within individuals, due to the fact that SNA allows respondents to assign others to specific categories (e.g., friend). Compared to the GEQ, which measures each individual's behavior as independent of others, SNA accounts for the interdependent nature of individuals within a network (i.e., relationships) and reflects that cohesion can only exist in the context of others. Second, SNA focuses on the relationships between individuals, compared to separating individuals into categories based upon individual attributes. In fact, SNA has the capacity to assess relationships between network members and individual attributes simultaneously, so that deductions can be made in regard to how individual attributes influence ties between individuals. Third, SNA does not assume that network members engage only in multiple duets (reciprocated tie between two individuals) with separate individuals. SNA has the capability of depicting all relationships, including those that are less common such as outgoing ties that are not reciprocated with an incoming tie, subgroups or cliques, and different kinds of relationships (i.e., friendship, co-workers, etc.). Fourth, a group is considered a network of networks that may or may not be divided into separate groups, which means that subgroups or cliques may exist within the network as a whole. However, the GEQ does not account for cliques that might exist within the larger network or team, which could distort the assessment of cohesion by reflecting a cohesive network when in fact it is due to a clique of individuals. SNA is able to account for this type of relationship. Finally, SNA examines the relational nature of the network compared to statistical methods that require independent units of analysis. That is, SNA assumes that individuals are interdependent and it is crucial that

all group members are included in a dataset in order to depict a true representation of the network.

Furthermore, SNA sociograms have the capacity to examine network structures (such as teams, companies, organizations, etc.) in combination with individual attributes (such as age, playing experience, team position, etc.) making it well suited for investigating the complex relations that exist within sport teams (Lusher, Robbins, & Kremer, 2010). In addition, SNA has been utilized in studies of coaching burnout and deviance, managerial recruitment, and even racial stacking in sport (Nixon, 1993). It is important to acknowledge that SNA is not seen as a replacement to existing instruments (such as the GEQ), but as an addition or complementary way to consider cohesion (cf. Warner, Bowers, & Dixon, 2011). In fact, Warner and colleagues (2012) suggested that research would “benefit from synthesizing the relative contributions of the GEQ and SNA” (p. 64). For example, it may be beneficial to know if the most popular or prominent team members (i.e., SNA centrality) are also those who have the highest perceptions of team cohesion and strongest investments in the group’s objectives (as measured by the GEQ), because this would allow coaches the opportunity to identify the reasons that some team members are more central to the team than others. Overall, SNA can provide a better understanding of team dynamics, individual roles within the team, and network evolution while illuminating issues related to cohesion and performance.

To the knowledge of the researchers, these measures have not yet been used simultaneously in an investigation of team cohesion. It is expected that the results of this study will help highlight the positive outcomes of team cohesion, while also further positioning SNA as a diagnostic tool for coaches to better understand the cohesiveness, or lack thereof, of their team. Therefore, the current study utilized both the GEQ and SNA to assess the cohesion of

Division I collegiate volleyball teams in order to explore the use of SNA as a complementary tool in cohesion research and compare it to the more widely used measure in sport psychology, the GEQ.

In order to fill this void in the research, the first purpose of the present study was to determine areas of agreement and disagreement between the GEQ and SNA regarding the measurement of team cohesion and temporal patterns in cohesion across the three time points. Both the GEQ and SNA will generate a cohesion measure for each individual and team as a whole, which will indicate the level of cohesion perceived by the participants. The researcher sought to answer two questions:

Q1a: Is there agreement between the GEQ and SNA total cohesion scores at each time point?

Q1b: Is there agreement in longitudinal patterns between both the (a) GEQ and SNA total cohesion scores and (b) GEQ subscales and SNA networks?

In regard to the two research questions, the researcher hypothesized that:

H1a: Both the GEQ and SNA total scores will be in agreement in terms of team cohesiveness at each time point.

H1b: Both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks would be in agreement in terms of the temporal patterns of cohesion over the course of the season.

Understanding the relationship between cohesion and performance and the factors that either foster or inhibit cohesion could benefit coaches in pursuit of peak performance and athlete satisfaction. Yet, simply establishing a relationship, either positive or negative, between cohesion and a given outcome variable, does little to aid coaches and athletic administrators in creating the

best possible athletic environment. Thus, utilizing a longitudinal design (i.e., three time points during the volleyball season) will not only provide insight into the evolution of social networks over the course of a season, but will also aid in establishing directionality between cohesion and outcome variables. For the current study, the researcher chose to focus on the group outcome of team performance and individual outcomes concerning behavioral consequences and satisfaction as outlined in the conceptual framework of cohesion. Therefore, the second purpose of this study was to determine the relationships among cohesion, using the GEQ and SNA, and team performance, anxiety, retention, and satisfaction over the course of the season. The second research question was:

Q2: Is the GEQ or SNA a better predictor of (a) team performance, (b) competitive anxiety, (c) retention, and (d) satisfaction?

Based upon previous research, the researcher hypothesized that:

H2a: Higher levels of cohesion, as determined by both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks, would be related to better team performance.

H2b: Higher levels of cohesion, as measured by the GI-T subscale of the GEQ and SNA efficacy network, would be associated with lower levels of competitive trait anxiety.

H2c: Higher levels of cohesion, as measured by the SNA friendship network, would be related to higher levels of retention.

H2d: Higher levels of cohesion, as measured by both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks, would be associated with higher levels of satisfaction.

Chapter 2: Review of the Literature

The present study sought to examine the impact of using both the Group Environment Questionnaire (GEQ) and Social Network Analysis (SNA) in an investigation of team cohesion and its relationship with team performance and individual thoughts, feelings, and behaviors. The following review describes the research concerning the cohesion-performance relationship, the relationship among cohesion and athlete anxiety, adherence/retention behaviors, and satisfaction. It should be noted that SNA is a fairly new methodology; consequently, the majority of the research described assesses cohesion via the GEQ.

Team Performance

Historically, the research in sport psychology has been inconclusive as to the relationship between cohesion and team performance. Fortunately, meta-analyses were carried out in order to provide more definitive answers on the cohesion-performance question. Mullen and Copper (1994) combined the results of 49 studies regarding the cohesiveness-performance effect, which revealed an overall significant effect of small magnitude ($\bar{r} = .248$). Although the Mullen and Copper meta-analysis provided useful insights into the cohesion-performance relationship, the included studies focused on a variety of groups other than sport teams, such as military units, lab groups, business teams, etc., and did not include unpublished studies and some refereed publications. Thus, with a larger body of research and a primary focus on sport teams, a meta-analysis conducted by Carron and colleagues (2002) found a moderate to large relationship between cohesion and performance in sport ($ES = .655$). Specifically, those studies that used the GEQ in order to measure cohesion, demonstrated a relationship classified as moderate in size ($ES = .499$). These results were consistent with the results reported *for sport* in the Mullen and Copper meta-analysis. Thus, the magnitude of the effect for the cohesion-performance

relationship is debatable depending on the type of group. The cohesiveness-performance effect also differs depending on the size of the group and gender; a stronger cohesiveness-performance effect has been found among smaller groups and female athletes/teams and a weaker effect among larger groups and male athletes/teams (Carron et al., 2002; Mullen & Copper, 1994).

Studies have demonstrated differing results in regard to the cohesion-performance relationship dependent on the degree of interaction required by the group. A meta-analysis by Mullen and Copper (1994) demonstrated that sports team exhibited the strongest cohesion-performance effect, followed by military groups, non-sport, nonmilitary groups and artificial groups. Specifically among sport teams, there is a difference in the relationship between interacting and coacting sports. Interacting sports require team members to coordinate their efforts and performances to produce a team performance outcome (i.e., volleyball), whereas the performance outcome in coacting sport is simply the sum of individual performance outcomes (i.e., golf). It is generally hypothesized that the cohesion-performance relationship is positive among interacting sports, but negative in coacting sports due to the incongruence between team cohesion and the individual nature of performance. According to Landers and Leuschen (1974), the reason for different performance findings rest in the fact that cooperative tasks found within interacting sports facilitate interaction that leads to greater cohesiveness and performance. However, meta-analyses conducted by Mullen and Copper (1994) and Carron and colleagues (2002) did not find a significant difference between interactive and coactive sports and performance. Thus, the cohesion-performance relationship is robust across sport types, which shows consistency rather than contradictory results.

In order to investigate the cohesion-performance relationship among coactive sports, Williams and Widmeyer (1991) studied 83 female golfers from Division-I teams participating in

a tournament. The researchers measured cohesion (using the GEQ), intrateam communication, and member motivation. Each team's total tournament score minus the team differential score (i.e., how well a team played prior to the tournament) was utilized to calculate the performance outcome. The results demonstrated that only task cohesion (ATG-T and GI-T) predicted performance. Furthermore, task cohesion predicted communication, while social cohesion (ATG-S and GI-S) predicted motivation. That is, more task cohesive teams had better performance and communication, while teams with higher social cohesion had greater motivation. A possible confounding factor includes the measure of individual motivation asked the participants to gauge how important it was to them personally to achieve the team goal, which directly reflects an aspect of task cohesion. Also, each golf team was not tested in its entirety, so it is possible that only high performers that would travel to events were included in the sample. Despite the general hypothesis that the cohesion-performance relationship is negative in coacting sports, the results revealed that cohesion relates positively to performance in coacting sports, which may have been confounded by the measures or sampling procedures. Therefore, Williams and Widmeyer (1991) demonstrated that the cohesion-performance relationship is likely positive among both interacting and coacting sports.

Furthermore, research regarding the cohesion-performance relationship has shown differing results between correlational and experimental designs, which each have certain quandaries. While the correlational paradigm examines individual member perceptions of group cohesion, the direction of the influential relationship is in question. On the other hand, the experimental paradigm generates groups of individuals based on high or low levels of cohesiveness, yet the artificiality of these groups questions the experimental approach. This difference in methodology suggests that the cohesion-performance effect would be stronger

among real groups and weaker among artificial groups induced in the laboratory. Mullen and Copper (1994) integrated previous research examining a total of 49 studies. Those studies from the correlational paradigm contributed a small effect ($\bar{r} = .252$) between cohesion and performance, but a smaller effect ($\bar{r} = .223$) was obtained from the experimental paradigm. However, Carron and colleagues (2002) did not find a significant difference in the magnitude of the relationship between correlational and experimental designs. Therefore, the relationship between cohesion and performance remains inconclusive depending on the type of study design.

Finally, temporal patterns in the relationship between cohesion and performance (i.e., from cohesion to performance and from performance to cohesion) have yet to be conclusively defined. In an integrative effort to gauge the direction of effects between cohesion and performance, the meta-analysis conducted by Mullen and Copper (1994) suggested that although cohesion may indeed act as an antecedent to performance ($r = .246$), the tendency for the team to experience greater cohesion as a result of performance may be even stronger ($r = .505$). Therefore, performance was seen as a stronger antecedent of cohesion compared to acting as an outcome of cohesion. However, the meta-analysis by Carron and colleagues (2002) demonstrated no difference in cohesion as a cause for or a result of successful performance. That is, both task and social cohesion contributes to better performance and, likewise, better performance contributes to task and social cohesion.

While the cohesion-performance relationship research has been dominated by the GEQ, a recent study conducted by Warner, Bowers, and Dixon (2012) used SNA as a tool to investigate the cohesion and performance of two Division-I women's basketball teams (Team A and Team B). In addition to the players, the head coach, assistants and support staff completed a roster-based online survey tailored to each team during the offseason, preseason, following

nonconference play or midseason, and end of season. For each individual on the roster, the participant indicated whether or not they went to this person for advice, trust this person, consider this person a close friend, and feel confident about this person's basketball-related knowledge and/or ability. These measures established the advice, trust, friendship, and efficacy networks of each participant. In addition, team performance was measured with the team's winning percentage, which demonstrated that Team A had a higher winning percentage than Team B. Furthermore, Team A (the more successful team) showed a steady increase in structural cohesion in terms of efficacy, trust, and advice networks over time. While Team A reported the highest levels of structural cohesion on the efficacy and trust networks, Team B reported the highest levels on the friendship and advice networks. Based upon these results, the researchers hypothesized that increases in cohesion with regard to efficacy and trust should improve team performance, yet improvements in friendship and advice would negatively affect team performance. The authors further pointed out that efficacy and trust networks were more task-oriented and seemed to improve performance, whereas friendship and advice were more social in nature and did not improve performance. In regard to future directions, the authors suggested that future research consider the impact the different networks would have on athlete retention and satisfaction.

Based upon this research regarding the cohesion-performance relationship, the researcher hypothesized that:

H2a: Higher levels of cohesion, as determined by both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks, would be related to better team performance.

Competitive Anxiety

In the context of sport participation, competitive anxiety is defined as “a tendency to perceive competitive situations as threatening and to respond to these situations with feelings of apprehension and tension” (Martens, Vealey, & Burton, 1990). A distinction within competitive anxiety can be made between momentary states and more permanent traits. Trait anxiety refers to an enduring characteristic of an individual’s personality, which influences one’s perception of a competitive situation (Patel, Omar, & Terry, 2010). On the other hand, state anxiety or A-state (Prapavessis & Carron, 1996) is thought to derive from feelings of stress in regard to perceptions of the importance of a given situation and uncertainty about the outcome (Eys et al., 2003). Competitive anxiety manifests itself in three forms: cognitive anxiety (e.g., worry, self-doubt), somatic anxiety (e.g., perceived increased heart rate, sweating), and self-confidence. Competitive anxiety has been found to be one of the individual variables negatively associated with cohesion, as members of highly task cohesive teams are likely to experience lower levels of competitive state anxiety compared to members of less cohesive teams. Research conducted with military groups found that members of cohesive groups had lower levels of anxiety than less cohesive groups (Julian, Bishop, & Fiedler, 1966).

Prapavessis and Carron (1996) assessed how group perceptions of specific forms of cohesion (i.e., ATG-T, ATG-S, GI-T, and GI-S) are associated with competitive state anxiety. A total of 110 male (n = 68) and female (n = 42) athletes from interactive team sports were asked to complete the GEQ and additional items that examined the degree to which the athletes perceived cohesion to be a psychological benefit and a psychological cost. The participants completed the Competitive State Anxiety Inventory-2 (CSAI-2) approximately fifteen minutes prior to a competition. Athletes with higher perception of task cohesion, as reflected in the ATG-T

subscale, experienced a lower level of cognitive anxiety prior to competition. However, there was not a strong relationship between social cohesion and cognitive and somatic anxiety levels. Therefore, athletes with higher perceptions of team task cohesiveness were more likely to indicate that they felt less pressure to implement group responsibilities and meet the expectations of teammates. The pressure to carry out responsibilities and satisfy the expectations of others can be assumed to be task-oriented activities. Consequently, they experienced lower state anxiety prior to competition.

In an effort to extend the work of Prapavessis and Carron (1996) who only found a significant relationship between task cohesion and anxiety, Eys and colleagues (2003) examined the relationship between athlete perceptions of task cohesiveness (Individual Attractions to the Group-Task: ATG-T; Group Integration-Task: GI-T) and the “degree to which perceptions of the presence of precompetition cognitive and somatic symptoms are viewed as facilitative or debilitating for performance” (p. 68). That is, each participant was asked to rate the extent to which he/she felt that each symptom was either debilitating (harmful) or facilitative (helpful) to his/her performance. The sample included 276 male and 116 female athletes from interactive sports at the intercollegiate, club, or competitive school level. Thirty to forty-five minutes prior to a regular season game, participants completed a modified version of the CSAI-2, which consisted of only the cognitive and somatic subscales and a scale for each question to gauge their interpretation (debilitating or facilitative) of the symptoms. In analyzing the data, two extreme groups were created: those with a negative sum of interpretations of experienced symptoms (Debilitative Group) and those with a positive sum of interpretations of experienced symptoms (Facilitative Group). Athletes in the Facilitative Group had higher perceptions of both ATG-T and GI-T compared to those in the Debilitative Group. In particular, athletes who viewed their

cognitive symptoms as facilitative had more positive perceptions of ATG-T and GI-T and athletes who viewed their somatic symptoms as facilitative had more positive perceptions of GI-T. Therefore, the more positive their perceptions of task cohesion, the more facilitative the athletes interpreted their state anxiety symptoms.

In comparison to the findings of Prapavessis and Carron (1996), Eys and colleagues (2003) found a relationship between both cognitive and somatic anxiety and cohesion and discovered that both ATG-T and GI-T were related to anxiety. In fact, Eys and colleagues (2003) found that the cohesion-state anxiety relationship was stronger for GI-T compared to ATG-T. These differential findings could be a result of the substantially larger sample size accrued by Eys and colleagues (2003), 392 compared to 110, which could have exposed an insignificant or small relationship between state anxiety and GI-T. Also, the difference in average age of the participants, 23.4 ($SD = 5.95$) compared to 17.12 ($SD = 3.76$), could have contributed to their perceptions of cohesion and their interpretations of their anxiety symptoms based on level of competition, years of sport experience, or even maturity. Yet, the most plausible reason for the differential findings between the two studies is the fact that Eys and colleagues (2003) examined the interpretation (i.e., facilitative or debilitating) attached to the anxiety symptoms. Despite these differences, the findings of Eys and colleagues (2003) reinforce those of Prapavessis and Carron (1996) explaining that members of highly task cohesive teams are likely to experience lower levels of competitive state anxiety compared to members of less cohesive teams.

A recent follow-up to the results of Prapavessis and Carron (1996) and Eys et al. (2003), sought to examine the relationship between group cohesion and anxiety in soccer (Borrego et al., 2012). A total of 366 soccer players, who took part in Portugal's championships, participated in the study and included 322 males and 44 females. The participants completed the Portuguese

version of the GEQ and approximately 60 minutes before their game, completed the Portuguese version of the CSAI-2. The researchers analyzed the mean differences between individual attraction (ATG-T) and integration in the group (GI-T) in terms of task, as well as between somatic and cognitive anxiety for all the participants. Both the males and females perceived themselves to be more attracted to the group (ATG-T) rather than integrated in it (GI-T) and reported experiencing more precompetition cognitive anxiety than somatic. Although cognitive anxiety related significantly with ATG-T and GI-T among the total number of participants and the male gender, the correlation was weak and negative. The best predictor of cognitive and somatic anxiety was GI-T; integration in the group associated to the task (GI-T) explained 19.4% of the variance and ATG-T explained only 0.6% of the variance for both cognitive and somatic anxiety.

In accordance with previous research, the best predictor for both cognitive and somatic anxiety was integration to the group associated with the task. That is, athletes who felt involved in the team goals experienced lower levels of cognitive and somatic anxiety. This further confirms the relationship between cognitive factors and cohesion. First, Prapavessis and Carron (1996) found that athletes who had higher perceptions of cohesion experience less cognitive anxiety. Second, Eys and colleagues (2003) extended the conclusions of Prapavessis and Carron (1996) and found that athletes who interpreted their symptoms as facilitative to their performance were more likely to perceive greater team cohesion and consequently, less cognitive anxiety. Therefore, these studies demonstrate that there is an association between groups with higher task cohesion and experiencing fewer or less severe cognitive and somatic symptoms of competitive anxiety, thereby generating the ability to deal better with anxiety-producing situations. In conclusion, the sum of this research propelled the researcher to hypothesize that:

H2b: Higher levels of cohesion, as measured by the GI-T subscale of the GEQ and SNA efficacy network, would be associated with lower levels of competitive trait anxiety.

Adherence/Retention

The question of why individuals adhere to exercise and sporting programs is still a pressing concern. Understanding the factors that contribute to an individual's adherence to exercise or sport could prove vital in terms of maintaining a successful team atmosphere and retaining athletes. By its very definition, cohesiveness depicts a united whole in pursuit of common goals and maintenance of the group as a whole is paramount to the accomplishment of the group's goals. Therefore, it is clear that group cohesion is related to the adherence of its members. In fact, a meta-analysis by Carron, Hausenblas, and Mack (1996) has shown that a moderate effect size of 0.62 is present for the task cohesion-individual adherence behavior relationship. That is, task cohesion has a moderate effect on whether individuals demonstrate adherence behavior in group exercise settings.

In order to explore the cohesion-member adherence relationship, Carron, Widmeyer, and Brawley (1988) examined cohesion relationships across different physical activity groups and settings. In Study 1, past members of fitness classes and elite sport teams who had voluntarily left their respective groups before the completion of the program or season (i.e., nonadherers) were compared with individuals still active in their groups (i.e., adherers). This examination generated four groups: fitness class adherers (n = 120), fitness class nonadherers (n = 30), elite sport adherers (n = 102), and elite sport nonadherers (n = 27). The participants completed the GEQ, which was slightly modified for the exercise class adherers and nonadherers (i.e., minor tense and frame of reference text changes). The results demonstrated that the elite sport adherers

were more attracted to the group's task (ATG-T) and perceived the group as more integrated around social and task dimensions (GI-S and GI-T, respectively) compared to the sport nonadherers. Similarly, the fitness class adherers were more attracted to the group's task and to the group as a social unit compared to the fitness class nonadherers. Nonetheless, the fitness class adherers and nonadherers did not differ in their perceptions of the degree to which the group was united based on a social component (GI-S) or around goals and objectives (GI-T).

Although the work of Carron and colleagues (1988) concluded that developing a group as a task and social cohesive group could contribute to increased adherence in fitness class and sporting environments, they questioned if the relationship would differ for other physical activity groups and forms of adherence. Consequently, their purpose of Study 2 was to assess the relationship between group cohesion and absenteeism/lateness among 212 male and female summer recreation sport participants. Absenteeism/lateness was measured by keeping track of the number of times an individual arrived after the formal practice had begun within the final four weeks of the season. The researchers chose to proceed with data analysis using an extreme-groups design with participants who were neither absent nor late comprising one extreme group and those who were absent or late on at least two occasions comprising the other. Both male and female participants who perceived that there was lower social cohesion with respect to their team exhibited greater absenteeism/lateness, while those who perceived greater social cohesion were not absent/late. Thus, providing support that social cohesion is of importance to sport adherence.

In general, the findings from these two studies reveal that perceptions of group cohesiveness are strongly related to different forms of individual adherence behavior across a variety of physical activity groups. However, the specific aspects of cohesiveness associated with adherence varied across these different groups. Specifically, a critical element associated with

member adherence in elite sport teams was cohesion based on the individual attractions to the group task and group integration based on the task. Thus, emphasizing the group task and individual commitment to the group may lead to greater individual adherence behavior on elite sport teams. In both recreation sport participants and elite sport team members, the individual's perception of social cohesion was the distinguishing factor that separated low and high adherers in regard to withdrawal behavior (Study 1) and absenteeism/lateness (Study 2) (Carron et al., 1988). So, by fostering and better understanding the group's social framework, adherence in summer recreation leagues could be enhanced. Finally, Carron and colleagues (1988) Study 1 demonstrated that cohesiveness is important in fitness class situations as nonadherers were less attracted to the group' task and social aspects compared to those who maintained their involvement. Based upon these results, it is possible that greater adherence in fitness class settings could be produced by focusing more on group cohesion and interaction rather than viewing the class as a set of individuals.

In order to extend the findings of previous studies investigating the cohesion-adherence relationship, Spink (1995) examined the perceptions of team cohesiveness and the intention of players to return. In Spink' Study 1, 196 females competing on recreational ringette teams were asked to complete the GEQ (cohesiveness), indicate how likely they were to return to playing ringette next season on a 5-point scale (future participation), and record the final league standing of their team (team performance). The players who indicated that they would likely return the next season reported higher cohesiveness compared to those who indicated that they were not likely to return. There was no significant difference in team standing based on intention to return. In a follow-up study (Study 2), the sample consisted of females participating in the Canadian National Ringette Championship and due to an extreme-groups design, the final sample was

comprised of 124 participants. Participants who intended to return (n = 77) responded to the category *very likely* to return and those not likely to return (n = 47) responded to the *not at all likely* and the *not likely* to return categories. Both social cohesion factors (GI-S and ATG-S) were greater for those who intended to return the following season. Similarly to the results of Study 1, there was no significant difference in position finished between the teams of those who intended to return and those who did not intend to return. Therefore, cohesion rather than team performance seems to be important for athlete retention.

The results of Study 1 and Study 2 conducted by Spink (1995) suggest that a female player's perception of cohesiveness is positively related to her intent to return for another season for both recreational and elite sport participants. In both recreational and elite female athletes, those who indicated that they would likely return the next season reported higher cohesiveness compared to those who indicated that they were not likely to return. Specifically, those intending to return for another season were more attracted to the team as a social unit. Moreover, Carron and colleagues (1988) revealed that recreational participants who perceived greater social cohesiveness exhibited less absenteeism/lateness. Thus, the research points to the idea that the social atmosphere of their team is more important to female athletes compared to male athletes. However, Carron and colleagues (1988) assessed both males and females and discovered that the gender differences in the cohesion-adherence relationship did not exist.

Furthermore, Spink, Wilson and Odnokon (2010) extended the research to assess actual future participation, rather than intentions, and perceptions of team cohesion. For this study, participants were 122 male ice hockey players playing on elite junior teams. Participants completed the GEQ during the last 2 weeks of their regular season. By examining the rosters of the teams the following year, actual return participation was determined for each individual

(individuals who were not eligible to return based on age restrictions, trades, cuts, or career-ending injury were excluded). The four subscales of cohesion explained 16% of the variance in the prediction of group membership with ATG-T contributing most to the significant mean difference between returners ($M = 29.8$, $SD = 5.0$) and non-returners ($M = 25.0$, $SD = 6.2$). After controlling for team standing, individual perceptions of task cohesion (ATG-T) significantly predicted actual return.

The emergence of task cohesion as the differentiating factor contrasts with Spink (1995), which examined intention to return and found that social cohesion tended to differentiate those who intended to return from those who did not. Spink and colleagues (2010) explained that this difference in the type of cohesion may reflect the fact that this study assessed actual return compared to intention to return and only sampled males. The results of Spink (1995) were based on a female sample. Therefore, Spink (1995) in concert with Spink and colleagues (2010) reveal gender differences in terms of the type of cohesion that significantly contributes to the cohesion-adherence relationship; males returned to sport based on high perceptions of task cohesion and females were more likely to return to teams they viewed as socially cohesive. In terms of the relationship between cohesion and adherence or retention, the researcher hypothesized that:

H2c: Higher levels of cohesion, as measured by the SNA friendship network, would be related to higher levels of retention.

Satisfaction

Chelladurai and Riemer (1997) defined athlete satisfaction as “a positive affective state resulting from a complex evaluation of the structures, processes, and outcomes associated with the athletic experience” (p. 135). Thus, the level of satisfaction is a reflection of an athlete’s reactions to the extent that the athletic experience meets one’s personal standards and

expectations. One personal factor that has been shown to be positively related to team cohesion is the member's satisfaction with the task and social aspects of the group (Aoyagi, Cox, & McGuire, 2008; Kamphoff et al., 2005; Widmeyer & Williams, 1991). Carron (1982) included satisfaction as both an antecedent and outcome in his conceptual framework of cohesion. Similar to the conceptual framework of cohesion provided by Carron and his associates (1985), Chelladurai and Riemer (1997) considered the distinction between an individual's reactions to self as a member of the group and to the group aside from the member and task and social factors in classifying the various facets of athlete satisfaction.

Athlete satisfaction with the athletic experience at the collegiate level is influenced by the athlete's ability to balance the demands of academic work and sport participation (Dhurup & Reddy, 2013). Dhurup and Reddy (2013) sought to examine the relationship between team cohesion and athlete satisfaction among a sport and recreation first year cohort of university students. As a result, moderate to strong correlations ($r = .335$ to $r = .651$) were established between social and task cohesion and satisfaction. In particular, individual integration to the group had the strongest impact on satisfaction, which demonstrates that a greater level of satisfaction is achieved as team cohesiveness grows.

In order to assess the relationship between team cohesion and athlete satisfaction in a coaching sport, Widmeyer and Williams (1991) asked 85 Division I, female golfers how satisfied they were during the season. Specifically, they were asked how satisfied they were with (a) the recognition they received by being a member of the team, (b) the opportunities that the team provided for developing their golf skills, (c) their social interaction with teammates, and (d) the competition they were experiencing by being a member of the team. Total satisfaction was calculated by totaling all four satisfactions. The participants were also given the GEQ to assess

cohesion. The researchers concluded that the best single predictor of all four cohesion subscales was total satisfaction (ATG-T, $r = .61$; GI-T, $r = .68$; ATG-S, $r = .63$; GI-S, $r = .56$). However, they noted that a reverse flow could apply to the variable examined, so future research should examine all variables at three or more points in time to determine better the direction of influence.

Using a set of satisfaction questions adapted from Widmeyer and Williams (1991), Kamphoff and colleagues (2005) asked participants to indicate how satisfied they were with (a) their role on the team, (b) the social interaction they have with their teammates, (c) the interactions they have with their coach, (d) the opportunities they have to develop and demonstrate their skills, and (e) the opportunities for competition they have as a member of their team. The participants responded using a 5-point Likert scale anchored at extremes by *very dissatisfied* (1) and *very satisfied* (5). A sample of both individual and team sport, Division I athletes revealed a significant positive relationship between satisfaction and group cohesion ($r = .51$, $p < .01$) and all four cohesion subscales of the GEQ, ATG-T (.51), ATG-S (.42), GI-T (.44), and GI-S (.29).

These studies demonstrated a moderate relationship between all four subscales of the GEQ and athlete satisfaction; athletes who perceive their team as more cohesive are more satisfied with their overall experience of being a member of the team. Therefore, the current study explored the relationship between cohesion and satisfaction and SNA as a tool for improving the student-athlete experience. Based upon the knowledge provided by these studies, the researcher hypothesized that:

H2d: Higher levels of cohesion, as measured by both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks, would be associated with higher levels of satisfaction.

Conclusions

Although this review of the literature depended on the consolidation of a vast amount of research regarding different outcomes of team cohesion in regard to athletes, the researcher highlighted four subtopics and consequently, four hypotheses. The purpose of the current study is to discern any differences in cohesion as measured by the GEQ and SNA and to determine which team cohesion measure (GEQ or SNA) better predicts team performance and individual outcomes of anxiety, retention, and satisfaction.

Chapter 3: Methods

Participants

Participants included members of four NCAA Division-I women's volleyball teams from the Southeastern U.S. who gave their informed consent to contribute to the study. Volleyball was initially chosen due to the researcher's familiarity with the sport, but the four-month season (i.e., August to November) accommodated for the time constraints of obtaining data at all three time points. As an interacting sport, volleyball requires team members to coordinate their efforts and performances in a cohesiveness manner to produce a team performance outcome. Participants received an email notifying them of the study and making them aware that participation was voluntary and had been approved by the University Internal Review Board. The teams competed in comparable athletic conferences and thus, the athletes chose to attend somewhat similar colleges in regard to the level of athletic competition.

All members of the teams were invited to participate including the players and coaches (head and assistant coaches). It was integral to the social network analysis that all members of the teams participated in the study in order to gain a complete depiction of the team as a network. Furthermore, the decision to include coaches and support staff in the networking analysis was based on the idea that the functioning of a team depends on the synthesis of all parts, not just the players.

Cohesion Measures

Group Environment Questionnaire (GEQ). The GEQ was used to measure team cohesiveness. The GEQ, developed by Carron et al. (1985), is an 18-item self-report questionnaire that assess cohesion by way of perceptions of four factors: Individual Attractions to the Group-Task (ATG-T), 4 items (e.g., "I do not like the style of play on this team.");

Individual Attractions to the Group-Social (ATG-S), 5 items (e.g., “Some of my best friends are on this team.”); Group Integration-Task (GI-T), 5 items (e.g., “Our team is united in trying to reach its goals for performance.”); Group Integration-Social (GI-S), 4 items (e.g., “Members of our team do not stick together outside of practice and games.”). Athletes are required to respond to the items about their team using a 9-point Likert scale, with responses ranging from 1 (strongly disagree) to 9 (strongly agree). Thus, higher scores reveal stronger perceptions of cohesiveness among team members. Cronbach’s alpha values range between .65 and .85 in most studies using the GEQ (cf. Carron et al., 1998), which suggests that it is an internally consistent instrument. Research has shown that the GEQ exhibits content, factorial (Carron et al., 1985), predictive (Carron et al., 1988), and concurrent (Brawley, Carron, & Widmeyer, 1988) validity.

Social Network Analysis. The researcher developed an online roster-based survey, in which the participants indicated which team members (players and coaches) fit a given criteria by simply placing a check next to their name. The criteria employed to generate the two networks (friendship and efficacy) included: I consider this person a close friend; I feel confident about this person’s sport-related knowledge and/or ability. Thus, each question had the same number of opportunities to answer as members on their given team roster. Similar to the distinction between social and task cohesion provided by the GEQ, the friendship network captures relationships that are social in nature, while the efficacy network is task-oriented. Although friendship and cohesion are two separate constructs, both focus on interpersonal affinity among group members. Past studies suggest that friendship (often operationalized as cohesion) in work groups may have such benefits as information sharing, productive conflict, and increased motivation (Jehn & Shah, 1997). Furthermore, both cohesion and efficacy have been positively linked to performance success and persistence, which suggests that common

ground relating these two concepts exists (Leo Marcos et al., 2010; Spink, 1990). Participant responses to the SNA networks were then formatted as square adjacency matrices comprised of the collective responses of each individual regarding his or her teammates or players for each separate network. That is, an $n \times n$ table (where n is the number of team members), with the rows indicating outgoing ties to other team members and the columns reflect the incoming ties to each team member for that specific network. These matrices were then converted into network maps or visualizations using NetDraw software. In regard to the network maps, starters versus reserves were determined based on the end of the season game statistics; those who started a majority of the games were classified as starters.

Outcome Variables

In addition, team performance, competitive trait anxiety, retention, and satisfaction were assessed as these variables are commonly examined in studies examining potential antecedents and consequences of cohesion.

Team Performance. During the season in which the teams were surveyed, the team's performance was measured via winning percentage. At each time point, the researcher recorded the win-loss record thus far and divided the number of wins by the total number of matches to date to calculate the team's winning percentage.

Competitive Trait Anxiety. As recommended by Cox, Martens, and Russell (2003) the Revised Competitive State Anxiety Inventory-2 (CSAI-2R; Cox, Martens, & Russell, 2003) was used to assess participant's anxiety levels. The CSAI-2R is a 17-item sport-related questionnaire that measures three separate state components: cognitive anxiety (e.g. "I am concerned about losing"), somatic anxiety (e.g. "I feel jittery"), and self-confidence (e.g. "I am confident about performing well"). The instructions of the CSAI-2R were modified to instruct participants to

choose the answer which described his or her usual feelings before or during competition in order to assess competitive trait anxiety. Each item was accompanied by a 4-point Likert scale anchored at extremes by *not at all* (0) and *very much so* (3), where higher scores indicated higher levels of state anxiety. Each subscale score was calculated by summing the answers, dividing by the number of items, and multiplying by 10. Thus, the score range is 0 to 30 for each subscale.

Retention. To assess the intent to participate in the future or athlete retention from one season to the next, participants were asked to respond to the following question, “How likely are you to return to playing next season?” Responses were made on a 5-point scale that included the following categories: *not at all likely (at or near 0% chance)*, *not likely (25% chance or less)*, *so-so (50% chance)*, *likely (75% chance or better)*, and *very likely (at or near 100%)*.

Satisfaction with Overall Volleyball Experience. A set of six satisfaction questions was used to assess the athlete and coach satisfaction with their overall volleyball experience. The first three items (“All in all, I am satisfied with my volleyball experience here”; “In general, I like playing/coaching here”; and “In general, I don’t like my volleyball experience here”) were adapted from the Michigan Organizational Assessment Questionnaire Job Satisfaction Subscale (MOAQ-JSS; Cammann, Fichman, Jenkins, & Klesh, 1979). Bowling & Hammond (2008) reported that the MOAQ-JSS is a reliable (internal consistency reliability = 0.84) and construct-valid measure of job satisfaction. The second three items were adapted from the Campus Atmosphere Scale (CAS; Lounsbury & Deneui, 1996): “I wish I had signed to/coached another team instead of this one”; “I would recommend this volleyball program to student-athletes in my high school”; and “I someday plan to give alumni contributions to this athletic program”. An approach which involves a number of different aspects of satisfaction is consistent with the notion long recognized by organizational researchers that satisfaction is a multifaceted construct

(Locke, 1976; Smith, Kendall, & Hulin, 1969; Weiss, Dawis, England, & Lofquist, 1967). The participants responded using a 5-point Likert scale anchored at extremes by *strongly disagree* (1) and *strongly agree* (5).

Procedure

Initially, Division I coaches from teams within the Southeast were contacted to determine their interest and request their participation; 50% of contacted teams agreed to participate in the study. The online survey was divided into sections in order to separate the GEQ, SNA, CSAI-2R, satisfaction questions, and retention question. Participants were assured that their responses would remain confidential.

Upon consent, all of the members of each team were emailed a link to a short online survey at three critical points during the calendar year. These points in time included preseason (at the completion of nonconference play and prior to the completion of two regular season games), midseason (at the completion of approximately half of the regular season games), and postseason (at the completion of all regular season games and prior to any postseason play). A longitudinal research design was employed as team cohesion and athlete satisfaction are considered to change across time (Paskevich, Estabrooks, Brawley, & Carron, 2001). In fact, previous research has found that group cohesion changes during the sport season (Heuze, Sarrazin, Masiero, Raimbault, & Thomas, 2006; Leo, Sanchez-Miguel, Sanchez-Olivia, Amado, & Garcia-Calvo, 2012). Thus, utilizing a longitudinal design (i.e., three time points during the volleyball season) will not only provide insight into the evolution of team dynamics over the course of a season, but will also aid in establishing directionality between cohesion and outcome variables.

Data Analysis

After the data were collected at each time point ($N = 49$ completed all three time points), SNA software (UCINET) was used to generate a cohesion measure for each individual and team as a whole for the friendship and efficacy networks. Individual responses were combined to arrive at complete network data for both of the two networks. Within the software, the density calculation was used to measure structural cohesion. This measure identifies the proportion of the number of connections that exist between actors in relation to the number of the maximum possible connections in the network. Network cohesion can range from 0 to 1 and the larger the measure, the more cohesive an individual's network. For instance, if all members of a team were unconnected, the cohesion measure of density would be zero; yet, if all members were connected to one another, the cohesion measure of density would be one.

Since SNA utilized a ratio measurement and team performance was measured via winning percentage, these two measures represent nonparametric data due to the limited range of values. Therefore, the researcher utilized Spearman's rho (r_s) when analyzing correlations that involved these variables. Only those who completed the survey at all three time points were included in the analyses. A significance level of $p < .05$ was adopted for the study.

Measurement of Cohesiveness. In order to assess whether the GEQ and SNA are related in line with Hypothesis 1a, correlations between the total cohesion measures generated by the GEQ and SNA were employed to assess the degree to which these measures agreed over the three time points. That is, correlations were conducted between the total GEQ and total SNA cohesion scores at each time point – preseason, midseason, and postseason. Based upon the 9-point scale employed by the GEQ for each of the four GEQ subscales, the total GEQ score had a possible range from 4 to 36. In regard to SNA, the density measure ranged from 0 to 1 for both

the efficacy and friendship networks. In order to generate a total score, the density measures from the two networks were averaged. Thus, the total SNA score still had a possible range from 0 to 1. These correlations between the GEQ and SNA totals were conducted across all participants and between each team.

Temporal Patterns. Furthermore, in order to examine the agreement in longitudinal patterns between both the (a) GEQ and SNA total cohesion scores and (b) GEQ subscales and SNA networks (Q1b). Due to the longitudinal measurement of cohesion using the GEQ and SNA at three time points, a series of 3 X 4 repeated-measures ANOVAs were employed for (1) the GEQ total score, (2) SNA total score, (3) GEQ subscales, and (4) SNA networks, across all participants and between each team.

Team Performance. Due to the small sample size of four teams, a correlational relationship between cohesion and team performance could not be assessed within statistical reason. Thus, visual inspections of the GEQ and SNA total scores, SNA network maps, and team winning percentages were conducted in order to examine the relationship between cohesion and team performance. By cross-referencing the graphical output of the SNA network maps with both the generated indices of team cohesion and the team's winning percentage, conclusions regarding cohesion and team performance were drawn.

Competitive Anxiety, Retention, and Satisfaction. Finally, Pearson correlations (r) were implemented to determine the strength of the relationship between team cohesion, as measured by the GEQ, and competitive anxiety, retention, and satisfaction. Furthermore, Spearman's rho correlations (r_s) were utilized to assess the relationship between team cohesion, as measured by SNA, and the outcome variables.

Chapter 4: Results

Cohesion Measures – GEQ vs. SNA

Measurement of Cohesiveness. The first purpose was aimed at better understanding the agreement, or lack thereof, between the GEQ and SNA total cohesion scores at each time point (Q1a). At preseason, there was a small, significant correlation between the GEQ and SNA ($r_s = .351, p = .014$). In addition, there was a moderate, significant relationship between the GEQ and SNA at midseason ($r_s = .506, p < .001$) and postseason ($r_s = .482, p < .001$). Furthermore, Spearman's correlations indicated a strong, significant relationship between the GEQ and SNA at pre- ($r_s = .711, p = .032$) and post-season ($r_s = .681, p = .043$) for Team A, whereas Team C demonstrated a moderately significant relationship between the GEQ and SNA at midseason ($r_s = .575, p = .025$) (see Table 2). Although there was weak to moderate agreement between the GEQ and SNA at each of the three time points and for certain teams, the cohesion measures did not strongly align (see Table 1). Since these relationships were only small to moderately strong, the researcher concluded that the GEQ and SNA are measuring different, although related, constructs. Thus, the researcher rejected Hypothesis 1a.

Temporal Patterns. As shown in Table 3, a series of repeated-measures ANOVAs were used to examine whether cohesion changed over the course of the season. The researcher sought to better understand the agreement in longitudinal patterns between both the (a) GEQ and SNA total cohesion scores and (b) GEQ subscales and SNA networks (Q1b). The researcher hypothesized that both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks would be in agreement in terms of the temporal patterns of cohesion over the course of the season (H1b).

A repeated-measures ANOVA revealed a significant main effect of time for the GEQ total cohesion scores, $F(2, 90) = 23.347, p < .001, \eta^2 = .342$. Pairwise comparisons revealed a significant decrease in cohesion from preseason ($M = 29.362, SD = 4.719$) to midseason ($M = 26.664, SD = 4.726$) and to postseason ($M = 25.902, SD = 4.829$). However, there was not a significant decrease in cohesion from midseason to postseason. In addition, a repeated-measures ANOVA revealed a significant main effect of time for the SNA total density scores, $F(2, 96) = 5.580, p = .005, \eta^2 = .104$. Pairwise comparisons discovered a significant increase in cohesion from preseason ($M = .529, SD = .218$) to postseason ($M = .605, SD = .206$), $p < .05$, and midseason ($M = .553, SD = .221$) to postseason, $p < .05$. Thus, the GEQ total scores decreased over time, whereas SNA total scores increased over the course of the season.

Specifically, a repeated-measures ANOVA indicated a significant main effect of time for all four GEQ subscales: ATG-T [$F(2, 90) = 23.034, p < .001, \eta^2 = .339$]; ATG-S [$F(2, 90) = 3.297, p = .041, \eta^2 = .068$]; GI-T [$F(2, 90) = 18.657, p < .001, \eta^2 = .293$]; and GI-S [$F(2, 90) = 4.685, p = .012, \eta^2 = .094$]. Pairwise comparisons revealed a significant decrease from preseason to midseason in ATG-T ($M = 1.010, SE = .162, p < .001$), GI-T ($M = .930, SE = .203, p < .001$), and GI-S ($M = .435, SE = .166, p < .05$). In addition, there was a significant decrease from preseason to postseason in ATG-T ($M = 1.216, SE = .194, p < .001$), GI-T ($M = 1.214, SE = .209, p < .001$), and GI-S ($M = .651, SE = .240, p < .05$). In addition, a repeated-measures ANOVA indicated a significant main effect of time for only the SNA friendship network, $F(2, 90) = 7.967, p = .001, \eta^2 = .150$. Pairwise comparisons revealed a significant increase in friendship across all participants from preseason to postseason ($M = .105, SE = .033, p = .007$) and midseason to postseason ($M = .071, SE = .025, p = .024$). However, there was not a significant main effect of time for the SNA efficacy network. (Note: M here is the mean

difference score.) Thus, three of the four GEQ subscales decreased over the course of the season, whereas the friendship network increased over time.

Furthermore, there was a significant main effect of team for only the GI-T subscale, $F(3, 45) = 3.388, p = .026, \eta^2 = .184$. Pairwise comparisons revealed that Team B ($M = 7.481, SE = .396$) reported significantly greater GI-T scores than Team A ($M = 5.867, SE = .396$) across all three time points ($p = .036$). Also, there was a marginally significant interaction between time and team for the GI-S subscale, $F(6, 90) = 2.267, p = .044, \eta^2 = .131$. While the GI-S scores for Team A, B, and C remained relatively stable across time, Team D scores steadily declined from preseason ($M = 7.547, SE = .282$) to midseason ($M = 6.063, SE = .344$) to postseason ($M = 5.875, SE = .332$). However, there was not a significant main effect of team or an interaction between time and team for SNA. Thus, Team B (the least successful team) reported greater closeness and bonding surrounding the task compared to Team A (the most successful team). Furthermore, Team D demonstrated a decrease in the closeness and bonding in regard to social relationships, which could explain the relatively low winning percentage at each time point.

In conclusion, these findings demonstrate that the GEQ as a whole and three of the GEQ subscales significantly decreased, while SNA as a whole and the friendship network increased over the course of the season. Moreover, there was no definable longitudinal pattern in cohesion, as measured by the GEQ and SNA, between the four teams. Therefore, there is a clear disagreement in the longitudinal patterns of cohesion between both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks across all participants and teams, thereby rejecting Hypothesis 1b.

Outcome Variables

The second research question was to assess if the (a) GEQ or SNA total cohesion scores and (b) GEQ subscales or SNA networks were better predictors of team performance, anxiety, retention, and satisfaction (Q2). For each of the outcome variables (i.e., team performance, anxiety, retention, and satisfaction), the researcher assessed the correlation between earlier cohesion and later measurements of the outcome variable. Therefore, three correlations were reported: (1) preseason cohesion and midseason outcome, (2) midseason cohesion and postseason outcome, and (3) preseason cohesion and postseason outcome. For each of these correlations, cohesion was assessed using the GEQ and SNA total scores and the GEQ subscales and SNA networks. In particular, the directionality of the relationship between cohesion and team performance was in question based on the literature, which demonstrated that the relationship could possibly flow in both directions. Therefore, in addition to the correlations described above, the researcher also reported the correlations between (1) preseason performance and midseason cohesion, (2) midseason performance and postseason cohesion, and (3) preseason performance and postseason cohesion.

Team Performance. As seen in Table 4, the winning percentiles for the four teams tended to decrease over the course of the season. Specifically, Team A had the highest winning percentage at the end of the season and Team B had the lowest winning percentage. Since these two teams (i.e., Team A and Team B) represented the most and least successful teams in regard to winning percentage, the researcher chose to conduct visual inspections of the two networks for only these two teams. In order to assess the change in these networks over the course of the season, the friendship and efficacy network maps at pre- and post-season for Team A and B are provided (see Figures 2, 3, 4, and 5). In regard to the relationship between team cohesion and

team performance, the researcher hypothesized that higher levels of cohesion, as determined by both (a) the GEQ and (B) SNA, would be related to better team performance (H2a).

Although both Teams A and B consisted of the same number of network members, each having 9 members, there is an evident and visual discrepancy in the density, or number of connections, reported at pre- and post-season (see Figures 2, 3, 4, and 5). Across both the friendship and efficacy networks, Team A, the most successful team, started the season with a 0.432 density measure and ended the season at 0.494, while Team B, the least successful team, started at 0.716 and ended at 0.728. While the GEQ total score also demonstrated that Team B was the more cohesive team, SNA is able to generate an assessment of the team that is defined by individual relationships rather than an overall perception of the environment.

A visual inspection and comparison of Figures 2 and 4 reveal that Team A, the better performing team, reported far fewer friendships between fellow teammates compared to Team B, the less successful team. Thus, the team with fewer friendship connections was more successful in terms of team performance. As depicted in Team A's friendship network maps at pre- and post-season (see Figure 2), the head coach is completely removed from the preseason network and only connected by one tie at postseason. Considering this team (i.e., Team A) had the highest winning percentage at the end of the season, it seems that the lack of social connection between the head coach and the players positively influenced their performance in comparison to the other three teams.

Competitive Trait Anxiety. As shown in Table 5, Pearson correlations revealed a significant relationship between preseason SNA total score and midseason somatic anxiety ($r_s = -.317, p = .026$). However, there were no significant relationships between the GEQ total score and anxiety. Specifically, the researcher hypothesized that higher levels of cohesion, as measured

by the GI-T subscale of the GEQ and the SNA efficacy network, would be associated with lower levels of competitive trait anxiety (H2b). Data analysis revealed that there was a significant relationship between preseason efficacy and mid- ($r_s = -.365, p = .010$) and post-season ($r_s = -.292, p = .042$) somatic anxiety. There were no significant relationships between any of the cohesion variables and cognitive anxiety or self-confidence. Although the results did not provide support for the relationship between the GEQ and anxiety, the researcher was able to provide limited partial support for Hypothesis 2b by demonstrating a relationship between SNA efficacy and somatic anxiety. That is, higher levels of cohesion, as measured by the SNA efficacy network, was associated with lower levels of competitive trait somatic anxiety later in the season. Thus, SNA appears to be a better predictor of competitive trait somatic anxiety compared to the GEQ.

Retention. Due to the fact that senior athletes would not logistically be returning to the team the following season, seniors ($n = 7$) were excluded from the data analysis concerning Hypothesis 2c (i.e., Cohesion, as measured by the SNA friendship network, would lead to greater levels of retention).

As shown in Table 6, findings revealed significant correlations between (1) preseason GEQ and midseason retention ($r = .398, p = .009$), (2) midseason GEQ and postseason retention ($r = .332, p = .032$), and (3) preseason GEQ and postseason retention ($r = .354, p = .021$). In addition, there were significant relationships between midseason SNA and postseason retention ($r_s = .358, p = .011$) and preseason SNA and postseason retention ($r_s = .340, p = .017$). Specifically, Pearson correlations revealed a significant correlation between both preseason ATG-S ($r = .462, p = .002$) and GI-S ($r = .449, p = .003$) and midseason retention. In addition, midseason ATG-T and ATG-S were moderately correlated with postseason retention ($r = .411, p$

= .007 and $r = .361$, $p = .019$, respectively). Finally, preseason ATG-T was significantly correlated with postseason retention ($r = .446$, $p = .003$). Furthermore, there was a significant relationship between midseason friendship and postseason retention ($r_s = .285$, $p = .047$). In addition, there were significant correlations between preseason efficacy and postseason retention ($r_s = .298$, $p = .038$) and midseason efficacy and postseason retention ($r_s = .312$, $p = .029$).

Therefore, both the GEQ and SNA total scores were significant predictors of retention. In addition, the GEQ subscales that focused on individual attractions to the group (ATG-T and ATG-S) and efficacy were moderately associated with later intentions of retention, or returning to the team the following season. Finally, due to the significant relationship between midseason friendship and postseason retention, the findings provided partial support for Hypothesis 2c. Overall, the GEQ and SNA appeared to be equal predictors of retention.

Satisfaction with Overall Volleyball Experience. Finally, the researcher hypothesized that higher levels of cohesion, as measured by both (a) the GEQ and (b) SNA, would be associated with higher levels of satisfaction (H2d). As shown in Table 7, findings revealed significant correlations between (1) preseason GEQ and midseason satisfaction ($r = .507$, $p < .001$), (2) midseason GEQ and postseason satisfaction ($r = .390$, $p = .006$), and (3) preseason GEQ and postseason satisfaction ($r = .459$, $p = .001$). Furthermore, there were significant correlations between preseason SNA and midseason satisfaction ($r_s = .466$, $p = .001$) and midseason SNA and postseason satisfaction ($r_s = .282$, $p = .050$). Thus, cohesion, as measured by both the GEQ and SNA, was associated with later satisfaction. Specifically, preseason ATG-T ($r = .399$, $p = .005$), ATG-S ($r = .451$, $p = .001$), GI-T ($r = .464$, $p = .001$), GI-S ($r = .414$, $p = .003$), Friendship ($r_s = .340$, $p = .017$), and Efficacy ($r_s = .375$, $p = .008$) were positively correlated with midseason satisfaction. That is, all GEQ and SNA cohesion variables at preseason had a

significant relationship with midseason satisfaction. Second, midseason ATG-T ($r = .506, p < .001$), ATG-S ($r = .360, p = .011$), and GI-T ($r = .296, p = .039$) were positively correlated with postseason satisfaction. Third, preseason ATG-T ($r = .470, p = .001$), ATG-S ($r = .314, p = .028$), GI-T ($r = .406, p = .004$), and GI-S ($r = .348, p = .014$) were positively correlated with postseason satisfaction. A visual inspection of the mean scores for cohesion and satisfaction reveal that both measures decreased over time. Thus, these positive relationships demonstrate that as cohesion decreased over the course of the season, satisfaction levels also decreased, which provides support for Hypothesis 2d. Overall, the GEQ demonstrated stronger relationships with satisfaction compared to SNA.

Conclusions

The results demonstrated that the GEQ total scores significantly decreased, while SNA total scores increased over the course of the season for each team. Also, the task subscales of the GEQ (i.e., ATG-T and GI-T) incurred more significant change over time compared to the social subscales. On the other hand, the social SNA network (i.e., friendship) demonstrated significant change over time, whereas the task (i.e., efficacy) network did not significantly change over time. Although there was some agreement between the GEQ and SNA at select time points and for certain teams, “cohesion” as measured by the GEQ and SNA were not in consistent agreement. As a result, both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks were not in agreement in terms of the longitudinal patterns over the course of the season. Furthermore, the GEQ and SNA demonstrated a lack of consistency in the prediction of the outcome variables. While SNA was deemed a better predictor of competitive anxiety and the GEQ had stronger relationships with satisfaction, both the GEQ and SNA were equal predictors of retention. The overall conclusions for each outcome variable were as follows:

- (a) The team with fewer friendship connections was more successful in terms of team performance compared to the less successful teams.
- (b) SNA efficacy was associated with lower levels of competitive somatic anxiety.
- (c) The GEQ subscales that focused on individual attractions to the group (ATG-T and ATG-S) and SNA friendship and efficacy were moderately associated with later intentions of retention, or returning to the team the following season.
- (d) As cohesion, measured by the GEQ and SNA, decreased over the course of the season, satisfaction levels decreased.

Chapter 5: Discussion

This study investigated the use of both the GEQ and SNA as methods of measuring cohesion among elite volleyball teams, while also attempting to clarify the relationships between cohesion and select outcome variables. This study builds upon Warner et al.'s (2012) work by answering the call to synthesize the relative contributions of the GEQ and SNA to the measurement of team dynamics. Warner and colleagues (2012) posited that the SNA could be used a complementary tool to Carron et al.'s (1985) GEQ. Yet, they noted that a study had yet to use both measures simultaneously. Therefore, the first purpose of the present study was to determine areas of agreement and disagreement between the GEQ and SNA in regard to the measurement of team cohesion and temporal patterns in cohesion across the three time points. Furthermore, the second purpose of the present study was to determine the relationships among cohesion, using the GEQ and SNA, and team performance, anxiety, retention, and satisfaction over the course of the season. The results from this study suggest that the GEQ and SNA differ in the measurement of and longitudinal pattern in cohesion for elite volleyball teams. In addition, the GEQ and SNA displayed differing relationships with the various outcome variables. Several conclusions can be drawn as a result of the findings.

First, the GEQ and SNA did not demonstrate concrete evidence of agreement in the measurement of cohesiveness at each of the time points or longitudinal patterns for the four elite volleyball teams. Correlation analyses revealed moderate relationships between the GEQ and SNA at mid- and post-season and for two of the teams. Although there was agreement between the GEQ and SNA at select time points and for certain teams, the cohesion measures did not align consistently across the season. Thus, the researcher rejected H1a (i.e., Both the GEQ and SNA total scores will be in agreement in terms of team cohesiveness at each time point.).

Furthermore, there was clear disagreement in the longitudinal patterns of cohesion between both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks across all participants and teams, thereby rejecting Hypothesis 1b (i.e., Both the (a) GEQ and SNA total scores and (b) GEQ subscales and SNA networks would be in agreement in terms of the temporal patterns of cohesion over the course of the season.). In particular, the GEQ as a whole and three of the GEQ subscales (ATG-T, GI-T, and GI-S) significantly decreased, while SNA as a whole and the friendship network increased over the course of the season. The teams also demonstrated differences in group integration over the course of the season. Team B reported significantly greater GI-T subscale scores across all three time points. Also, GI-S scores for Team D steadily declined across the season, while the scores for Team A, B, and C remained relatively stable across time. However, the four teams did not significantly differ across time in terms of SNA (i.e., network density).

Because these two measures of cohesion did not agree, it seems that the GEQ and SNA are not measuring the same construct of “cohesion”. This is exemplified by the fact that cohesion as measured by the GEQ total score decreased and the SNA total score increased over the course of the season across all teams. The researcher chose to only use the friendship and efficacy networks to assess cohesion using SNA in the present study. So, it is possible that the trust (i.e., I trust this person) and advice (i.e., I went to this person for advice) networks that have previously been used by Warner and colleagues (2012) may be a better measurement of team cohesion and more strongly agree and correlate with the GEQ. Future research should explore the use of the trust and advice networks in comparison to the GEQ as measurements of team cohesion.

It should be noted that the disagreement between the GEQ and SNA could be due to the fact that the GEQ is more of a global measure, whereas SNA depends on the sum of the

individual relationships. That is, the GEQ is comprised of 18 items regarding the general team environment and overall relationships with teammates by grouping all individuals together. SNA, on the other hand, measures team cohesion (i.e. density) based on the amalgamation of explicitly defined dyadic relationships (i.e., relationships between two individuals) and tailors the analysis for each team by asking specific questions regarding teammates by name. This allows SNA to provide insight into team structure and the process by which team cohesion evolves over the course of a season. Lusher and colleagues (2010) asserts that a focus on actual relations between team members is important (i.e., SNA), rather than just a focus on the attitudes of the team members about the team more generally (i.e., GEQ). Although there are formal relations between team members, there are also informal relations, such as friendships, that affect how a team operates. As noted by Lusher and colleagues (2010), the influence of these informal relations on team dynamics cannot be readily understood by just asking about the team in general. Thus, the exploration of these informal social relations between team members lends itself to the use of SNA, rather than the GEQ. These two methodologies take distinct paths in understanding the intra-group relations of a team. Therefore, this incongruence further explains the lack of agreement in the measurement of a team dynamic, such as team cohesion, as found in this study.

The second driving research question examined the predictive value of the GEQ and SNA in relation to team performance, competitive anxiety, retention, and satisfaction. Although the inverse relationship between cohesion and winning percentage was not predicted in the present study, it is still interesting that this sample exhibited an association between higher levels of cohesion and lower levels of performance. This is opposed to the general hypothesis that the cohesion-performance relationship is positive among interacting sports, such as volleyball, and

contradictory to the findings that a stronger, positive cohesion-performance effect has been found among female athletes/teams (Carron et al., 2002; Mullen & Copper, 1994). Furthermore, the work of Williams and Widmeyer (1991) implied that a positive relationship exist between cohesion and performance. Within the present sample, the team with the highest perception of self-reported team cohesion (Team B) also had the lowest winning percentage at all three time points. This suggests that too much team cohesion could negatively impact team performance.

Recently, Wise (2014) supported this idea of an inversely curvilinear relationship between cohesion (i.e., network density) and performance and challenged the strictly positive relationship between the two variables, which much of the literature supports (e.g., Carron et al., 2002; Mullen & Copper, 1994; Williams & Widmeyer, 1991). Thus, Wise's work implies that the network structures that help some teams accomplish their goals reach a point of diminishing returns, after which further increasing that team cohesiveness leads to negative performance consequences. That is, there is an optimal level of cohesion at which performance is maximized; whereas, too little cohesion produces structural holes and too much cohesion leads to group think, which both decrease team performance.

In particular, the team with fewer friendship connections (i.e., Team A) was more successful in terms of team performance, which is consistent with the findings of Warner et al. (2012) that increases in cohesion based on friendship negatively influence team performance. Therefore, one might conclude that female teams with fewer friendships and fewer overall network connections are more likely to have team performance success. Although the socially-oriented friendship network appeared to not be as strongly related to performance, coaches and sport managers should not dismiss the importance of socially cohesive networks, especially in the case of female athletes. The work of Spink (1995) demonstrated that social cohesiveness for

female athletes was positively related to intentions to continue participating in team sports. Furthermore, White (1993) discovered that female athletes place a greater importance on the social aspect of the team experience, which in turn contributes to athlete satisfaction.

The longitudinal social networking data collected over the course of a season lends further insight into the relationship between cohesion and performance. For instance, if a coach moves to the periphery of the team during the course of a season, one would assume that the coach does not have a sound relationship with the other team members; however, perhaps this is a result of the coach empowering the players to take a more prominent and central role within the team. When comparing SNA with the GEQ, the GEQ cannot illustrate the coach's position within the team, so conclusions cannot be drawn regarding the relationship between the coach and other team members and the potential impact this might have on performance and other outcome variables.

Next, SNA efficacy was associated with lower levels of competitive somatic anxiety. Based upon prior research (e.g., Borrego et al., 2012; Eys et al., 2003; Prapavessis & Carron, 1996), the researcher hypothesized that cohesion, as measured by the GI-T subscale of the GEQ and the SNA efficacy network, would lead to lower levels of competitive trait anxiety (H2b). Although the results did not provide support for the relationship between the GEQ and anxiety, the researcher was able to provide support for the relationship between efficacy and anxiety in regard to the somatic anxiety subscale; thus, there was partial support for Hypothesis 2b. It seems logical to conclude that athletes, who perceived higher levels of efficacy with regard to their fellow teammates and coaches, perceived experiencing fewer physical symptoms of competitive anxiety later in the season. Likewise, coaches who felt confident in the knowledge and/or ability of their players and fellow coaches perceived having lower levels of somatic

anxiety. This is consistent with the findings of Eys and colleagues' (2003) and Prapavessis and Carron's (1996) work that found an association between groups with higher task cohesion and experiencing fewer or less severe somatic symptoms of competitive anxiety.

Although there was a significant relationship between the preseason SNA total score and midseason somatic anxiety, there were no significant relationships between the GEQ and the competitive anxiety subscales. In this case, SNA could be deemed a better predictor of somatic anxiety when compared to the GEQ. However, the weak correlations do not provide strong evidence that SNA is overall a better predictor of competitive anxiety compared to the GEQ. In addition, there were no significant relationships between any of the cohesion variables and cognitive anxiety or self-confidence. Thus, higher levels of cohesion, as measured by the SNA efficacy network, were associated with lower levels of competitive trait somatic anxiety later in the season. That is, athletes and coaches who had greater confidence in the knowledge and/or ability of their teammates experienced lower levels of somatic anxiety later in the season. Yet, cohesion did not influence cognitions (i.e. cognitive anxiety) or self-confidence related to competitive anxiety.

Also, the GEQ subscales that focused on individual attractions to the group (ATG-T and ATG-S) and SNA friendship and efficacy moderately influenced later intention to return to the team the following season (i.e., retention). Due to the significant relationship between midseason friendship and postseason retention, the findings provided support for Hypothesis 2c. This is consistent with the work of Spink (1995) who concluded that social cohesiveness was positively related to female athletes' intentions to continue participating in team sports (i.e., retention). Furthermore, the GEQ and SNA total scores were both significant predictors of retention. It is particularly interesting that both friendship, a social component, and efficacy, a task component,

were moderately related to retention. This indicates that the athletes' and coaches' perceptions of both task and social relationships influenced their intentions to return to the team the following season.

Lastly, cohesion, as measured by both the GEQ and SNA, was associated with later satisfaction. Since cohesion decreased over the course of the season, satisfaction levels also decreased. The researcher hypothesized that cohesion, as measured by both (a) the GEQ and (b) SNA, would increase satisfaction (H2d). Specifically, all GEQ subscales and SNA networks at preseason had a significant relationship with midseason satisfaction (i.e., lower levels of cohesion at preseason were associated with lower levels of satisfaction at midseason). Previous research has indicated that member's satisfaction with the task and social aspects of the group is positively related to team cohesion (Aoyagi, Cox, & McGuire, 2008; Kamphoff et al., 2005; Widmeyer & Williams, 1991), which provides partial support for the current findings. Furthermore, the work of Dhurup and Reddy (2013), Kamphoff et al. (2005), and Widmeyer and Williams (1991) have established moderate to strong correlations between both social and task cohesion, as measured by all four subscales of the GEQ, and satisfaction. While this work strongly supports the current study's findings regarding the significant relationship between the GEQ subscales and satisfaction, the two SNA networks at pre- and mid-season did not maintain a significant relationship with postseason satisfaction. Instead, only the GEQ subscales at pre- and mid-season were significantly related to postseason satisfaction. The strength of these relationships varied from weak to moderate. In particular, ATG-T maintained the strongest relationships with satisfaction, which is contradictory to the finding of White (1993) that female athletes placed a greater importance on the social aspect of the team experience. In conclusion, both cohesion and satisfaction decreased over the course of the season, which provides support

for Hypothesis 2d. Thus, athletes and coaches who perceive their team as more cohesive are more satisfied with their overall volleyball experience.

Limitations

A few limitations of the present study should be acknowledged. The primary limitation of the current study is the small sample of four volleyball teams surveyed over the course of the season. In addition, only female athletes and teams were included in the study. Future research should consider male, female, and co-ed teams as the results may vary. In this study, performance was measured via winning percentage, which could be influenced by confounding variables (e.g., years of experience, strength of schedule, etc.). Future research should consider implementing other measures of performance. Furthermore, the current study, as with most team cohesion research, relies solely on the self-report measures of the participants and thus, socially desirable responses may act as a limitation. So, it is possible that participants reported higher levels of cohesion compared to their true perceptions of cohesion among their team. In particular, SNA only allows for a yes/no response format, which might limit the team dynamic information as yes and no responses could vary in strength.

Practical Applications

As noted by Carron (1982), the standard approach to measuring cohesion (i.e., the GEQ) makes no attempt to determine the structure of relationships and interactions in the collective whole, including the task- and interpersonal-oriented behaviors and interlocking roles assumed by members. When the group is treated as an aggregate of its components, this particular implication arises. Instead, SNA seems to make up for what the GEQ lacks in regard to assessing the network structure of teams. The researcher hoped that the use of more than one mode of assessment by concurrently using traditional self-report measures (i.e., GEQ) and behavioral

correlates which reflect cohesiveness (i.e., friendship and efficacy networks) would provide convergent validity for the estimates of team cohesion. The current study was meant to introduce coaches and sport managers to a tool that is available to generate richer explanation and prediction of team dynamics. As team cohesion research continues to evolve, it is important that the field continues to advance by introducing complementary tools, such as social networking, in combination with the contributions of the Group Environment Questionnaire. This study, however, pointed to the GEQ and SNA likely measuring different constructs.

Despite the fact that the more socially-oriented network, friendship, appeared to not positively influence team performance, a coach or sport manager should not dismiss the important of socially cohesive networks, especially for female athletes (Warner, Bowers, & Dixon, 2012; Warner & Dixon, 2013). In the current study, social cohesiveness for females based on friendship was positively related to intentions to return the following season and satisfaction with their overall volleyball experience. These findings answer the call of Warner and colleagues (2012) for future research to consider the impact social networks would have on retention and athlete satisfaction. Based upon the current findings, fostering significant friendships among team members may not contribute to team performance, but these friendships influence retention and satisfaction among female athletes and coaches. This does not mean that friendship has no bearing on individual athlete performance, only that it does not significantly influence team winning percentage. Thus, coaches and sport managers should allocate time and effort into creating an environment that fosters social relationships and encouraging athletes to build meaningful friendships with fellow teammates in order to improve the overall athletic experience (Warner & Dixon, 2011; Warner, Dixon, & Chalip, 2012).

From an applied perspective, research has found that team building, which refers to programs aimed at promoting increased cohesiveness, does have a positive impact on cohesion in sport teams (Martin, Carron, & Burke, 2009). If in fact team building programs have a positive impact on cohesion in sport teams, then coaches and sport practitioners should invest in team building efforts to increase cohesion among team members. This in turn, as demonstrated in the current study, could promote decreased somatic anxiety, increased retention, and improved overall satisfaction among female athletes and coaches.

Conclusions

The results of this study help to highlight the positive outcomes of team cohesion, while also further positioning SNA and the GEQ as important tools for athletic administrators and coaches to better understand the functioning, or lack thereof, of their teams. While it is clear that the GEQ and SNA may be measuring different constructs, SNA was able to offer unique contributions in exploring how specific dyadic relationships among team members evolve over the course of the season and relate to team performance and somatic anxiety. Although the limitations inherent in this study may underscore the tentative nature of the conclusions, it is hoped that the findings are suggestive enough to warrant further study in an attempt to replicate the findings of the present study with a larger sample size. Although SNA might not yet be ready for practical use until fully tested and a better understanding of the results from this type of analysis is obtained, future research must continue to explore the unique contributions provided by SNA in regard to team dynamics.

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Table 1

Correlation Between the GEQ and SNA at Pre-, Mid-, and Post-season

	GEQ		SNA		Correlation	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>r_s</i>	<i>p</i>
Preseason	29.362	4.719	.529	.218	.354	.014
Midseason	26.664	4.726	.553	.221	.506	< .001
Postseason	25.902	4.829	.605	.206	.482	< .001

Table 2

Correlation Between the GEQ and SNA at Pre-, Mid-, and Post-season for Each Team

Team	Time	GEQ		SNA		Correlation	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>r_s</i>	<i>p</i>
A (n = 9)	Preseason	26.717	4.389	.432	.157	.711	.032*
	Midseason	24.944	4.812	.494	.225	.622	.074
	Postseason	21.794	5.448	.494	.168	.681	.043*
B (n = 9)	Preseason	31.144	3.723	.716	.109	.405	.279
	Midseason	28.800	3.971	.667	.219	.151	.698
	Postseason	28.417	4.133	.728	.146	.271	.480
C (n = 15)	Preseason	28.607	5.054	.536	.283	.229	.412
	Midseason	26.580	5.284	.555	.263	.575	.025*
	Postseason	26.843	3.967	.636	.265	.449	.093
D (n = 16)	Preseason	30.556	4.643	.473	.165	.435	.093
	Midseason	26.509	4.484	.522	.170	.482	.059
	Postseason	25.916	4.495	.569	.159	.278	.298

Table 3

Main Effect of Time Between the GEQ and SNA

				Preseason		Midseason		Postseason	
	<i>F</i> (2, 90)	<i>p</i>	η^2	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
GEQ	23.347	< .001	.342	29.256	.679	26.708	.700	25.743	.662
SNA	5.580	.005	.104	.529	.031	.553	.032	.605	.029

Table 4

Team Cohesion and Team Performance at Pre-, Mid-, and Post-season

Team	Time	GEQ		SNA		Performance
		M	SD	M	SD	%
A (n = 9)	Preseason	26.717	4.389	.432	.157	85.71
	Midseason	24.944	4.812	.494	.225	69.57
	Postseason	21.794	5.448	.494	.168	56.25
B (n = 9)	Preseason	31.144	3.723	.716	.109	33.33
	Midseason	28.800	3.971	.667	.219	15.79
	Postseason	28.417	4.133	.728	.146	16.67
C (n = 15)	Preseason	28.607	5.054	.536	.283	100.0
	Midseason	26.580	5.284	.555	.263	55.0
	Postseason	26.843	3.967	.636	.265	48.39
D (n = 16)	Preseason	30.556	4.643	.473	.165	33.33
	Midseason	26.509	4.484	.522	.170	40.74
	Postseason	25.916	4.495	.569	.159	37.14

Table 5

Correlations Between Cohesion and Anxiety

	Mid-Somatic		Mid-Cognitive		Mid-Confidence		Post-Somatic		Post-Cognitive		Post-Confidence	
	<i>r_s</i>	<i>p</i>	<i>r_s</i>	<i>p</i>	<i>r_s</i>	<i>p</i>	<i>r_s</i>	<i>p</i>	<i>r_s</i>	<i>p</i>	<i>r_s</i>	<i>p</i>
Pre-GEQ	-.151	.301	-.009	.949	.065	.657	.005	.971	.032	.827	.106	.469
Mid-GEQ	-.218	.132	-.125	.391	.151	.301	.037	.802	.037	.799	.030	.840
Pre-SNA	-.316	.027	.001	.992	-.119	.415	-.193	.184	.073	.616	-.198	.173
Mid-SNA	-.012	.932	.124	.395	-.080	.586	.047	.750	.240	.096	-.099	.501
Pre-ATG-T	-.173	.236	-.081	.578	.126	.390	-.108	.459	-.047	.748	.196	.177
Pre-ATG-S	-.194	.182	-.031	.832	.137	.349	-.044	.764	.054	.711	.080	.583
Pre-GI-T	-.074	.615	.092	.530	-.042	.775	-.008	.958	.061	.677	.050	.736
Pre-GI-S	-.053	.720	.005	.971	-.024	.870	.234	.105	.061	.675	-.002	.990
Pre-Friendship	-.109	.454	.063	.666	-.130	.373	-.035	.811	.141	.333	-.207	.153
Pre-Efficacy	-.365	.010	-.079	.591	-.040	.785	-.292	.042	.008	.957	-.062	.670
Mid-ATG-T	-.341	.017	-.281	.051	.265	.066	-.164	.259	-.099	.498	.235	.104
Mid-ATG-S	-.042	.777	-.082	.577	.129	.377	.192	.187	.030	.839	-.008	.957
Mid-GI-T	-.257	.074	.042	.773	.046	.753	-.117	.424	.103	.483	.004	.979
Mid-GI-S	.035	.810	-.012	.932	-.027	.855	.261	.070	.112	.445	-.203	.161
Mid-Friendship	-.042	.776	.118	.420	-.172	.238	.077	.598	.280	.051	-.186	.200
Mid-Efficacy	-.123	.400	.051	.727	.055	.707	-.100	.495	.133	.361	.049	.738

Table 6

Correlations Between Cohesion Variables and Retention

	Midseason Retention		Postseason Retention	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Preseason GEQ	.398	.009	.354	.021
Midseason GEQ			.332	.032
Preseason SNA	.275*	.056	.340*	.017
Midseason SNA			.358*	.011
Preseason ATG-T	.155	.288	.304	.034
Preseason ATG-S	.258	.002	.270	.060
Preseason GI-T	.229	.114	.327	.022
Preseason GI-S	.160	.272	.219	.131
Preseason Friendship	.254*	.078	.271*	.060
Preseason Efficacy	.240*	.097	.298*	.038
Midseason ATG-T			.411	.007
Midseason ATG-S			.361	.019
Midseason GI-T			.258	.073
Midseason GI-S			.020	.892
Midseason Friendship			.285*	.047
Midseason Efficacy			.312*	.029

* Spearman's rho correlation (r_s); significant correlations are indicated in bold

Table 7

Correlations Between Cohesion and Satisfaction

	Midseason Satisfaction		Postseason Satisfaction	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Preseason GEQ	.507	< .001	.459	.001
Midseason GEQ			.390	.006
Preseason SNA	.466*	.001	.248*	.085
Midseason SNA			.282*	.050
Preseason ATG-T	.399	.005	.470	.001
Preseason ATG-S	.451	.001	.314	.028
Preseason GI-T	.464	.001	.406	.004
Preseason GI-S	.414	.003	.348	.014
Preseason Friendship	.340*	.017	.159*	.276
Preseason Efficacy	.375*	.008	.234*	.106
Midseason ATG-T			.506	< .001
Midseason ATG-S			.360	.011
Midseason GI-T			.296	.039
Midseason GI-S			-.021	.884
Midseason Friendship			.216*	.136
Midseason Efficacy			.220*	.129

* Spearman's rho correlation (r_s); significant correlations are indicated in bold

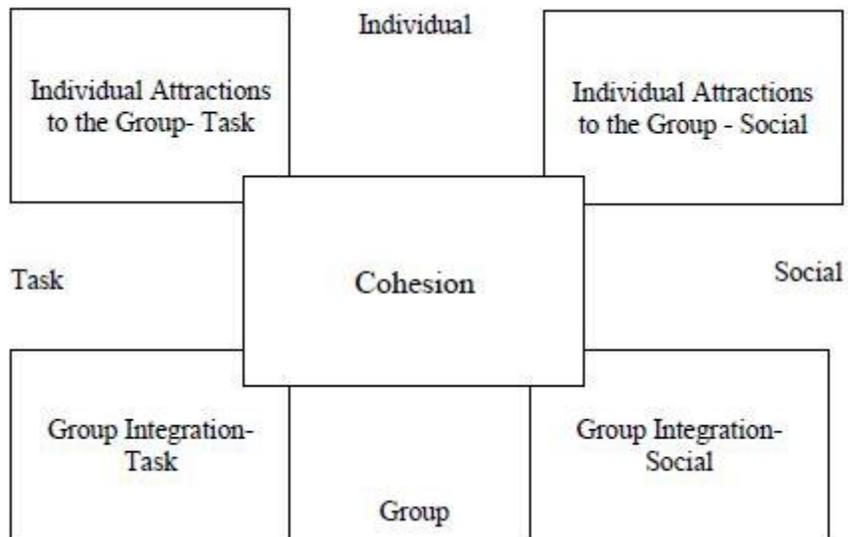
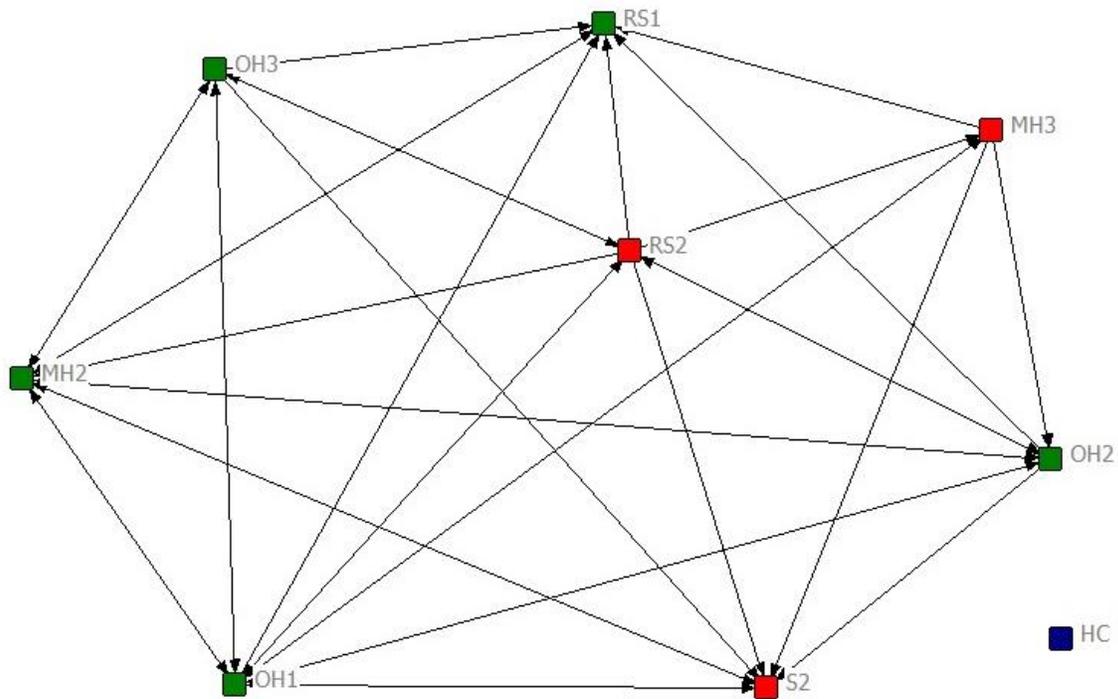
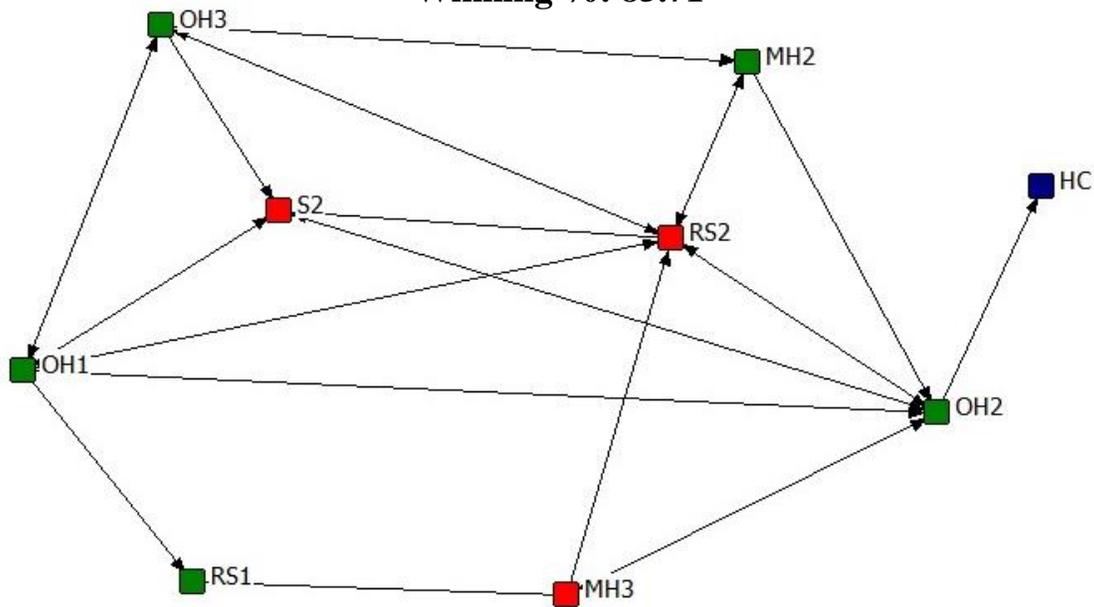


Figure 1. Adapted from “The Development of an Instrument to Assess Cohesion in Sport Teams: the Group Environment Questionnaire”, by A.V. Carron, W.N. Widmeyer, and L.R. Brawley, 1985, *Journal of Sport Psychology*, 7, p. 248.



Winning %: 85.71



Winning %: 56.25

Figure 2. Team A: Friendship Network Map at Preseason (top) and Postseason (bottom). Each participant was labeled based on their position (HC = head coach; OH = outside hitter; MH = middle hitter; RS = right side hitter; S = setter) and players were assigned a color based on their playing status (green = starters; red = reserves). The winning percentage at that time point is indicated below each network map.

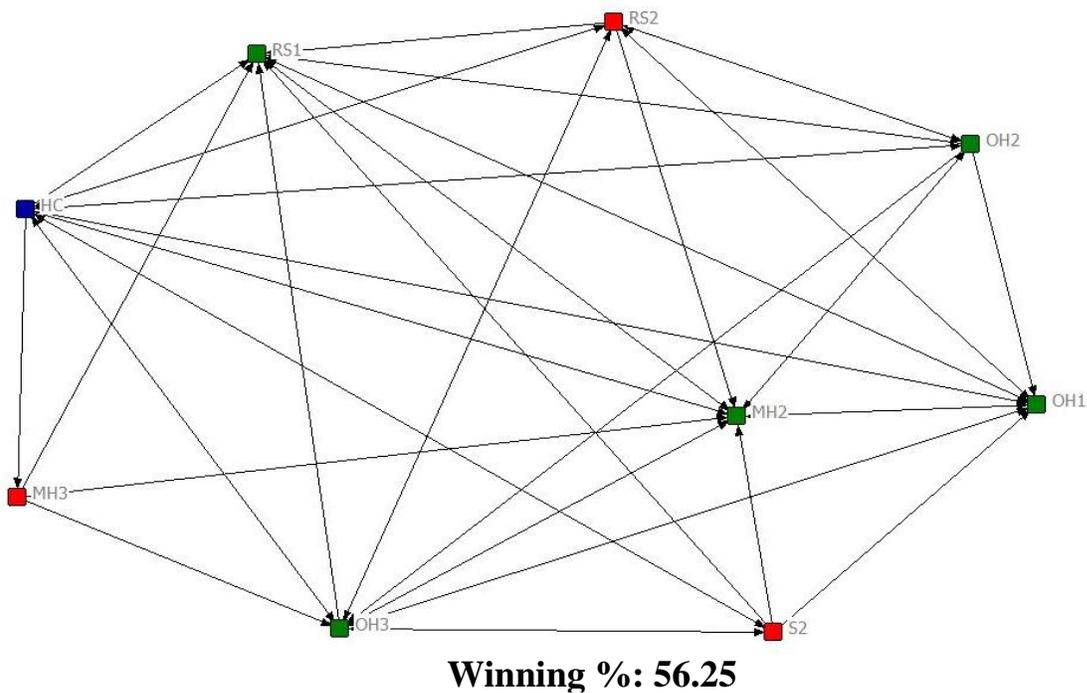
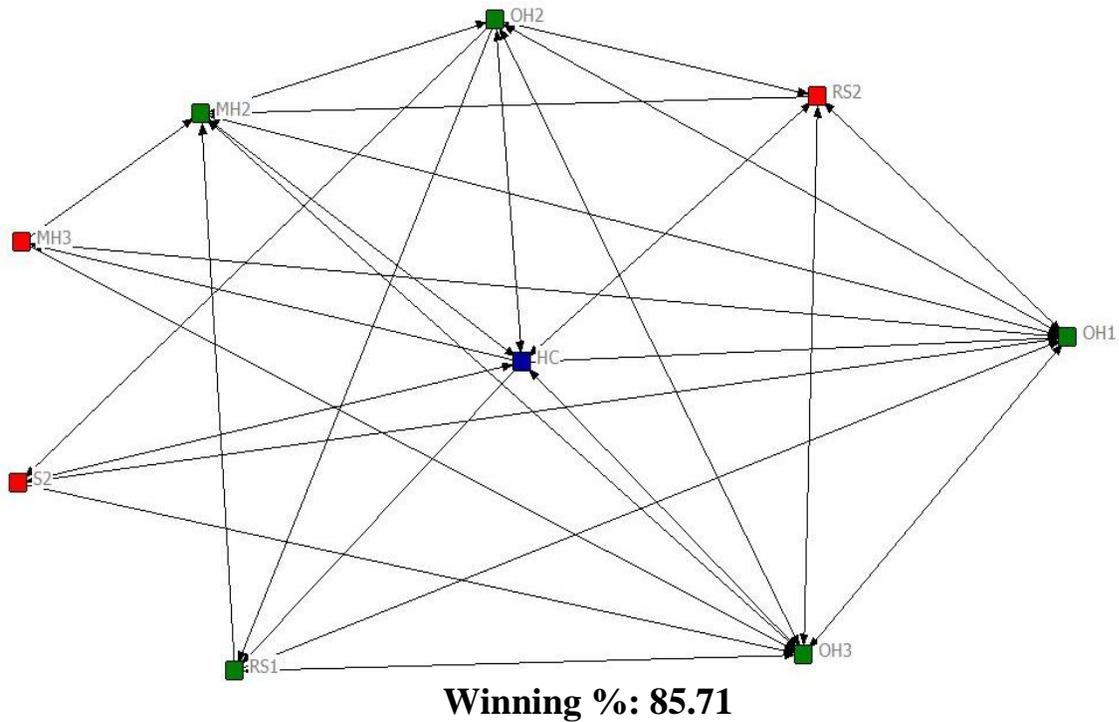


Figure 3. Team A: Efficacy Network Map at Preseason (top) and Postseason (bottom). Each participant was labeled based on their position (HC = head coach; OH = outside hitter; MH = middle hitter; RS = right side hitter; S = setter) and players were given a color based on their playing status (green = starters; red = reserves). The winning percentage at that time point is indicated below each network map.

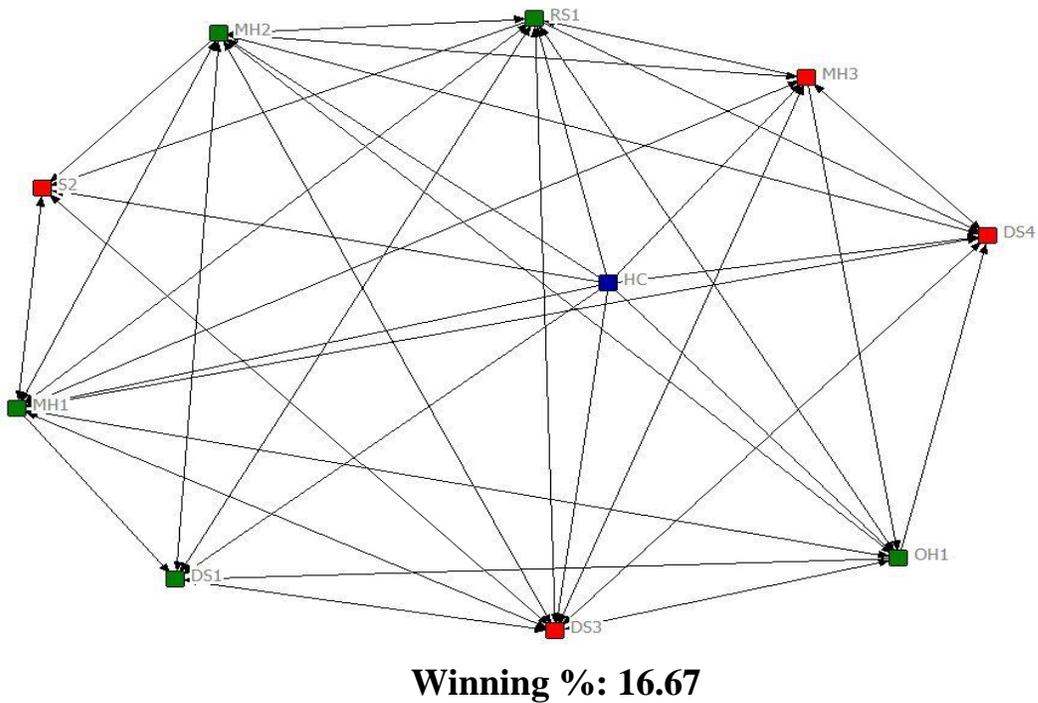
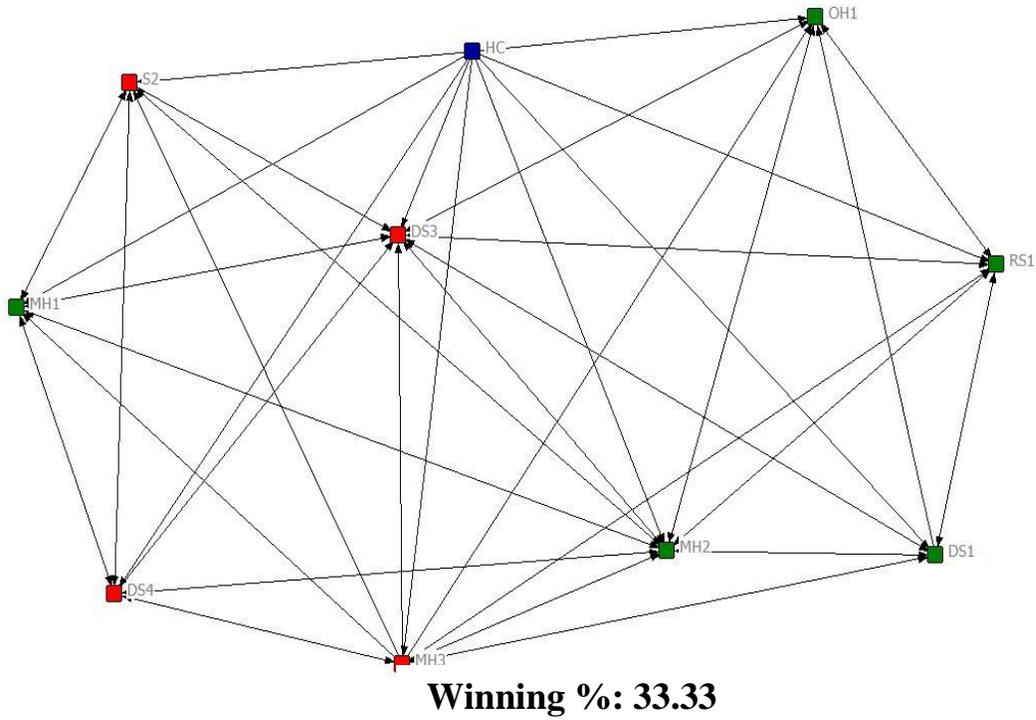
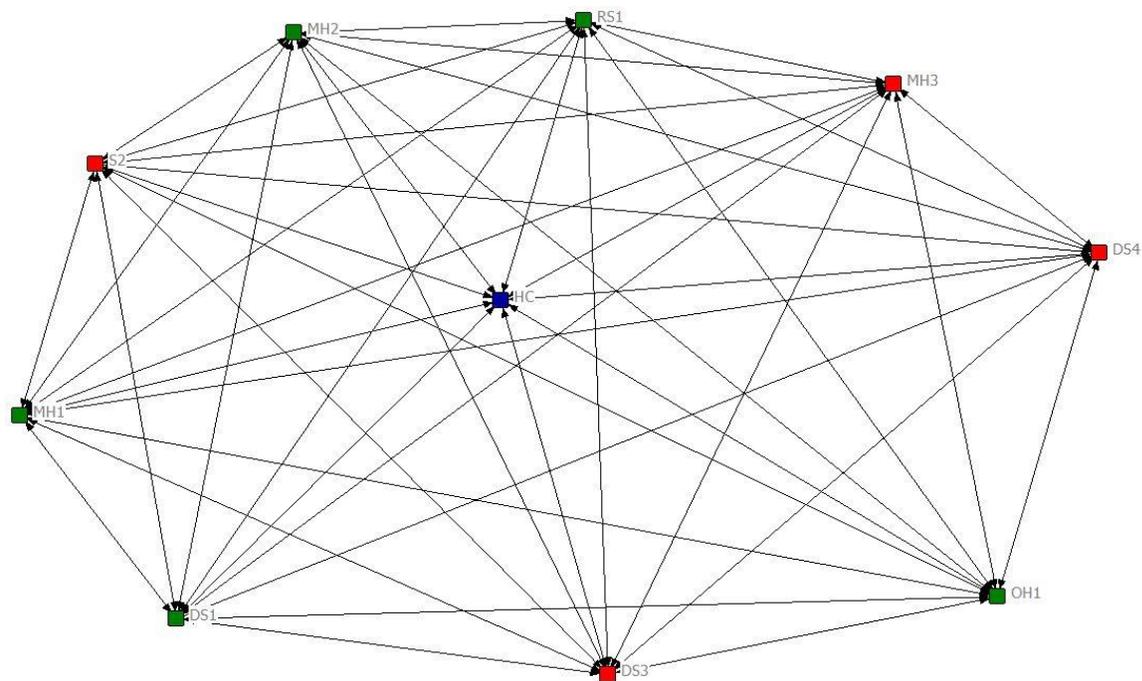
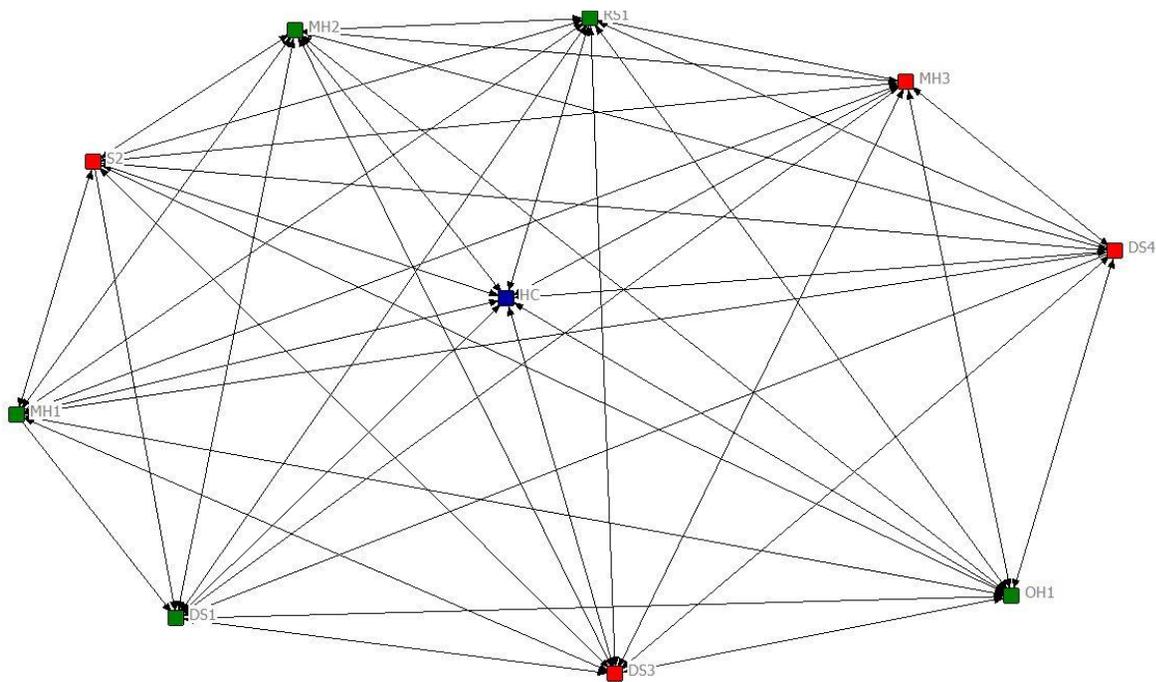


Figure 4. Team B: Friendship Network Map at Preseason (top) and Postseason (bottom). Each participant was labeled based on their position (HC = head coach; OH = outside hitter; MH = middle hitter; RS = right side hitter; DS = defensive specialist; S = setter) and players were given a color based on their playing status (green = starters; red = reserves). The winning percentage at that time point is indicated below each network map.



Winning %: 33.33



Winning %: 16.67

Figure 5. Team B: Efficacy Network Map at Preseason (top) and Postseason (bottom). Each participant was labeled based on their position (HC = head coach; OH = outside hitter; MH = middle hitter; RS = right side hitter; DS = defensive specialist; S = setter) and players were given a color based on their playing status (green = starters; red = reserves). The winning percentage at that time point is indicated below each network map.

Appendix A: IRB Approval Letter



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moyer Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · www.ecu.edu/irb

Notification of Exempt Certification

From: Social/Behavioral IRB

To: Arden Anderson

CC: Stacy Warner

Date: 7/2/2014

Re: UMCIRB 14-000501

Effects of Team Cohesion on Team Performance and Athlete Anxiety, Retention, and Satisfaction

I am pleased to inform you that your research submission has been certified as exempt on 7/2/2014. This study is eligible for Exempt Certification under category #2.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

Appendix B: Survey Instrument

You are being invited to participate in a research study titled “Relationships among Team Cohesion and Performance, Anxiety, Retention, and Satisfaction” being conducted by Arden Anderson, a graduate student at East Carolina University in the Kinesiology department. The survey will take approximately 15 minutes to complete. It is hoped that this information will assist us to better understand the effects of team cohesion within a sports setting on team performance and athlete anxiety, retention, and satisfaction.

We are asking you to provide identifying information. However, your responses will be kept confidential. No data will be released or used with your identification attached. Your participation in this research is voluntary. You may choose not to answer any or all questions, and you may stop at any time. There is no penalty for not taking part in this research study.

Please contact Arden Anderson at 704-473-2279 for any research related questions or the East Carolina University Office of Research Integrity & Compliance (ORIC) at 252-744-2914 for questions about your rights as a research participant.

By clicking “Next” you certify that you have read all of the above information and agree to participate in the study knowing that you can stop taking part in this study at any time.

1. Please choose your name from the list below. Remember that your answers to this survey are confidential.

- Player A
- Player B
- Player C
- Player D
- Player E
- Player F
- Player G
- Player H
- Player I
- Player J
- Player K
- Player L
- Coach A
- Coach B
- Coach C

2. For each of the members on the roster, please indicate whether you consider that person a close friend and/or feel confident about their sport-related knowledge and/or ability.

	“I consider this person a close friend”	“I feel confident about this person’s sport-related knowledge and/or ability”
Player A	<input type="checkbox"/>	<input type="checkbox"/>
Player B	<input type="checkbox"/>	<input type="checkbox"/>
Player C	<input type="checkbox"/>	<input type="checkbox"/>
Player D	<input type="checkbox"/>	<input type="checkbox"/>
Player E	<input type="checkbox"/>	<input type="checkbox"/>
Player F	<input type="checkbox"/>	<input type="checkbox"/>
Player G	<input type="checkbox"/>	<input type="checkbox"/>
Player H	<input type="checkbox"/>	<input type="checkbox"/>
Player I	<input type="checkbox"/>	<input type="checkbox"/>
Player J	<input type="checkbox"/>	<input type="checkbox"/>
Player K	<input type="checkbox"/>	<input type="checkbox"/>
Player L	<input type="checkbox"/>	<input type="checkbox"/>
Coach A	<input type="checkbox"/>	<input type="checkbox"/>
Coach B	<input type="checkbox"/>	<input type="checkbox"/>
Coach C	<input type="checkbox"/>	<input type="checkbox"/>

3. The following statements are designed to assess your feelings about YOUR PERSONAL INVOLVEMENT with this team. Please read each statement and then click a number from 1 to 9 to the right of the statement to indicate your level of agreement with each of these statements.

	Strongly Disagree 1	2	3	4	Neutral 5	6	7	8	Strongly Agree 9
1. I do not enjoy being a part of the social activities of this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I'm not happy with the amount of playing time I get.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I am not going to miss the members of this team when the season ends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I'm unhappy with my team's level of desire to win.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Some of my best friends are on this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. This team does not give me enough opportunities to improve my personal performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I enjoy other parties rather than team parties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I do not like the style of play on this team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. For me, this team is one of the most important social groups to which I belong.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. The following statements are designed to assess your perceptions of YOUR TEAM AS A WHOLE. Please read each statement and then click a number from 1 to 9 to the right of the statement to indicate your level of agreement with each of these statements.

	Strongly Disagree 1	2	3	4	Neutral 5	6	7	8	Strongly Agree 9
1. Our team is united in trying to reach its goal for performance.	<input type="radio"/>								
2. Members of our team would rather go out on their own than get together as a team.	<input type="radio"/>								
3. We all take responsibility for any loss or poor performance by our team.	<input type="radio"/>								
4. Our team members rarely party together.	<input type="radio"/>								
5. Our team members have conflicting aspirations for the team's performance.	<input type="radio"/>								
6. Our team would like to spend time together in the off season.	<input type="radio"/>								
7. If members of our team have problems in practice, everyone wants to help them so we can get back together again.	<input type="radio"/>								
8. Members of our team do not stick together outside of practice and games.	<input type="radio"/>								
9. Our team members do not communicate freely about each athlete's responsibilities during competition or practice.	<input type="radio"/>								

5. Please read each statement and then click the appropriate number to the right of the statement to indicate your level of agreement with each of these statements.

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
All in all, I am satisfied with my volleyball experience here.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, I like playing/coaching here.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, I don't like my volleyball experience here.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish I had signed to/coached another team instead of this one.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would recommend this volleyball program to student-athletes in my high school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I someday plan to give alumni contributions to this athletic program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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6. How likely are you to return to playing/coaching next season?

- Not at All Likely (at or near 0% chance)
- Not Likely (25% chance or less)
- So-So (50% chance)
- Likely (75% chance or better)
- Very Likely (at or near 100%)

7. A number of statements that athletes have used to describe their feelings before competition are listed below. Please read each statement and then click the appropriate number to the right of the statement to indicate how you usually feel before or during competition. There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer which best describes how you usually feel.

	Not At All 0	Somewhat 1	Quite A Bit 2	Very Much So 3
1. I feel jittery.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I am concerned that I may not do as well in competition as I could.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I feel self-confident.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. My body feels tense.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I am concerned about losing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I feel tense in my stomach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I am confident I can meet the challenge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I am concerned about choking under pressure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. My heart races.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I am confident about performing well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I am concerned about performing poorly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. I feel my stomach sinking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I am confident because I mentally picture myself reaching my goal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I am concerned that others will be disappointed with my performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. My hands are clammy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. I am confident of coming through under pressure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. My body feels tight.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

