ASSESSING THE GROUP DYNAMIC VARIABLES OF ATHLETE LEADERSHIP, COHESION, AND TRUST UTILIZING A SOCIAL NETWORK APPROACH

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ASSESSING THE GROUP DYNAMIC VARIABLES OF ATHLETE LEADERSHIP, COHESION, AND TRUST UTILIZING A SOCIAL NETWORK APPROACH

By

Marie Desrosiers

A Thesis
Submitted to the Faculty of Graduate Studies through the Department of Kinesiology in Partial Fulfillment of the Requirements for the Degree of Master of Human Kinetics at the University of Windsor

Windsor, Ontario, Canada

2017

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ABSTRACT

The current study examined the group dynamic variables of athlete leadership, cohesion, and trust utilizing a social network approach. The participants consisted of an elite team of 22 female hockey players (Mage = 24.64, SD = 2.32). After completing an emotional competence self-reported questionnaire (Short Profile of Emotional Competence; Mikolajczak, Brasseur, & Fantini-Hauwel, 2014), the players were asked to rate each other on six dimensions of transformational leadership behaviors (appropriate role model, fostering acceptance of group goals, high performance expectations, individual consideration, inspirational motivation, intellectual stimulation), two dimensions of cohesion (social and task), and four dimensions of trust (benevolence, competence, integrity, justice). The networks were analyzed for their density, centralization, and an autocorrelation was conducted between the networks and the attribute of Emotional Competence. In terms of the network density, the results were consistent, with the highest density being the network for trust (i.e., justice), and the lowest density being the network for athlete leadership (i.e., appropriate role model). Moreover, the centralization of the network presented consistent spread in the players’ effectiveness to display the behaviors. The least centralized network was trust (i.e., integrity), while the most centralized were the networks of trust (i.e., justice) and athlete leadership (i.e., inspirational motivation). Finally, for the autocorrelation between Emotional Competence (intrapersonal and interpersonal dimensions) and the different networks, the Moran’s I index was significant although the results were negligible both positively and negatively. Overall, the presence of homophily was detected for 13 out of the 24 autocorrelations performed.
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RESEARCH ARTICLE

Introduction

In sport, intangible factors such as leadership, cohesion, and trust are often viewed as critical determinants of team performance (Carron, Colman, Wheeler, & Stevens, 2002; Curtner-Smith, Wallace, & Wang, 1999; Dirks, 2000; Voight & Callaghan, 2001; Zhang & Chelladurai, 2013). Given this importance, it is essential to understand the particular role that a sport team plays in an athlete’s life. The study of sport teams is known broadly as group dynamics (Carron & Eys, 2012) and is defined as “advancing knowledge about the nature of groups, the laws of their development, and their interrelations with individuals, other groups, and larger institutions” (Cartwright & Zander, 1968, p. 7). One model that allows for the systematic study of group dynamic variables is Carron and Eys’ (2012) conceptual framework for the study of sport teams (see Figure 1). This conceptual framework is a linear model consisting of inputs, throughputs, and outputs. The inputs in the model include *member attributes* and *group environment*. Specifically, *member attributes* comprise personal factors such as the social, psychological, and physical characteristics of the group members. The second category, *group environment*, refers to the physical and geographical locations in which the team is set (Stevens & Bloom, 2003). Those characteristics encompass elements such as the team’s territoriality, the team’s size, and the nature of the task. The inputs then contribute to the throughputs, which consist of *group structure*, *group cohesion*, and *group processes*. *Group structure* refers to the patterns of relationships between the members (Johnson & Johnson, 2014). It includes elements such as members’ role responsibilities, normative expectations, and leadership. *Cohesion* encompasses the task and social bonding present within a team. The last throughput presented in the model consists of *group processes*. It relates to elements associated to the group interaction,
communication, motivation, team goals, and efficacy. Finally, the model contains two types of outputs operationalized as individual and group outcomes. They represent the degree of satisfaction, retention, and performance of the individual athlete, as well as the group-level consequences of performance and stability (Horn, 2008).

Given the size, complexity, and number of variables within Carron and Eys’ (2012) model, the present study focused on four variables: emotional competence (member attributes), athlete leadership (group structure), cohesion, and trust (group processes). First, emotional competence is defined as “the ability to monitor one’s own and other’s feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (Salovey & Mayer, 1990, p. 189). Research in emotional competence suggests that it plays an important role in sport (Laborde, Dosseville, & Allen, 2016). For instance, Perlini and Halverson (2006) found that National Hockey League players’ emotional competence was higher compared to that of the general population.

Second, athlete leadership is defined as “an athlete who occupies a formal or informal role within a team, and who influences the group members towards achieving a common goal or objective” (Loughead, Hardy, & Eys, 2006, p. 144). Inherent in this definition are the formal and informal leadership roles that athletes occupy based on their status within the team. An athlete who is assigned a leadership role by the team or the organization is considered a formal leader (e.g., team captain). Alternatively, informal leaders are athletes whose leadership emerges following interactions with teammates. While formal designations are often limited in terms of number because they fill specific roles, informal leadership roles are accessible to everyone. Thus, the concept of athlete leadership involves a distribution of leadership among several athletes on a team. The presence of athletes serving in a leadership capacity is critical to team
functioning. Specifically, the majority of research examining athlete leadership in relation to team functioning has examined cohesion, which is the third variable being examined in this study.

Historically, cohesion has been viewed as one of the most important group-level variable (Golembiewski, 1962; Lott & Lott, 1965) and is defined as a “dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or for the satisfaction of members’ affective needs” (Carron, Brawley, & Widmeyer, 1998, p. 213). Carron, Widmeyer, and Brawley (1985) highlighted that cohesion is a multidimensional construct consisting of four types of cohesion. In particular, the authors argued cohesion should be examined at both the individual and the group level, and distinguish between the task and social components of cohesion. Therefore, the four dimensions of cohesion are: Individual Attractions to the Group-Task (ATG-T), Individual Attractions to the Group-Social (ATG-S), Group Integration-Task (GI-T), and Group Integration-Social (GI-S). ATG-T refers to the individual’s feelings about his or her involvement in terms of participating in the group’s tasks, objectives, and productivity. ATG-S reflects the perception of an individual’s sense of belonging and acceptance within the group. GI-T represents the degree to which an individual feels unity and affinity between the group members when it comes to the group’s goals and objectives. GI-S consists of the level of similarity and closeness of the group as a whole as perceived by an individual in a social context.

As noted above, there has been some research examining the relationship between athlete leadership and cohesion. For example, Vincer and Loughead (2010) examined the influence of athlete leadership behaviors on team cohesion. Athlete leadership was assessed using the Leadership Scale for Sports (LSS; Chelladurai & Saleh, 1980) while cohesion was measured by
the Group Environment Questionnaire (GEQ; Carron et al., 1985). Using an intercollegiate sample of athletes, all four dimensions of cohesion (ATG-T, ATG-S, GI-T, GI-S) were positively related to two dimensions of athlete leadership behavior Training and Instruction, and Social Support. Conversely, Autocratic Behavior was negatively linked to all four dimensions of cohesion while Democratic Behavior was positively associated to the cohesion dimension of ATG-T. Using a transformational leadership approach, Callow, Smith, Hardy, Arthur, and Hardy (2009) examined the relationship between team captain leadership behaviors and cohesion in ultimate Frisbee players. Athlete leadership behaviors of individual consideration, high performance expectations, promoting team work, and fostering acceptance of group goals were positively related to task cohesion. Furthermore, the leadership behaviors of Fostering the Acceptance of Group Goals and Promoting Team Work were positively related to social cohesion.

Finally, the variable of trust is emerging as an important variable within the realm of sport. Grounded in the work of Mayer, Davis, and Schoorman’s (1995) who examined trust using an organizational perspective, Zhang and Chelladurai (2013) have spearheaded much of the research in sport and have focused their interest on investigating the factors that contribute to athletes trusting their leader. In particular, the authors identify four factors: ability (skills, competencies, and characteristics that enable an individual to have influence over someone), benevolence (extent to which a trustee is perceived to do good to a trustor), integrity (trustee follows a set of principles that the trustor finds acceptable), and justice (fairness in the treatment of others). In one study, Zhang and Chelladurai assessed the formation of an athlete’s trust in his/her coach and the consequences of trust. They found all four factors were all positively associated to trust in leadership from the coach and accounted for 61% of the variance.
While these four group dynamic variables have been found to be influential in regards to understanding the way teams function, it is essential to continue examining these variables to better understand team functioning.

Research examining any of the four constructs of emotional competence, athlete leadership, cohesion, and trust have typically used questionnaires that focus on the perceptions concerning all team members. That is, questionnaires have traditionally adopted a “Rating the Team” approach where the target of appraisal is not a specific individual but the team as a whole (Gockel & Werth, 2010). As such, with the “Rating the Team” approach, researchers have no way of knowing how the players generated their ratings. Possibly, some athletes could provide a score based on the average display of the team members’ behavior. Alternatively, the raters could base their judgement on the player(s) displaying the greatest amount of that specific characteristic, trait, or skill. Further, the “Rating the Team” approach does not take into account the effect of intra-team relationships for each individual team member. That is, the results do not provide any indications on the extent to which each individual team member influences other team members (Gockel & Werth, 2010). Yet, a sports team is more than the collection of independent individuals; team members interact with one another. They are involved in social (and, therefore, dependent) relations with one another (Abbott, 1997), and it is through those interactions in which team members develop patterns of relationships that impact the transfer of influence and thus the structure of the team (McGrath, 1984).

Considering the limitations of traditional measurement methods (e.g., Rating the Team) as well as McGrath’s (1984) assertion that group structure is dependent on members’ interactions, it would be useful to utilize measurement tools that take these interactions into consideration when assessing group dynamics variables (Warner, Bowers, & Dixon, 2012).
Consequently, the use of a network approach has been proposed as a potential methodology since it focuses on the relational connectivity between individuals (i.e., member interactions) while determining systematic patterns within the structure of a network (Wasserman & Faust, 1994). Deriving from graph theory, network approaches use analytics as well as visual schemas to emphasize the connectedness and embeddedness of the individuals contained within a social structure (Warner et al., 2012). Whereas typical statistical methods assume independence of the observations, networks are relational (i.e., dependent) in nature and thus researchers can examine the impact of these social relations on individual team members (Lusher, Kremer, & Robins, 2014).

An advantage of the network method is its ability to examine both social structures and individual attributes simultaneously. In other words, individual-level attributes (emotional competence in the case of the current study) can be incorporated into a social network investigation to see how such attributes are associated with social relations within the team (Lusher, Robins, & Kremer, 2010). For that reason, the network methodology is well suited for investigating the complex relations that exist within teams, such as those examined in the present study.

To date, very few studies have utilized a social network approach when examining group dynamic variables in sport. The little research that has been conducted has focused on examining athlete leadership. Fransen et al. (2015a) examined the athlete leadership structure of sport teams. Specifically, the authors wanted to establish the reliability of a fourfold athlete leadership role categorization (task, social, motivational, and external) within sport teams. Thus, players were asked to rate the level of leadership for each teammate based on a scale ranging from very poor leader to very good leader. This process allowed the authors to identify specific individuals
displaying high-quality leadership skills within their teams. The four athlete leadership roles assessed (task, social, motivational, and external) were shown to be distinct roles requiring specific leadership qualities. Furthermore, the researchers compared the perceived leadership qualities displayed by the coaches versus the formal and informal leaders of the team. Informal athlete leaders were viewed as the best all-around leaders on their team, being rated higher than coaches and team captains (Fransen et al., 2015a). Lastly, only half the teams sampled acknowledged that their best all-around athlete leader was their team captain.

In another study, researchers examining athlete leadership and social network analysis investigated the attributes of high-quality athlete leaders (Fransen et al., 2015b). Included among the factors considered were: the player’s age, captaincy status, years of experience, leadership outside sport, playing time, social connectedness, and the team tenure. Social connectedness, or the degree to which other players felt connected to the team leader, was to be found the most predictive characteristic when assessing a team leader’s perceived quality. In fact, based on the study results, social connectedness was found to be essential for effective leadership regardless of the leadership role occupied (task, social, motivational, and external).

Lastly, Loughead et al. (2016) examined the four leadership roles (social, task, motivational, and external) and their relationship to cohesion using social network analysis. Corroborating previous research findings (e.g., Vincer & Loughead, 2010), they found that a higher degree of athlete leadership was related to greater perceptions of task and social cohesion.

In order to add to the existing literature on social network and to further investigate the role of group dynamic factors in the sport context, the general purpose of the present study was to examine four group dynamics constructs (emotional competence, athlete leadership, cohesion, and trust) utilizing a social network approach. The variables selected for the study are all
contained with Carron and Eys’ conceptual framework, and have been examined independently in previous research. In order to achieve this objective, this study followed a threefold procedure. First, the density of the athlete leadership, cohesion, and trust networks were investigated. Second, the centralization of the athlete leadership, cohesion, and trust networks were examined. Third, using the technique of autocorrelation, the principle of homophily was tested. Homophily is described as the propensity for people to seek interactions with others who are similar to them (Lazarsfeld & Merton 1954). In the present case, if homophily is present between the players, those who rated themselves similarly on the attribute of emotional competence would be expected to occupy similar position in the networks of athlete leadership, cohesion, and trust. A description of density, centralization, and autocorrelation is presented in the results section of the thesis. Given the exploratory nature of this study, no apriori hypotheses were advanced.

Method

Participants

The participants of this study were professional female ice hockey players from one team competing in a North American league. The team consist of 22 female players, of which 19 agreed to participate to the study. This number of participants is considered satisfactory since the network approach to analyzing the data requires a high participation rate within the team, but accommodates a low number of participating teams. According to Kilduff and Tsai (2007), one team provides sufficient data since there is no target value to hit in order to reach power for the study. However, depending on the type of social network analyses performed, 75% of group members from a team need to participate for the results to be trustworthy (Smith & Moody, 2013; Wasserman & Faust, 1994). Consequently, the participation of 19 of the 22 players corresponds to over 86% of participation rate, which is regarded as adequate.
The players on this team ranged from 22 to 30 years of age ($M = 24.64$, $SD = 2.32$), having played on their current team between one and five years ($M = 2.32$, $SD = 1.49$).

**Measures**

**Demographics.** Participants indicated their age, playing position, tenure on the team, and leadership status on the team (i.e., formal, informal, or no leadership role).

**Attribute variable.** An attribute variable refers to an individual-specific type of data collected on each player through self-rated questionnaires in social network theory. The attribute variable collected in the present study was emotional competence as measured by Mikolajczak, Brasseur, and Fantini-Hauwel’s (2014) Short Profile of Emotional Competence (S-PEC). The S-PEC (see Appendix B) contains 20 items, which measures five dimensions of emotional competence: identification of emotions (four items), understanding of emotions (four items), expression of emotions (four items), regulation of emotions (four items), and use of emotions (four items). Half of the items assess intra-personal abilities while the other half assesses one’s inter-personal ability to deal with emotions. Identification of emotions consist of being able to perceive an emotion when it appears. Sample items are: “When I am touched by something, I immediately know what I feel” (intra-personal), and “I am good at sensing what others are feeling” (inter-personal). Understanding emotions can be described as being able to understand the causes and consequences of emotions, and to distinguish triggering factors from causes. Sample items include: “When I am feeling low, I easily make a link between my feelings and a situation that affected me” (intra-personal), and “I do not understand why the people around me respond the way they do” (reverse score, inter-personal). Expressing emotions is defined as being able to express emotions in a socially accepted manner. Items measuring that dimension are: “I am good at describing my feelings” (intra-personal), and “Other people tend to confide in
me about personal issues” (inter-personal). Regulating emotions consists of being able to regulate stress or emotions when they are not appropriate to the context. Example items are: “I find it difficult to handle my emotions” (reverse score, intra-personal), and “When I see someone who is stressed and anxious, I can easily calm them down” (inter-personal). Finally, Using Emotions is defined as being able to use emotions to improve reflection, decisions and actions. Sample items are: “My emotions inform me about changes I should make in my life” (intra-personal), and “I can easily get what I want from others” (inter-personal).

All items are scored on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Eight out of the 20 items are negatively worded, thus requiring reverse scoring. The S-PEC has demonstrated evidence of factorial, concurrent, and predictive validity (Mikolajczak et al., 2014).

**Network variables.** Network research fundamentally focuses on the relationships between individuals in a given context (Lusher et al., 2010). Thus, a relational methodology was adopted in this study when examining three different variables: athlete leadership, cohesion, and trust. There is a total of 12 network items: six items pertaining to athlete leadership, two for cohesion, and four for trust. In order to assess the relations between players, the participants were asked to rate each one of their teammates utilizing a roster based survey format.

**Athlete leadership.** Each athlete was asked to rate the effectiveness of their teammates’ leadership on a scale from 1 (Very poorly) to 5 (Very well). The items relating to athlete leadership were based on the six transformational leadership dimensions from the DTLI (Callow et al., 2009). That is, for each leadership dimension, an item was created according to its operational definition (see Appendix C). The six dimensions include Individualized Consideration, inspirational motivation, intellectual stimulation, fostering the acceptance of
group goals, high performance expectations, and appropriate role model. Individualized Consideration assesses the leader’s personal attention to the follower and takes into account the follower’s individual needs. Inspirational motivation refers to a leader articulating a positive vision of the future and inspiring followers that they can achieve that vision. Intellectual stimulation is displayed when a leader challenges his/her followers to demonstrate creativity. Fostering acceptance of group goals refers to a leader promoting cohesion and cooperation by getting group members involved and committed to the group’s goals. High performance expectations occurs when a leader places high demands on the follower, expecting a high quality of work. Lastly, appropriate role model is displayed when a leader acts in ways that sets an example for followers.

**Cohesion.** In order to examine cohesion, participants indicated the extent they felt cohesive with each teammate on both a task and social level (see Appendix D). This distinction between task and social cohesion is consistent with Carron et al.’s (1985) conceptual model of cohesion which differentiates between the instrumental (task) and the affect (social) aspects of cohesion. To measure task cohesion, the participants were asked to: “Indicate the extent to which you feel united with [player X] in order to achieve the team’s goals and objectives.” For social cohesion, the item will be as follow: “Indicate to which extent you feel united with [player X] in order to maintain good social relationships within the team.” The participants were presented with a roster in which they had to rate each teammates on a scale from 1 (*Not united at all*) to 5 (*Extremely united*) for each type of cohesion.

**Trust.** Trust was assessed according to Mayer et al.’s (1995) conceptualization of trust which contains four factors influencing one’s perceptions of trust: justice, benevolence, integrity, and competence. Competence refers to a “group of skills, competencies, and characteristics that
enable a party to have influence within some specific domain” (Mayer et al., p. 717). In order to measure competence, the players were asked to: “Indicate the extent to which [player X] has abilities that can increase your own performance”. Benevolence is defined as “the extent to which a trustee is believed to want to do good to the trustor” (Mayer et al., p. 718). The players provided a rating based on: “The extent to which [player X] looks out for what is important for you”. Integrity is conceptualized as “a trustor’s perception that the trustee adheres to a set of principles that the trustor finds acceptable” (Mayer, et al., p. 719). Based on this definition, the players were required to: “Indicate the extent to which [player X] acts with integrity towards you, that she adheres to a set of behaviors that you find acceptable”. Finally, justice is broadly described as the role of fairness in the nature of treatment of others (Greenberg, 1987; 1996). In order to measure the level of justice, each player provided a rating of: “The extent to which [player X] is just and fair towards you, that she is consistent in her acknowledgement and reward for your contributions to the team”. For each of these factors, the players were presented with a roster and asked to rate each one of their teammates on a five point Likert scale ranging from 1 (Not at all) to 5 (To a great extent) (see Appendix E).

**Procedure**

Ethics approval was obtained from the University of Windsor’s Research Ethics Board. Four teams from an elite women’s league were contacted through email to inquire about their interest in participating in the study. This introduction email (see Appendix F) contained general information about the study. One general manager showed interest in having her team partake in the study, thus the following steps were oriented towards this specific team. The primary researcher sent a second email (Appendix G) to the general manager asking for a copy of the email to be posted in the team’s locker room for the players to see. That email contained more
detailed information about the study as well as the primary researcher’s contact information. Any player interested in participating in the study was asked to contact the primary researcher directly. Following the reception of an email from the interested athletes, the primary researcher sent a follow-up email containing the survey link (Appendix H). Once the players clicked on the survey link, they were presented with a Letter of Information and Consent to Participate Form (see Appendix I) where they were asked to confirm their participation in the study. Once their consent was given, the players were directed to the survey which included demographic questions, as well as measures for emotional competence, athlete leadership, cohesion, and trust.

A unique aspect when conducting research using a social network approach is the need to identify each of the players on a team. Unlike traditional methods, whole network studies do not guarantee anonymity since it is the only way for the researcher to associate individual-level data with social network ties (Lusher et al., 2010). Therefore each player was initially identified, until the data were inputted into the computer software program, at which time the names of the players were removed. Each online questionnaire was estimated to take an average of 30 minutes to complete.

Results

Descriptive Statistics

The means and standard deviations for the demographic variables of age and tenure, along with the means, standard deviations, and internal consistencies of Emotional Competence (intra-personal and inter-personal) can be found in Table 1. Similar information for the network variables of athlete leadership, cohesion, and trust is provided in Table 2.

As suggested by Žnidaršič, Ferligoj, and Doreian (2012), the size of each of the networks, the number of responses received, as well as the percentage of non-respondents per network (to
be found in last three columns) can be found in Table 3. Three players from the sampled team did not wish to partake in the current study, however they did not request that their names and data be removed from the questionnaire. In other words, their teammates were able to rate these non-participating team members and thus, data pertaining to these players are included in the network analyses. Huisman (2009) termed this type of missing data as unit non-response, since all the outgoing ties and attribute scores of these actors (i.e., players), although included within the network boundaries, are missing. Apart from the unit non-responses, the networks also show instances of item non-responses, whereas data on actors’ particular ties are missing. The rate of missingness (including units and items non-responses) ranged from 13.64% to 18.61% per network, with an average of 15.03% of missing data for all of the networks (see Table 3). This level is deemed acceptable as it was generally agreed that a network presenting up to 26% of missing data is considered a plausible model (Koskinen, Robins, Wang, & Pattison, 2013).

Social Network Analyses

A particularity of social network analysis is the impossibility to generalize the results as if they were obtained from a random sample of a population (Borgatti, 2009). Because the population surveyed in this study consists of members of a hockey team (i.e., a complete network), the players are believed to be dependent from one another and therefore classical statistical testing cannot be applied reliably (Borgatti, Everett, & Johnson, 2013; Brandes, Robins, McCranie, & Wasserman, 2013; Prell, 2012; Wasserman & Faust, 1994). This interdependency violates standard assumptions made in traditional inferential statistics. For that reason, researchers utilizing social network analysis need to treat their data differently than they would if using traditional statistics. Hence, the computer program UCINET was used to conduct the analyses in the current study. One method developed to accommodate social network data is
the permutation test. This test computes the proportion of chance of obtaining an association as large as the one that was actually observed in the data if the value of the variables would have been assigned independently of each other, or if it was likely that such an association happened by chance.

The first permutation test performed on the data compared the average tie strength (which is a measure of density for valued networks) against a test value (in this case, the value of 5.00) to assure the results obtained from the collected data were not due to random variation (Hanneman & Riddle, 2005). This test allowed to control for a possible effect that would have arisen for two specific reasons: time constraint and trust issue. Indeed, certain players might have been tempted to reduce the time of response by providing the same rating regardless of the teammate they were evaluating. Moreover, as assumed by the social identity theory (Tajfel, 1978; Tajfel & Turner, 1979), the researcher was likely perceived as an outsider by the players, which could have led to a lower level of trust between the respondents and the researcher. Because of the personal nature of the questions, it is possible that some players felt the need to protect and/or bolster the perception they have of their teammates. For those reasons, they could have altered the ratings of their teammates in that every single player was exemplary (i.e., rating every teammate as a 5 out of 5 for each network question). Therefore, the value against which we tested our networks was 5.00 (i.e., the highest possible rating of a teammate). UCINET estimated the standard error by a permutation method (bootstrap; Efron, 1979) which produced 10,000 networks by using random samples of node sub-sets and computed the density of the networks each time (Hanneman & Riddle, 2005). As presented in Table 4, the values of the estimated standard error for density ranged from 0.13 to 0.17. When converted to standard error units, the results ranged from -4.56 to -8.47. Every network showed significance for the
bootstrap test ($p = .0001$), therefore demonstrating that the average tie strength value of our networks did not differ from 5.00 due to random variation. Therefore, the primary social network analyses can be performed on the data while being confident that players did not inflate their teammates’ ratings to the maximum value possible.

In order to test the three main research objectives, tests of density, centralization, and autocorrelation were conducted.

**Density.** Density is primarily interpreted to be a measure of connectivity between network actors (Robins, 2015). It considers the amount and proportion of ties in the social network as a whole. The number of ties within a network is limited by the number of nodes, and density is a measure of proportion of the ties present within the network out of the maximum number of ties possible (Wasserman & Faust, 1994). In the case of a valued network such as the ones in this study, this measure had to be adapted. More specifically, the measure of density takes into account the weight of the ties, and is therefore reflected in the average value of the ties between the players. Consequently, the density of the networks in this study can range from an absolute minimum of 1 to an absolute maximum of 5. For the present study, a higher density score means that more players effectively displayed the behavior assessed (leadership, cohesion, or trust). Conversely, in the case of less dense networks, fewer players were perceived as being efficient at leadership, cohesion, or trust.

The results from the density analyses are displayed in the first column of Table 3. Sociograms are also provided in Figures 1, 2, and 3 to visually highlight the difference between the most and least dense networks for each dimensions; fostering acceptance of group goals and appropriate role model, respectively for the athlete leadership networks, task and social, respectively for the cohesion networks, and finally justice and competence, respectively for the
trust networks. In sociograms, players are represented by nodes (circles) while the lines represent the relationships between the players. Light blue circles represent the players in Figures 1, 2, and 3, and line thickness varies according to the rating between the players: the thicker the lines, the higher the rating. Thus, the more “crowded” the networks, the denser they are. For the six athlete leadership networks, the athlete leadership behaviors ranged in density from a high of 4.22 (Fostering Team Goals) to a low of 3.79 (appropriate role model). The social and task cohesion networks were almost identical in terms of density, with the task cohesion being 4.15 and social cohesion being 4.11. For trust, justice was the most dense network at 4.32, followed by integrity at 4.27, benevolence at 3.93, and competence at 3.91.

**Centralization.** Another measure in network studies is centralization. It is calculated from an individual-level measure of analysis called *node centrality*, which examines the level of prominence of each actor (i.e., player) in the network (Berkowitz, 1987). It is assumed that the more centrally located within a network, the more influence an actor is perceived to possess. Therefore, a node with a high centrality refers to a player that is perceived to possess a lot of influence. When aggregated over all actors of the network to obtain a group-level measure, the measure is called *centralization*. It is measured by dividing the node centrality present in the network to what would be the maximal node centrality possible in that network. In other words, it calculates how heterogeneous the actors’ centralities are within the network (Wasserman & Faust, 1994). This measure alludes to a theory which assumes that players who are the most important (or prominent) are centrally located within the social network. The scale ranges from 0 to 1. The closer the value is to 1, the more likely the network ties are highly concentrated on one single player, thus leaving the remaining players considerably less central (Wasserman & Faust, 1994). Completely centralized networks resemble a perfect star where all the players are
connected to one highly central actor but not tied to each other. Conversely, decentralized
networks are represented when all actors have similar centrality scores (Wasserman & Faust,
1994).

As mentioned in Prell (2012), centralization is a measure that does not translate well in
valued network. In the present study, participants rated teammates on a scale from 1 to 5 (i.e., a
valued network). For that reason, the ties between actors have been dichotomized, where the
values of four and five were coded as a 1, and the values of one, two, and three were coded as a
0.

For all six of the athlete leadership networks many players effectively displayed the
characteristics assessed. As presented in the second column of Table 3, the indegree
centralization of the different leadership networks ranged from .19 (individual consideration) to
.33 (inspirational motivation). As for cohesion, the indegree centrality score for social cohesion
was .21 and .19 for task cohesion. Lastly for trust, competence was the most centralized at .27,
followed by benevolence at .22, justice at .18, and integrity at .15. A visual representation of the
results can be found in Figures 4, 5, and 6. In this case, the size and color of the nodes were
determined based on the indegree score of each player. Although not a comprehensive measure
of centrality, the indegree score is one way to convey centrality (Borgatti et al., 2013; Warner &
Faust, 1994). In the sociograms, the bigger and darker the node, the higher the indegree score of
that player. A legend provides information about the color of the nodes in relation to their
indegree scores. Incidentally, networks that are more centralized should contain more nodes with
smaller indegree values. Conversely, less centralized networks should be comprised of more
nodes with average indegree values.
**Autocorrelation.** Autocorrelation is a method available through UCINET to examine the relationship between actor attributes’ (i.e., emotional competence) and network relations (i.e., athlete leadership, cohesion, and trust). A key insight of the social network approach is the idea that an individual’s attitudes and behaviors are affected by the attitudes and behaviors of those to whom the actor is connected, and it is through social process that those connections can be explained. The processes of homophily and heterophily, for example, provide theories through which it is possible to interpret the node location within the social networks. The basic idea of autocorrelation is that the relation between the attribute of two actors in a dyad covaries according to their position in the network (Apkarian & Hanneman, 2016). The similarities of two people’s attributes are usually reflected through agreements regarding behavior, attitudes, values, and beliefs. This would in turn be translated into a common behavior, which would be displayed through the leadership, cohesion, and trust networks (Forsyth, 2010).

The indexes used to calculate autocorrelation in UCINET were originally developed to measure geo-spatial distance but later adapted to fit the needs of social network. In the current study, the measure of distance or closeness was calculated using, amongst other values, the strength of the ties between the players. There are two autocorrelation methods available in UCINET: Moran and Geary. Although either method could have been used for this study, Moran’s was deemed more appropriate since it enables the detection of global patterns across networks rather than focusing on immediate neighbors as Geary’s tends to do (Hanneman & Riddle, 2005). Similar to a regular correlation coefficient, Moran’s index ranges from -1.0 (representing a perfectly negative correlation) through 0 when there is no correlation, to +1.0 (indicating a perfectly positive correlation).
As seen in Table 5, all the results showed a p-value below .05, signifying that the null hypothesis was rejected. In other words, it meant that the players’ level of emotional competence had an influence on the actors’ position within the networks. However, the data obtained from the analysis pointed towards a very weak dependence, positive for most of the networks, but negative for others. Four out of the six athlete leadership networks presented positive autocorrelational values (fostering acceptance of group goals, individual consideration, intellectual stimulation, and appropriate role model) while two were negative (high performance expectations and inspirational motivation) when correlating with intra-personal emotional competence. In the case of inter-personal emotional competence, five networks resulted in positive values (fostering acceptance of group goals, individual consideration, intellectual stimulation, appropriate role model, and inspirational motivation), while one was negative (high performance expectations). The results between the cohesion networks and the attributes of intra-personal and inter-personal emotional competence were found to be negative for both the social and task dimensions. When applying the autocorrelation to the networks of trust and the attribute of emotional competence, two of the four networks presented positive results for both the intra-personal and the inter-personal dimensions (benevolence and integrity). The remaining two networks indicated negative autocorrelational values as seen in Table 5 (competence and justice).

**Discussion**

This study used a social network approach to examine the perception players had of their teammates’ leadership, cohesion, and trust. The general purpose of the current study was to examine four group dynamics constructs (emotional competence, athlete leadership, cohesion, and trust) using social network analyses. The first purpose was to examine the density of the athlete leadership, cohesion, and trust networks. The second purpose was to examine the
centralization of the athlete leadership, cohesion, and trust networks. The third purpose was to examine homophily between the players.

In regard to the purpose concerning density for the athlete leadership networks, the highest density was found for the dimension of fostering the acceptance of group goals. In other words, out of the six transformational leadership behaviors that were examined, fostering the acceptance of group goals was the athlete leadership behavior that was displayed the most effectively by the players of the team, while appropriate role model was the least effective. This finding does not align with previous athlete leadership literature where athletes were asked to rank athlete leaders’ most important behaviors (Duguay, Loughead, & Munroe-Chandler, in press). In their research, Duguay et al. (in press) found that athletes perceived appropriate role model to be the most important leadership behavior. However, it should be noted that all six of the athlete leadership transformational behaviors were still rated fairly effective. Nonetheless Duguay et al.’s study was based on the theoretical importance of athlete leadership behaviors, while players in the current study were asked about their perceptions of teammates on their current team. It is therefore possible that a discrepancy would exist between theoretical importance and perceptions. It is important to keep in mind, however, that the players who were sampled for Duguay et al.’s study were varsity level players with an average age of 20.76 years whereas the players in the current study performed at a higher level and were for the most part older (mean age =24.64). These factors could have played a role in the difference in results between the two studies. More specifically, if Duguay et al.’s study would have been performed on older athletes, the results might have matched the ones in this study. This would signify that the importance of athlete leadership behaviors vary based on the athlete’s age. Future research
should explore the importance of different transformational athlete leadership behaviors in a sample of older elite players to confirm or refute the results from the current study.

For cohesion, the network with the highest density (although only by a small margin) was the task cohesion network. Simply put, players on the team felt more task cohesive than socially cohesive. This finding may be explained from the results of a meta-analysis performed by Carron et al. (2002) that examined the relationship between cohesion and performance in sport teams. In this meta-analysis, cohesion type (task or social) and gender were considered as a potential moderators. The authors found that both task and social cohesion were equally effective at enhancing performance. However, the results also showed that female athletes had a greater cohesion-performance relationship than male athletes. Although the results from the present study sampled only one female team, the results are interesting in that both gender and cohesion type together may play a role in a team’s performance. Therefore future research should continue to examine moderating variables using SNA.

For trust, the network with the highest density was the dimension of justice. That is, in relation to the four trust factors that were examined in the current study, the players perceived their teammates to be most fair and just towards them. This finding was in contrast to Zhang’s (2004) results where the trust factor of benevolence was found to have the strongest relationship to trust in leadership. However, it should be noted that Zhang’s results were based on a coach-athlete’s relationship while the current study examined athlete-athlete relationship. Even though the coach and the athlete can both occupy leadership roles, it does not signify that their relationship to the player providing the rating is perceived to be equal. In other words, the perceived trustworthiness can be dependent on different factors. In fact, a parallel that can be made with leadership, where it was shown that despite coaches and athletes occupying a
leadership role on their teams, they were not expected to provide the same type of leadership to the team members (Loughead & Hardy, 2005). Hence, this could very well translate for the construct of trust. Even though both coaches and athletes could be perceived as trustworthy, they are not necessarily evaluated based on the same criteria.

Practical implications based on the team’s overall network density results should involve approaches to increase the network’s density. Past research from organizational psychology has recognized the benefits of denser networks as it was demonstrated that work teams with higher levels of communication and friendship network density outperform work teams with lower levels of density (Baldwin, Bedell, & Johnson, 1997; Reagans & Zuckerman, 2001).

Regarding the centralization of the networks, the current study inquired about the level of sharedness of the networks. To derive those results, the data were dichotomized and every actor (i.e., player) was provided a centrality score based on the amount of nominations they received in relation to the total amount of nominations that were made for each network studied. The centralization score illustrates how equal (shared) or unequal (centralized) the distribution of nominations, and thus how widespread the influence is within the networks (Hanneman & Riddle, 2005).

The centralization scores of the six athlete leadership networks were found to be low, providing evidence that the leadership on the team is displayed by several players. This finding aligns with the paradigm which claims that leadership on teams is shared amongst several individuals (e.g., Loughead, 2017; Pearce & Conger, 2003). Additionally, Eys, Loughead, and Hardy’s (2007) contention that an even degree of representation (i.e., sharedness) among the different leadership dimensions relates to player satisfaction, the results from this study could indicate that the players were relatively satisfied with the leadership displayed on their team.
This is illustrated by a low (0.147) variation rate of the indegree centralization between the six athlete leadership networks.

In regard to the centralization scores of the cohesion networks, the results confirmed that several players were perceived as promoting social and task cohesion on the team. With centralization scores that mirrored athlete leadership scores, these results support Glenn and Horn (1993) and Loughead et al.’s (2016) findings in which the perceived leadership of a player was a predictor of cohesiveness with that player. In other words, an athlete’s leadership has a positive influence on the perception of task and social cohesion.

The indegree centralization of the trust networks presented generally low levels of centralization for all four networks, meaning that several players on the team were perceived as trustworthy, rather than a select few. This result could prove to be beneficial for the team based on Zhang and Chelladurai’s (2013) contention that the presence of trust in a group brings positive dividends such as an increase in the members’ commitment to the team and cooperation with one another. In turn, those factors are believed to impact the performance of the team (Becker, Billings, Eveleth, & Gilbert, 1996). Hence, the team benefits from having several players effectively displaying the trust factors of benevolence, competence, integrity, and justice.

In order to place the current findings into context concerning the centralization scores that were found, it is useful to examine communication structures of work teams. While highly centralized networks were historically considered the norm, research has demonstrated that centralized communication structures are beneficial for simple tasks, while decentralized or more shared communication networks are superior for complex tasks (Baldwin et al., 1997; Friedkin, 1993; Sparrowe, Liden, Wayne, & Kraimer, 2001). Since hockey is a dynamic sport involving interdependent actors, the tasks executed by the players are largely considered to be complex.
Consequently, the team should aim to have many individuals displaying influence in order to increase its performance.

By examining the dependence between the attribute of emotional competence and relational data (athlete leadership, cohesion, and trust), the purpose of the autocorrelation analysis was to uncover patterns of homophily amongst players. Positive autocorrelation scores would tend to suggest that for players who scored similarly in emotional competence found themselves close to one another in the networks. All of the 12 networks analyzed through autocorrelation yielded low results, either positively or negatively.

For the six athlete leadership networks, a pattern of homophily was uncovered for four of the networks. In practical terms, this means that two players who had a similar emotional competence score tended to be located closer in the networks than two players who scored differently on the attribute of emotional competence. This dependency showed to be a little stronger for the networks of appropriate role model (intrapersonal emotional competence) and intellectual stimulation (interpersonal emotional competence). That is to say that players who were similar when it came to identifying, understanding, expressing, regulating and using emotions in themselves, tended to possess a similar influence in terms of acting as an appropriate role model. Moreover, players who scored similarly at identifying, understanding, expressing, regulating and using their emotions in others, tended to possess a similar influence at intellectually stimulating others. These findings are therefore consistent with previous literature which stated that individuals who exhibit transformational leadership behaviors also possess higher levels of emotional competence (Gardner & Stough, 2002; Palmer & Stough, 2001).

For cohesion, the autocorrelations were negative all around, meaning that players who scored similarly in emotional competence (intrapersonal and interpersonal) tended to be located
further apart in the networks. This pointed towards heterophily rather than homophily, where people of similar emotional competence did not feel united to one another. It argues against the popular saying that “birds of a feather flock together” and rather supports the saying that “opposites attract”. Past literature on collaborative networks partially supports this claim as it denotes that people are likely to form heterophilic task-related ties with those who are complementary to their own skill sets (Moody, 2004). A benefit of these kind of ties is that they are assumed to promote complementarity between individuals (Kaplan & Gurven, 2005). For the current study, people of divergent EC tended to be closer in the cohesion networks, increasing the exchanges between players who perceive and express emotions differently, allowing them to learn from one another and diversify their abilities.

Regarding the autocorrelation index of the trust networks, the dimension of competence received the highest Moran’s I score and was negative. This suggests that players who have a similar ability to identifying, understanding, expressing, regulating and using emotions about themselves and others tend to be dissimilar in their level of competence. These results are somewhat consistent with Christie, Jordan, and Troth’s (2015) findings, which demonstrated no significant relationship between emotional competence and trust in co-workers.

Albeit the present study adds to the existent literature on group dynamics by examining the variables of athlete leadership, cohesion, and trust using a relational perspective, it is not without its limitations. First, the data collected for this study was obtained from one team and at one point in time only. Because the group dynamic constructs assessed in this study are known to change through time (Tuckman, 1965), the results can solely apply to the one team and are specific to the moment of data collection. Second, the cross-sectional nature of the study did not allow for the causality of the influence to be inferred. Therefore, in relation to the
autocorrelations results, it is impossible to advance whether possessing a similar level of emotional competence led to proximity in the network, or if proximity in the network led individuals to adjust their level of emotional competence. Future research should consider including several teams and gathering data at several time points throughout the season in order to determine the direction.

Third, although it was the original goal to use valued data for all of the analysis, UCINET offered a limited range of possible analysis to be performed on valued data. Hence, the dichotomization of the data was necessary, which was not ideal considering that it involves subjectively determining a cutoff value. As was suggested by Hawe, Webster, and Shiell (2004), the collection of qualitative data alongside the quantitative analysis might have been useful to truthfully interpret the meaning of results.

In conclusion, as this study was the first of its kind to explore the variables of athlete leadership, cohesion, and trust in the context of sport using a relational approach, it is important to stress that the results presented should be considered exploratory. Nonetheless, the current study confirmed the pertinence of using a social network approach in the sport context. This methodology allowed insight into the team’s inner-relationships, which would not have been possible otherwise. Also, through a relatively high rate of participation, the players demonstrated an inherent interest in learning more about their own team’s dynamics. While this study explored selected group dynamics variables in sport, multiple questions still remain. Further research pertaining to group dynamics and employing a social network approach is warranted in order to confirm the findings from the present study and to further advance the research in sport psychology.
References


athlete leadership at the individual and team level through social network analysis.


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Table 1

Descriptive Statistics for the Attributes of Age, Tenure, Athlete Leadership, and Emotional Competence

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>$M$</th>
<th>$SD$</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>---</td>
<td>24.64</td>
<td>2.32</td>
<td>---</td>
</tr>
<tr>
<td>Tenure (years)</td>
<td>---</td>
<td>2.32</td>
<td>1.49</td>
<td>---</td>
</tr>
<tr>
<td>Emotional Competence –Intra</td>
<td>---</td>
<td>34.95$^b$</td>
<td>5.54</td>
<td>0.76</td>
</tr>
<tr>
<td>Emotional Competence- Inter</td>
<td>---</td>
<td>35.00$^b$</td>
<td>5.13</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Note: $^a$= Score for athlete leadership variables can range from 25 to 125. $^b$=Score for emotional competence can range from 10 to 50.
Table 2

**Descriptive Statistics for Networks of Athlete Leadership, Cohesion, and Trust**

<table>
<thead>
<tr>
<th>Network</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL – Appropriate role model</td>
<td>68.45&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.26</td>
</tr>
<tr>
<td>AL – Fostering group goals</td>
<td>75.91&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.01</td>
</tr>
<tr>
<td>AL – High performance</td>
<td>75.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.33</td>
</tr>
<tr>
<td>expectations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL – Individual</td>
<td>73.86&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.46</td>
</tr>
<tr>
<td>consideration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL – Inspirational</td>
<td>70.77&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.61</td>
</tr>
<tr>
<td>motivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL – Intellectual</td>
<td>68.91&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.18</td>
</tr>
<tr>
<td>stimulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cohesion – Social</td>
<td>74.59&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.75</td>
</tr>
<tr>
<td>Cohesion – Task</td>
<td>75.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.83</td>
</tr>
<tr>
<td>Trust – Benevolence</td>
<td>67.14&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.45</td>
</tr>
<tr>
<td>Trust – Competence</td>
<td>70.59&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.53</td>
</tr>
<tr>
<td>Trust – Integrity</td>
<td>73.14&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.36</td>
</tr>
<tr>
<td>Trust – Justice</td>
<td>74.18&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.82</td>
</tr>
</tbody>
</table>

*Note. AL= Athlete Leadership. *<sup>a</sup>* = The scores for those networks could theoretically range from 18 to 95. *<sup>b</sup>* = The scores for the networks of trust (benevolence, integrity, and justice) could theoretically range from 17 to 90.*
Table 3

Size of the Networks, Percentage of Non-Respondents, Density, and Centralization Results

<table>
<thead>
<tr>
<th>Networks</th>
<th>Average value (Density) a</th>
<th>Network Indegree Centralization b</th>
<th>Number of actors c</th>
<th>Number of responses d</th>
<th>Percentage of missingness e</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL – Appropriate role model</td>
<td>3.793</td>
<td>0.331</td>
<td>22</td>
<td>397</td>
<td>14.07%</td>
</tr>
<tr>
<td>AL – Fostering group goals</td>
<td>4.217</td>
<td>0.215</td>
<td>22</td>
<td>396</td>
<td>14.29%</td>
</tr>
<tr>
<td>AL – High performance expectations</td>
<td>4.156</td>
<td>0.234</td>
<td>22</td>
<td>397</td>
<td>14.07%</td>
</tr>
<tr>
<td>AL – Individual consideration</td>
<td>4.073</td>
<td>0.186</td>
<td>22</td>
<td>399</td>
<td>13.64%</td>
</tr>
<tr>
<td>AL – Inspirational motivation</td>
<td>3.912</td>
<td>0.333</td>
<td>22</td>
<td>398</td>
<td>13.85%</td>
</tr>
<tr>
<td>AL – Intellectual stimulation</td>
<td>3.809</td>
<td>0.236</td>
<td>22</td>
<td>398</td>
<td>13.85%</td>
</tr>
<tr>
<td>Cohesion – Social</td>
<td>4.113</td>
<td>0.213</td>
<td>22</td>
<td>399</td>
<td>13.64%</td>
</tr>
<tr>
<td>Cohesion – Task</td>
<td>4.153</td>
<td>0.193</td>
<td>22</td>
<td>399</td>
<td>13.64%</td>
</tr>
<tr>
<td>Trust – Benevolence</td>
<td>3.928</td>
<td>0.220</td>
<td>22</td>
<td>376</td>
<td>18.61%</td>
</tr>
<tr>
<td>Trust – Competence</td>
<td>3.912</td>
<td>0.274</td>
<td>22</td>
<td>397</td>
<td>14.07%</td>
</tr>
<tr>
<td>Trust – Integrity</td>
<td>4.268</td>
<td>0.152</td>
<td>22</td>
<td>377</td>
<td>18.40%</td>
</tr>
<tr>
<td>Trust – Justice</td>
<td>4.317</td>
<td>0.184</td>
<td>22</td>
<td>378</td>
<td>18.18%</td>
</tr>
<tr>
<td>All networks</td>
<td>--</td>
<td>--</td>
<td>22</td>
<td>4711</td>
<td>15.03%</td>
</tr>
</tbody>
</table>

Note. AL = Athlete Leadership. a = Density scores were based on valued data. The values could range from 1 to 5; b = Centralization scores were based on binary data. The values could range from 0 to 1; c = Number of respondents, including non-respondents, within the network boundaries; d = Number of responses (ties) ranges from 376 to 399; e = Percentage of missingness including units and items non-responses.
Table 4

**Hypothesis About the Data’s Central Tendency**

<table>
<thead>
<tr>
<th>Networks</th>
<th>Parameter value</th>
<th>Density</th>
<th>Difference</th>
<th>Estimated standard error for density</th>
<th>z-score</th>
<th>Average bootstrap density</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL – Appropriate role model</td>
<td>5.000</td>
<td>3.7935</td>
<td>-1.2065</td>
<td>0.1676</td>
<td>-7.1995</td>
<td>3.77</td>
</tr>
<tr>
<td>AL – Fostering group goals</td>
<td>5.000</td>
<td>4.2172</td>
<td>-0.7828</td>
<td>0.1442</td>
<td>-5.4269</td>
<td>4.20</td>
</tr>
<tr>
<td>AL – High performance expectations</td>
<td>5.000</td>
<td>4.1562</td>
<td>-0.8438</td>
<td>0.1321</td>
<td>-6.3855</td>
<td>4.15</td>
</tr>
<tr>
<td>AL – Individual consideration</td>
<td>5.000</td>
<td>4.0727</td>
<td>-0.9273</td>
<td>0.1442</td>
<td>-6.4290</td>
<td>4.04</td>
</tr>
<tr>
<td>AL – Inspirational motivation</td>
<td>5.000</td>
<td>3.9121</td>
<td>-1.0879</td>
<td>0.1592</td>
<td>-6.8346</td>
<td>3.90</td>
</tr>
<tr>
<td>AL – Intellectual stimulation</td>
<td>5.000</td>
<td>3.8090</td>
<td>-1.1910</td>
<td>0.1407</td>
<td>-8.4659</td>
<td>3.76</td>
</tr>
<tr>
<td>Cohesion – Social</td>
<td>5.000</td>
<td>4.1128</td>
<td>-0.8872</td>
<td>0.1633</td>
<td>-5.4343</td>
<td>4.08</td>
</tr>
<tr>
<td>Cohesion – Task</td>
<td>5.000</td>
<td>4.1529</td>
<td>-0.8471</td>
<td>0.1499</td>
<td>-5.6513</td>
<td>4.13</td>
</tr>
<tr>
<td>Trust – Benevolence</td>
<td>5.000</td>
<td>3.9282</td>
<td>-1.0718</td>
<td>0.1560</td>
<td>-6.8710</td>
<td>3.98</td>
</tr>
<tr>
<td>Trust – Competence</td>
<td>5.000</td>
<td>3.9118</td>
<td>-1.0882</td>
<td>0.1510</td>
<td>-7.2049</td>
<td>3.99</td>
</tr>
<tr>
<td>Trust – Integrity</td>
<td>5.000</td>
<td>4.2679</td>
<td>-0.7321</td>
<td>0.1604</td>
<td>-4.5630</td>
<td>4.25</td>
</tr>
<tr>
<td>Trust – Justice</td>
<td>5.000</td>
<td>4.3175</td>
<td>-0.6825</td>
<td>0.1301</td>
<td>-5.2452</td>
<td>4.33</td>
</tr>
</tbody>
</table>

*Note. AL = Athlete Leadership. a = Parameter value was the value against which the network density was tested; b = Density scores were based on valued data. The values could range from 1 to 5; c = Expresses the difference between the parameter value and actual network density.*
### Table 5

**Autocorrelation of EC (Intra-personal and Inter-personal) and Network Data Using Moran Index**

<table>
<thead>
<tr>
<th></th>
<th>Autocorrelation Intra-personal EC</th>
<th>Significance Intra-personal EC</th>
<th>Autocorrelation Inter-personal EC</th>
<th>Significance Inter-personal EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL – Appropriate role model</td>
<td>0.006</td>
<td>0.000</td>
<td>0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>AL – Fostering group goals</td>
<td>0.004</td>
<td>0.000</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>AL – High performance expectations</td>
<td>-0.008</td>
<td>0.000</td>
<td>-0.007</td>
<td>0.000</td>
</tr>
<tr>
<td>AL – Individual consideration</td>
<td>0.003</td>
<td>0.000</td>
<td>0.002</td>
<td>0.000</td>
</tr>
<tr>
<td>AL – Inspirational motivation</td>
<td>-0.002</td>
<td>0.000</td>
<td>0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>AL – Intellectual stimulation</td>
<td>0.003</td>
<td>0.000</td>
<td>0.005</td>
<td>0.000</td>
</tr>
<tr>
<td>Cohesion – Social</td>
<td>-0.008</td>
<td>0.001</td>
<td>-0.006</td>
<td>0.000</td>
</tr>
<tr>
<td>Cohesion – Task</td>
<td>-0.003</td>
<td>0.000</td>
<td>-0.003</td>
<td>0.000</td>
</tr>
<tr>
<td>Trust – Benevolence</td>
<td>0.006</td>
<td>0.000</td>
<td>0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>Trust – Competence</td>
<td>-0.014</td>
<td>0.013</td>
<td>-0.014</td>
<td>0.012</td>
</tr>
<tr>
<td>Trust – Integrity</td>
<td>0.003</td>
<td>0.000</td>
<td>0.007</td>
<td>0.000</td>
</tr>
<tr>
<td>Trust – Justice</td>
<td>-0.007</td>
<td>0.001</td>
<td>-0.005</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*Note. AL= Athlete Leadership. EC= Emotional Competence. All autocorrelations based on 10,000 permutations.*
Figure 1: Density Sociogram: Athlete Leadership Networks

Figure 1. Sociograms representing the density of the athlete leadership networks of appropriate role model on the left and fostering the acceptance of group goals on the right. The thicker and darker the line the higher the rating between the players, as denoted by the legend located in the top center. Graphic generated through the software NetDraw (Borgatti, 2002).
Figure 2: Density Sociogram: Cohesion Networks

Figure 2 Sociograms representing the density of the networks of social cohesion on the left and task cohesion on the right. The thicker and darker the line the higher the rating between the players, as denoted by the legend located in the top center. Graphic generated through the software NetDraw (Borgatti, 2002).
Figure 3: Density Sociogram: Trust Networks

Figure 3. Sociograms representing the density of the trust network of competence on the left and justice on the right. The thicker and darker the line the higher the rating between the players, as denoted by the legend located in the top center. Graphic generated through the software NetDraw (Borgatti, 2002).
Figure 4: Centralization Sociogram: Athlete Leadership Networks

Figure 4. Sociograms representing the centralization of the athlete leadership network of inspirational motivation on top and individual consideration on the bottom. The bigger and darker the node, the higher the rating between the players, as denoted by the legend located middle page. Graphic generated through the software NetDraw (Borgatti, 2002).
Figure 5. Sociograms representing the centralization of the networks of social cohesion on top and task cohesion on the bottom. The bigger and darker the node, the higher the rating between the players, as denoted by the legend located at the bottom. Graphic generated through the software NetDraw (Borgatti, 2002).
Figure 6: Centralization Sociogram: Trust Networks

Figure 6. Sociograms representing the centralization of the trust network of competence on top and integrity on the bottom. The bigger and darker the node, the higher the rating between the players, as denoted by the legend located middle page. Graphic generated through the software NetDraw (Borgatti, 2002).
REVIEW OF LITERATURE

The purpose of this thesis is to examine the relationship between numerous group dynamic variables including athlete leadership, cohesion, trust, and Emotional Competence, using network theory. Accordingly, the following literature review will encompass four sections: 1) athlete leadership, 2) cohesion, 3) trust, and 4) emotional competence.

Athlete Leadership

This first section of the literature review will focus on athlete leadership. First, a definition will be provided followed by an examination of four methods of measurement. The section will conclude with a review of the main findings related to athlete leadership in sports.

Definition

Athletes are increasingly viewed as a source of leadership within their teams as well as key components of athletic success and effective team performance. As such, Loughead, Hardy, and Eys (2006) defined athlete leadership as “an athlete within a team who influences a group of team members towards the achievement of a common goal” (Loughead et al., 2006. p. 144). Grounded in Northouse’s (2001) writings, this definition encompasses four main components of leadership. First, leadership is viewed as a dynamic process where there are multidirectional interactions between a leader and follower(s). Second, influence occupies an essential role in leadership; without one’s influence over others, leadership is not possible. Third, it is implicit that leadership entails the presence of two or more individuals, and fourth, a goal must be in sight.

Inventories Used to Measure Athlete Leadership

Multiple assessment tools have been used to measure the athlete leadership. The most common procedure consists of self-report questionnaires. As such, the following section will review four of the main self-report inventories used to assess athlete leadership.
Leadership Scale for Sports. The Leadership Scale for Sports (LSS; Chelladurai & Saleh, 1980) was originally developed to assess coaching leadership behavior. However, after slight modifications to ensure its suitability, the LSS has been adapted to measure athlete leadership (Loughead & Hardy, 2005). 258 varsity athletes (140 males and 118 females) used the modified version and provided the following Cronbach’s alphas for each of the five athlete leadership behaviors: $\alpha = .81$ for democratic behavior; $\alpha = .75$ for autocratic behavior; $\alpha = .85$ for positive feedback; $\alpha = 0.87$ for training and instruction; and $\alpha = .86$ for social support (Loughead & Hardy, 2005). Furthermore, it was established by Vincer and Loughead (2010) that the five dimension model (i.e., democratic behavior, autocratic behavior, positive feedback, social support, and training and instruction) provided a moderately good fit to the data (Comparative Fit Index [CFI] = .99, Tucker Lewis Index [TLI] = .98, and Root Mean Square Error of Approximation [RMSEA] = .05).

The scale consists of 40 items measuring five dimensions of leadership behavior: Training and Instruction (13 items), Social Support (eight items), Positive Feedback (five items), Democratic Behavior (nine items), and Autocratic Behavior (five items).

Training and Instruction assesses the extent to which the leader teaches skills, techniques, and/or tactics, with the objective of increasing the ability level of the athletes. Social Support measures the level of personal consideration warranted by the leader to his/her followers. In order to satisfy the personal needs of followers, the leader must demonstrate interpersonal consideration and create a climate that promotes openness. Positive Feedback assesses the reinforcement the leader provides to his/her followers by means of appreciation and compliments. Democratic Behavior refers to a type of leadership in which the leader allows the
input of followers in the decision making process. Lastly, Autocratic Behavior refers to leadership behavior that stresses independence in decision making and personal authority.

**Multifactor Leadership Questionnaire-5X.** According to Bass (1990), superior leadership performance happens when transformational leadership is implemented. The main tenet of this type of leadership is to help followers reach challenging goals through constructive methods. More specifically, it can include components such as broadening and elevating the interests of followers, generating awareness and acceptance of the mission of the group, and stirring the followers to go above and beyond for the good of the group (Bass, 1990). A multitude of tools have been developed to measure transformational leadership (Hardy et al., 2010), but according to Rafferty and Griffin (2004), the Multifactor Leadership Questionnaire (MLQ-5X; Bass & Avolio, 2004) is the most widely utilized inventory. The MLQ-5X contains 36 items which examine three types of leadership: transformational, transactional, and laissez-faire.

Developed using nine sub-samples combined for a total of 2,154 individuals (Bass & Avolio, 2000), it was determined when using confirmatory factor analysis, that a nine-factor solution displayed the best fit with the data, presenting a goodness of fit value exceeding the recommended .90 (Bentler, 1990). The root mean square error residual was also found to be below the recommended cut-off mark of .05 (Joreskog & Sorbom, 1989). Additionally, the five transformational leadership subscales from the MLQ-5X, displayed high intercorrelations between them (average value of .83), combined with a slightly lower average intercorrelation (a value of .71) with the subscale of Contingent Reward.
Within transformational leadership, four factors, known as the four I’s, are assessed: Idealized Influence, Inspirational Motivation, Individualized Consideration, and Intellectual Stimulation. Idealized Influence refers to the extent to which the leader acts as a role model. Inspirational Motivation is defined as a way of utilizing emotional speeches to arouse enthusiasm among followers. Individualized Consideration assesses the leader’s personal attention to the follower and takes into account the follower’s individual needs. Lastly, Intellectual Stimulation is displayed when a leader challenges his/her followers to demonstrate innovation and creativity.

Additionally, the MLQ-5X measures another type of leadership. Transactional leadership is characterized as an exchange or transaction between the leader and his or her follower(s). Whereas good performance institute rewards, poor performance induces threats or punishments (Bass, 1990). Three dimensions of transactional leadership are assessed in the MLQ-5X: Contingent Reward, Management-by-Exception Active, and Management-by-Exception Passive. More specifically, Contingent Reward consists of an exchange between the leader and the follower. Whenever the follower exhibits a desired behavior and/or performance, he or she gets rewarded by the leader in a way that reinforces the action. Management-by-Exception exists in two forms: Active and Passive. In the Active form, the leader monitors the follower’s behavior, searching for deviance to the rules and norms. If any are found, corrective actions are taken to prevent the behavior to repeat. Accordingly, the Passive form involves little engagement from the leader, who only intervenes if the standards are not met or after mistakes are made. Finally, the MLQ-5X considers one passive form of leadership labelled Laissez-Faire. Laissez-Faire represents an absence of leadership, where the leader abstains from making decisions and abdicates responsibilities (Bass & Stogdill, 1990).
Differentiated Transformational Leadership Inventory. Originally developed for use in the military, the Differentiated Transformational Leadership Inventory (DTLI; Callow, Smith, Hardy, Arthur, & Hardy, 2009) was later modified for sport by Hardy et al., (2010). Items from the MLQ-5X and the Transformational Leadership Inventory (TLI; Podsakoff, MacKenzie, Moorman, & Fetter, 1990) were used to create this inventory. The 31 items assess six transformational and one transactional leadership behaviors. Three dimensions of transformational leadership were taken from the MLQ: Individual Consideration (four items), Inspirational Motivation (four items), and Intellectual Stimulation (four items). From the TLI, they utilized three transformational leadership behaviors including fostering acceptance of group goals (three items), high performance expectations (five items), and appropriate role model (five items).

Fostering acceptance of group goals refers to a leader promoting cohesion and cooperation by getting group members involved and committed to the group’s goals. High performance expectations refers to leader placing high demands on the follower, expecting a high quality of work. Lastly, appropriate role model is displayed when a leader acts in ways that sets an example for followers. With regards to the lone transactional behavior, Contingent Reward (six items) happens when desirable goods are provided in exchange of positive performance or behavior.

The DTLI demonstrated acceptable internal consistency and factorial validity in athlete leadership research (Callow et al., 2009). The transactional dimension (contingent reward, $\alpha = .82$) along with five of the six transformational leadership dimensions (inspirational motivation, $\alpha = .75$; intellectual stimulation, $\alpha = .82$; fostering acceptance of group goals and promoting teamwork, $\alpha = .73$; high performance expectations, $\alpha = .86$; idealized influence, $\alpha = .81$)
presented an alpha coefficients greater than the generally accepted value of .70 (Nunnally & Bernstein, 1994). Only the leadership behavior of individual consideration ($\alpha = .66$) displayed an alpha coefficient slightly below the .70 guideline. Furthermore, as proposed by Hu and Bentler (1999), the DTLI’s seven-factor model demonstrated factorial validity with a CFI = .98 and RMSEA = .05 (Callow et al., 2009).

**Sport Leadership Behavior Inventory.** Developed by Glenn and Horn (1993), the Sport Leadership Behavior Inventory (SLBI; 1993) is an inventory that assesses the leadership characteristics and attributes exhibited by athlete leaders. In order to come up with the personal characteristics, the authors examined 106 female soccer players and coaches to determine which ones contributed to effective leadership. The SLBI consists of 25 items; 19 of them measuring characteristics deemed desirable for athlete leaders to possess, and the remaining six items acting as filler items. A shorter version of the SLBI (11 items) was also developed by Glenn and Horn. It demonstrated a high correlation with the longer original version of the SLBI ($r = .96$). Both SLBI scales have demonstrated acceptable test-retest reliability and content validity (Glenn & Horn, 1993; Moran & Weiss, 2006).

**Research Examining Athlete Leadership**

This section will focus on the research conducted within the field of athlete leadership. The research performed can be categorized into three areas that will be covered in this section: athlete leaders’ characteristics, number of athlete leaders, and leadership behaviors displayed by athlete leaders.

**Athlete leaders’ characteristics.** Much of the early work concerning athlete leadership generally pertained to the relationship between athlete leaders and group composition. More specifically, playing position, team status, and personal characteristics were hypothesized to be
key elements of athlete leadership. In one of the first studies relevant to athlete leadership, Grusky (1963) examined the relationship between players’ position and their aptitude for displaying leadership in baseball. The author found a strong relationship between players occupying central positions such as catcher and infielder and the likelihood of occupying a managerial position once they retired from playing baseball. Similarly, Tropp and Landers (1979) used field hockey to examine the frequencies of interaction between the players based on the amount of passes made and received throughout games. It was hypothesized that players in central positions would interact more frequently with their teammates than those in peripheral positions. A nonsignificant correlation was found when comparing the interaction frequencies and playing position, which was in contrast to Grusky’s findings in baseball. Tropp and Landers suggested that the nature of the task the players were expected to accomplish led to interpersonal attraction, more so than the playing position did.

Yukelson, Weinberg, Richardson, and Jackson (1983) employed sociometric procedures in their investigation of two intercollegiate sport teams. Based on a sample of 45 varsity athletes, the authors found that players’ leadership status was based upon a set of qualities and characteristics. More specifically, athletes were more likely to occupy a leadership role if they were highly skilled, upperclassmen, and if they possessed an internal locus of control. Similarly, Loughead et al. (2006) found that players’ years of experience was a key factor in regard to leadership status. In particular, the longer a player’s tenure on a team, the more likely he/she would be recognized as a leader. Additionally, Loughead et al. showed that starters were more prone to occupying leadership roles, supporting the idea that skill is a central component of leadership status. Finally, Glenn and Horn (1993) sampled 138 soccer players to investigate personal factors that were specific to athlete leaders. The authors found that characteristics such
as being assertive, confident, friendly, nurturing, organized, and responsible were desirable features in athlete leaders.

**Quantity of athlete leaders.** Another method used to investigate athlete leadership has been by examining the quantity of athlete leaders on sport teams. The focus of research on the number of athlete leaders seems to have been prompted by comments from Gould, Hodge, Peterson, and Petlichkoff (1987), Glenn and Horn (1993), and Yukelson (1997) who reported that coaches recognized the importance of strong athlete leadership on their teams, and that the presence of one or two leaders was sufficient to provide that leadership.

Building off of the above statements, Loughead and Hardy (2005) surveyed 238 university athletes to explore the dispersion of leadership within sport teams. A majority of participants (65.1%) indicated that both formal and informal athlete leaders provided leadership on their respective teams. Fransen, Vanbeselaere, De Cuyper, Vande Broek, and Boen (2014) classified the athlete leaders’ roles into four functions: task, motivational, social, and external. Based on this four-fold classification, Fransen et al. found that it was unlikely for one player to fulfill all four leadership roles on his/her team. In fact, the findings indicated that all four leadership roles were fulfilled, which inferred that the leadership was shared among several players of the team rather than concentrated on one principal athlete leader. Specifically, Fransen et al. found that 56% of the athletes on a team occupied at least one leadership role.

**Behavior of athlete leaders.** Recently, the main focus of athlete leadership studies has been directed towards the behavior of the athlete leaders. This section of the literature review will describe representative studies that have used different methods of measuring athlete leaders’ behaviors: LSS (Chelladurai & Saleh, 1980), SLBI (Glenn & Horn, 1993), and DTLI (Hardy et al., 2010).
To begin, three studies utilizing the LSS (Chelladurai & Saleh, 1980) will be reviewed. First, Vincer and Loughead (2010) examined the influence of athlete leadership behaviors on team cohesion. Athlete leadership was assessed using the LSS while cohesion was measured by the Group Environment Questionnaire (GEQ; Carron, Widmeyer, & Brawley, 1985). A sample of 312 intercollegiate athletes engaged in a variety of interdependent sports were asked to complete the two questionnaires. The results demonstrated that all four dimensions of cohesion: Individual Attractions to the Group-Task (ATG-T), Individual Attractions to the Group-Social (ATG-S), Group Integration-Task (GI-T), and Group Integration-Social (GI-S), were positively related to two dimensions of athlete leadership behavior: Training and Instruction, and Social Support. Conversely, Autocratic Behavior was negatively linked to all four dimensions of cohesion while Democratic Behavior was positively associated to the cohesion dimension of ATG-T. Loughead and Hardy (2005) compared coaches and athletes’ leadership behavior using the LSS (Chelladurai & Saleh, 1980). Coaches and athlete leaders displayed differing amounts of leadership behaviors. Specifically, Training and Instruction as well as Autocratic Behaviors were exhibited in greater amount by coaches, whereas athlete leaders demonstrated higher levels of Positive Feedback, Social Support, and Democratic Behavior.

Paradis and Loughead (2012) examined whether cohesion served to mediate the relationship between athlete leadership and satisfaction. Results showed that task cohesion acted as a mediator between the athlete leaders’ task leadership behaviors and task aspects of satisfaction. Similarly, social cohesion was found to be a mediator between socially oriented leadership behaviors and social aspects of satisfaction.

Another study focusing on athlete leaders behaviors came from Price and Weiss (2011) who surveyed 191 competitive adolescent female soccer players. The purpose of their study was
two-fold. The first purpose was to investigate the relationship between personal characteristics and peer leaders behaviors, and the second purpose was to examine the relationship between athlete leaders’ behaviors and team outcomes. The players’ leadership behavior was assessed using the SLBI (Glenn & Horn, 1993), and the Peer Sport Leadership Behavior Inventory (PSLBI; Glenn 2003; Glenn & Horn, 1993). In regards to the first purpose, four different personal characteristics were found (Perceived Soccer Competence, Perceived Behavioral Conduct, Intrinsic Motivation, and Perceived Peer Acceptance) to be positively associated with peer leadership behaviors. The second purpose showed that athletes reported higher social cohesion when their levels of instrumental and prosocial leadership behaviors were rated higher by their teammates. Moreover, athletes who rated themselves as high in leadership behavior also reported high task and social cohesion, and collective efficacy.

Finally, Callow et al. (2009) examined the relationship between transformational leadership behaviors displayed by team captains and cohesion in 309 Ultimate Frisbee players. The authors used the DTLI (Hardy et al., 2010) to study athlete leaders’ behavior, while the GEQ (Carron et al., 1985) was used to assess cohesion. Athlete leadership behaviors of individual consideration, high performance expectations, promoting team work, and fostering acceptance of group goals were positively related to task cohesion. Furthermore, the leadership behaviors of fostering the acceptance of group goals and Promoting Team Work were positively related to social cohesion.

Cohesion

In the second section of the literature review, the definition of cohesion will be presented. Next, a conceptual model and measurement of the construct will be explained. Finally, studies examining the relationship between cohesion and performance will be outlined.
Definition

Many researchers have acknowledged the importance of cohesiveness in team sports. In fact, that construct was considered as one of the most influential small group variables by many (Golembiewski, 1962; Lott & Lott, 1965). Carron, Brawley, and Widmeyer (1998) advanced what is considered to be the most widely accepted definition of cohesion in sport psychology (Loughead & Hardy, 2006). They defined the concept as a “dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or for the satisfaction of members’ affective needs” (Carron et al., 1998, p. 213).

Model and Measurement of Cohesion

Carron et al. (1985) advanced a conceptual model that highlighted the multidimensional nature of cohesion (see Figure 7). The authors argued that a conceptual model should consider both the individual and the group’s perception of cohesion, and distinguish between the task and social components of cohesion. Thus, Carron et al.’s multidimensional model of cohesion is comprised of four dimensions: Individual Attractions to the Group-Task (ATG-T), Individual Attractions to the Group-Social (ATG-S), Group Integration-Task (GI-T), and Group Integration-Social (GI-S). ATG-T refers to the individual’s feelings about his or her involvement in terms of participating in the group’s tasks, objectives, and productivity. ATG-S reflects the perception of an individual’s sense of belonging and acceptance within the group. GI-T represents the degree to which an individual feels unity and affinity between the group members when it comes to the group’s goals and objectives. GI-S consists of the level of similarity and closeness of the group as a whole as perceived by an individual in a social context.

In order to measure these four dimensions of cohesion, Carron et al. (1985) developed the GEQ, which is an 18-item questionnaire and is the most frequently used measure of cohesion.
within the field of sport psychology (Eys, Carron, Bray, & Brawley, 2007). All items are scored on a 9-point Likert scale ranging from strongly disagree (1) to strongly agree (9). Twelve of the eighteen items are negatively worded to correct for response acquiescence, which is described as the tendency for people to agree to a statement without considering the content of the given statement prior to agreeing (Salazar, 2015). In order to accurately compile the result for those negatively worded items, reverse scoring is required. Hence, a higher score signifies a stronger perception of cohesion.

Conceptual Framework for the Study of Cohesion

Carron and Eys (2012) advanced a conceptual framework for the study of sport teams in which cohesion is the central component. The linear model contains antecedents or inputs, throughputs, and outputs, (see Figure 8) of group effectiveness.

Antecedents of the model. The authors posited that the antecedents contributing to effective sport teams could be grouped in two categories: member attributes and group environment. Specifically, member attributes comprise personal factors such as the social, psychological, and physical characteristics of the group members. The second category, group environment, refers to the physical and geographical locations in which the team is set (Stevens & Bloom, 2003). It encompass elements such as the team’s territoriality, the team’s size, and the nature of the task. Additionally, the environmental factors can be organizational in nature and contribute to constraining the members within the group through contractual responsibility and organizational orientation, for example.

Throughputs of the model. Those inputs then contribute to the throughputs, which are grouped in three components: group structure, cohesion, and group processes. Group structure refers to the patterns of relationships between the members (Johnson & Johnson, 2014). It
includes elements such as members’ role responsibilities, normative expectations, and leadership available on the team. In regards to the leadership factors, Carron (1982) argued that four leadership-related factors have been empirically recognized to impact team cohesion: the leader’s behavior, the leadership style, the coach-athlete relationship, and the coach-team relationship. The next throughput presented in the model consists of cohesion, which encompasses the four dimensions previously addressed in this literature review (i.e., GI-T, GI-S, ATG-T, ATG-S). Lastly, group processes relates to elements associated with the group interaction, communication, motivation, team goals, and efficacy.

**Outputs of the model.** The consequences of team effectiveness consist of *individual* and *group outcomes*. More specifically, group outcomes generally pertain to the performance effectiveness of the group while the individual outcomes consist of the level of the player’s satisfaction. Empirically, those have been two of the most researched outcomes of cohesion (e.g., Carron, 1982; Carron, Colman, Wheeler, & Stevens, 2002; Evans & Dion, 1991; Martens & Peterson, 1971). Therefore, a review of the main publications relating to the relationship between cohesion and performance will be discussed in the following paragraphs.

**Cohesion-Performance Relationship**

Within the sport context, team performance is considered one of the most widely researched outcomes of cohesion (Sullivan & Feltz, 2005). This should come as no surprise since the very definition of cohesion suggests a positive relationship with outcomes such as performance and satisfaction (Carron, Bray, & Eys, 2002; Carron & Chelladurai, 1981, Mullen & Copper, 1994).

Carron, Bray, et al., (2002) examined the relationship between task cohesiveness and team success in 27 sports teams from the sports of basketball (n=18) and soccer (n=9). Team
success was operationally defined as the team’s winning percentage whereas cohesion was assessed using the two task dimensions of cohesion (GI-T, ATG-T) from the GEQ. The results demonstrated a strong relationship between the cohesion dimension of ATG-T and team success.

Carron, Colman, et al., (2002) performed a meta-analysis of the cohesion–performance relationship in sport. This meta-analysis included 46 studies representing 9,988 athletes from 1,044 teams. In general, the results indicated that there was a moderate to large effect size (ES = .66) in the cohesion-performance relationship. Furthermore, the authors also examined various moderating variables believed to influence the cohesion-performance relationship; including sport type, gender, measures of performance, level of skill, and direction of the cohesion-performance relationship. As for sport type, the results showed that coactive sports (ES = .77) had a slightly larger effect than interdependent sports (ES = .66) although the difference was not statistically significant. There was a significant difference in gender where the results showed a large cohesion-performance relationship existed for female athletes (ES = .95) but a moderate relationship existed for male athletes (ES = .56). For performance, there were no difference between self-report measures of performance (ES = .58) and actual performance indices (ES = .69). Moreover, the level of competition of the athletes presented no significant differences amongst professional (ES = .20), club (ES = .23), intercollegiate (ES = .55), high school (ES = .83), and intramural (ES = .74) level athletes. Finally, the causal relationship between cohesion and performance showed no significant difference, indicating that both social and task cohesion are a cause of (ES = .57) and a result of (ES = .69) performance.
**Trust**

The following section of the literature review will examine the variable of trust. First, definitions of the construct will be presented. Second, a model of trust in sport will be reviewed. Finally, research findings relating to the study of trust in sport will be highlighted.

**Definition**

The construct of trust has received considerable attention from an array of disciplines ranging from the social sciences to the business domain (Gambetta, 1988). Trust has been examined as a personal trait (e.g., Burke, Sims, Lazzara, & Salas, 2007; Rotter, 1980), a social structure (Schutz, 1967), and an economic choice mechanism (Arrow, 1974; Achian & Demsetz, 1972) with each of these domains advancing their own definitions.

Researchers examining trust at the personality level have defined it as a personal characteristic which consists of a “generalized expectancy held by an individual that the word, promise, oral or written statement of another individual or group can be relied on” (Rotter, 1971, p. 444). From a social structure perspective, sociologists have viewed trust as an interpersonal phenomenon between actors (e.g., Deutsch, 1973; Dirks & Ferrin, 2002; Holmes, 1991). They suggest that it is the “faith and confidence in a person or a thing that makes social life viable” (Fox, 1964, p. 66). Lastly, economists such as Gambetta (1988) describe trust as “the probability that a person with whom we are in contact will perform an action that is beneficial or at least not detrimental, that is high enough for us to consider engaging some form of cooperation with him” (p. 217).

While there is no universal agreement about how best to define trust (Lewicki & Bunker, 1995), Rousseau, Sitkin, Burt, and Camerer (1998) pointed out that there is significant overlap of ideas amongst the various definitions. In their review of the literature concerning trust, Li and
Betts (2011) presented a list of common conceptualizations of the construct. Three key findings emerged from the review, including that trust is 1) a psychological state, 2) involves a social and relational dimension, and 3) requires a conscious choice on the part of the trustor. In line with these key findings, Mayer, Davis, and Schoorman (1995) defined trust as “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (p.712).

**Conceptual Model of Trust in Sport**

Zhang and Chelladurai (2013) advanced a conceptual model of trust in relation to leadership specific to the sport domain. This linear model encompasses antecedents, throughputs, and outputs of trust, with a moderating variable between the antecedents and throughputs (see Figure 9). Zhang and Chelladurai noted that a player’s trust in its leader was influenced by four perceived antecedents: Ability (described by Mayer et al., 1995, as “a group of skills, competencies, and characteristics that enable a party to have influence within some specific domain” p.717), benevolence (defined as “the extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive” Mayer et al., p. 718), integrity (conceptualized as “a trustor’s perception that the trustee adheres to a set of principles that the trustor finds acceptable” Mayer, et al., p. 719), and justice (broadly described as the role of fairness in the nature of treatment of others, Greenberg, 1987; 1996). It should be noted that an athlete’s propensity to trust moderates the relationship between these four antecedents and thus, the athlete’s trust in the leader. Next, the athlete’s trust in the leader will influence the consequences related to trust and the outcomes related to trust. That is, the level of trust between an athlete and his/her leader will impact their relationship, which influences the two
consequences and one outcome of trust: the athlete’s willingness to cooperate and follow directions, the level of commitment toward the leader, and the performance of the athlete. Taken together, it is assumed that the more an athlete perceives justice, benevolence, integrity, and ability from the leader, the more trust the athlete is going to have for the leader. Consequently, the higher the trust in the leader, the more likely the athlete will feel committed towards the leader and be willing to cooperate. This in turn, will lead to the athlete to perform better.

**Research Examining Trust in Leadership in Sport**

Most of the literature related to trust in sport has examined the relationship between trust and coaching leadership (Dirks, 2000; Zhang & Chelladurai 2013). Dirks (2000) examined the effect of trust in relation to leadership with NCAA Division I and III basketball teams. The results showed that teams whose players’ had the highest level of trust in their coach (as perceived by the players) early in the season outperformed their opponents throughout the season. Another study conducted by Zhang and Chelladurai (2013), assessed the formation of athlete’s trust in their coach and the consequences of trust. Results showed that benevolence, competence, justice, and integrity were all positively associated to trust in leadership. Specifically, the four antecedents of trust explained a total of 61% of the variance of trust in leadership (Zhang & Chelladurai, 2013).

**Emotional Competence**

This section of the literature review will address the construct of emotional competence (EC). As such, the section will be divided in five distinct parts. To begin, the construct will be introduced and defined. Then, the ability approach will be explained and its methods of assessment will be described. Third, the trait approach will be defined and measurement methods will be introduced. Fourth, a novel approach of conceptualizing the construct will be presented:
the tripartite model, as well as its associated measurement tools. To conclude, research findings resulting from the main studies of EC and sports will be examined.

**Review of the Construct and Definition**

Emotions have been recognized by many as an important paradigm influencing several facets of our lives, including the sport domain (i.e., Botterill & Brown, 2002; McCann, 1999; Meyer, Fletcher, Kilty, & Richburg, 2003; Zizzi, Deaner, & Hirschhorn, 2003). Theoretically rooted in psychological research which typically examines three aspects of the mind: cognition (thoughts), affect (feelings), and conation (motivational), emotional competence focuses on two of the three components: cognition and affect (Duncan, Latimer-Cheung, & Brackett, 2014). Thus, the emotional part of EC encompasses an individual’s emotions (e.g., happiness, sadness), moods, preferences, and feeling states (e.g., enthusiasm, fatigue) while the cognitive component refers to the tasks that involve reasoning, memory, judgement, and abstract thoughts. By associating cognition and affect, EC theory suggests that it is possible to think intelligently about emotions primarily because emotions allow the cognitive process to happen on a different level (Duncan et al., 2014).

Usually known as Emotional Intelligence (EI), the term Emotional Competence (EC) has been recently introduced into the literature (Brasseur, Grégoire, Bourdu, & Mikolajczak, 2013; Kotsou, Nelis, Grégoire, & Mikolajczak, 2011; Nelis et al., 2011; ) and adopted by a number of researchers. These authors believe that the new appellation more accurately define the construct as it implies that EI is a skill that can be learned and improved upon rather than a stable characteristic.

One of the most widely accepted definitions of EC comes from Salovey and Mayer (1990) who describe the construct as “the ability to monitor one’s own and other’s feelings and
emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (p. 189). Goleman (1998) defined EC as “the capacity for recognizing our own feelings and those of others, for motivating ourselves and for managing emotions effectively in ourselves and others.” (p. 317). Finally, Bar-On (1997) described the construct broadly as, “an array of non-cognitive capabilities, competencies, and skills that influence one’s ability to succeed in coping with environmental demands and pressures” (p. 14).

To date, three major conceptualizations of EC are recognized: EC as a competency (ability based approach), a trait (mixed models approach), and an integrative model (tripartite approach).

**Ability-Based Approach and Measurement of Emotional Competence**

Ability-based models conceptualize EC as a set of cognitive abilities that can be learned, rehearsed, and enhanced (Stough, Saklofske, & Parker, 2009). Based on this model, it is assumed that a person’s EC fluctuates according to their situation (Matthews, Zeidner, & Roberts, 2007; Salovey & Mayer, 1990). Mayer, Salovey, and Caruso’s Four-Branch Model (2004) is the most widely known ability model. According to their conceptualization, EC is operationalized into four distinct skills or branches. The first branch refers to the ability to accurately perceive and identify feelings, thoughts, and physical states. The second branch pertains to the use of emotions to prioritize thinking in meaningful ways. The third branch focuses on the ability to understand and analyze emotions, and refers to the cognitive process that goes into the analysis and the labeling of emotions. Finally, the fourth branch focuses on emotion management and refers to one’s ability to regulate emotions reflectively based on the situation, in order to promote an intellectual and emotional growth.
From this ability-based model, the authors created a measurement tool titled the Mayer-Salovey-Caruso Emotional Intelligence Test Version 2.0 (MSCEIT; Mayer, Salovey, & Caruso, 2002a). Since it conceptualizes EC as an ability, the MSCEIT 2.0 evaluates the construct following the markers of IQ (Matthews, Roberts, & Zeidner, 2004). As such, people’s EC is assessed based on their performance on various emotion-related tasks and ability to solve emotional problems (Howells, 2007). The MSCEIT 2.0 consist of 141 items designed to measure the four branches of EC. It uses pictures of landscapes, human faces, and abstract images, as well as written problems and scenarios in order to measure one’s ability to grasp and deal with emotions (Mayer, Salovey, & Caruso, 2002b).

Limitations of this inventory have been brought up concerning the overlap between the conceptions of EC and other constructs such as personality traits and general IQ (Fiori & Antonakis, 2011). However, the main concern comes from the difficulties in establishing pertinent scoring systems because unlike traditional cognition test, the correct answers of this inventory are determined in ways most often considered subjective: either by decisions from experts or by general population’s consensus (Jensen, 2007).

**Trait-Based Models and Associated Measurement Methods**

The second perspective of EC is referred to as the mixed model. This model considers EC to be a combination of an individual's trait and state characteristics. According to this conceptualization, EC is relatively stable across time and situations and is even considered as being part of one’s personality (Petrides, 2009; Stough, Saklofske, et al., 2009). There are two main theories within the trait paradigm: Bar-On’s (1988; 2004) emotional quotient (EQ) and Goleman’s (1995, 1998) emotional competence. Accordingly, both of those models present different methods of measurement, namely Bar-On’s EQ-i (Emotional Quotient Inventory,
Bar-On’s EQ-i is a 133 item self-report measure that assesses five scales and their competencies. Despite suggesting concurrent validity by presenting a considerable overlap between the EQ-i and other psychological measures (Meyer & Fletcher, 2007), the main criticism of the EQ-i comes from the fact that most of its subscales pertain to personality attributes (Brackett & Mayer, 2001; Conte, 2005; Dawda & Hart, 2000). Goleman et al. (2011) for their part, use a 360-degree tool designated to assess emotional competencies using self and other’s report. The latest version of the questionnaire includes 68 items comprised of 12 competencies. Although the research on this specific version of their inventory is sparse, both the validity and reliability of the measure have been questioned throughout the years in part because of a noteworthy overlap between the ESCI and measures of the Big Five personality traits (Conte, 2005; Matthews et al., 2004; Van Rooy & Viswesvaran, 2004).

**Tripartite Model: An Integrative Conceptualization**

There is yet to be an agreement between the proponents of the different models noted above. This can be illustrated by the contradiction between two pieces of literature concerning the most suitable approach to use in the sport context. In their theoretical overview, Meyer and Fletcher, (2007) claim that the ability model should be favored in sport psychology because of the overlap between the underpinnings of the model and that of the field of study. Specifically, they argue that EC as an ability can be taught and practiced, which is consistent with the methodology of the field of sport psychology where the efforts are focused on helping athletes and teams improve their mental and physical skills by education and training (Meyer & Fletcher, 2007). In contrast, Laborde, Dosseville, and Allen (2016) reviewed 36 empirical research related to EC in a sport or exercise context. Only 3 studies conceptualized EC using the ability model.
(Crombie, Lombard, Noakes, 2009, 2011; Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007) while the rest of the studies reviewed (i.e., 33 studies) conceptualized EC as a trait therefore utilizing the mixed model (Laborde et al., 2016). In essence, the main issue stems from the fact that the diverse conceptualizations of EC foster different methods of measurement that do not correlate significantly with one another, as would be expected from measures of similar construct (Jensen, 2007).

In an effort to reconcile the two perspectives, Mikolajczak (2009) proposed that EC be viewed as a holistic construct. She introduced a three-level model which aimed to “capture individual differences in emotions-related knowledge, abilities and dispositions” (p. 27). The first level, knowledge, refers to what one knows about emotions and how the individual deals with emotion-laden situations. At this level, the complexity and width of emotional knowledge is assessed. The second level alludes to emotion-related abilities that specifically focus on one’s aptitudes to implement a strategy when placed in an emotional situation. Lastly, the third level refers to one’s disposition to behave a certain way when found in an emotional situation.

According to Mikolajczak (2009), the tripartite model is hierarchically structured, which implies that the lower levels do not necessarily entail higher levels, but that the higher levels implicitly involve the lower levels. Hence, it is necessary to have knowledge in order to have the skills, and the skills are required in order to be disposed to act a certain way.

Following the creation of the three-level model, Mikolajczak, Quoidbach, Kotsou, and Nelis (2009) developed the Emotional Competency conceptual framework. Grounded in Mayer, Salovey, and Caruso’s Four-Branch Model (2004), Mikolajczak et al. extended the model by adding one branch that distinguished between the identification and expression of emotions. The authors believed it to be necessary as previous research concluded that the concepts of
identification and expression of emotions were factorially and conceptually distinct (Parker, Bagby, Taylor, Endler, & Schmitz, 1993). Thus, Mikolajczak et al.’s model involves five competencies: Identification of Emotions (i.e., having the ability to perceive an emotion when it occurs and identify it), Understanding of Emotions (i.e., having a grasp of the causes and consequences of emotions, and to distinguish triggering factors from causes), Expression of Emotions (i.e., being able to display emotions in a socially accepted manner), Regulation of Emotions (i.e., being able to control and regulate emotions when they are not appropriate to the context), and Use of Emotions (i.e., having the ability to use emotions to improve reflection, decisions and actions) (Brasseur et al., 2013; Mikolajczak et al., 2009). Moreover, the model distinguishes between one’s own and other’s emotions (intra-personal and inter-personal components of each dimensions).

Subsequently, Brasseur et al. (2013) developed a measurement tool based on the Emotional Competency theoretical model. The Profile of Emotional Competence (PEC) is a self-report questionnaire that encompasses 50-items (five items for each of the ten subscales), grouped into two higher-order factors (interpersonal EC and intrapersonal EC), contributing together to a single EC score. The questionnaire has shown good internal consistency. Mikolajczak, Brasseur, and Fantini-Hauwel (2014) thereafter developed a shortened version, titled the S-PEC (Short Profile of Emotional Competence, 2014). Two items were retained for each of the ten subscales for a total of 20 items. The analysis performed replicated the results obtained with the full version of the PEC, thus showing the questionnaire to be valid and reliable. Although the authors suggest using the 50-item version of the PEC when the subscale scores are the main concern; the S-PEC is sufficient when the factor scores (inter-personal and intra-personal EC) or global scores are of interest.
Research Findings

As reported in Laborde et al.’s (2016) systematic review, there is a growing body of evidence suggesting that EC plays an important role in sport. Consequently, the following section describes the research that has been done in the field of sport and that is considered relevant in the context of this proposed study.

Zizzi et al. (2003) investigated the relationship between EI and performance in college baseball players. The authors based their research on the premise that many of the psychological skills employed to improve sport performance overlap with the construct of EI. Thus, they hypothesized that emotional intelligence would lead to a better control of psychological skills which would in turn improve the athlete’s performance. Zizzi et al. measured EI using a trait-based inventory, Schutte et al.’s (1998) Emotional Intelligence Scale (EIS), to assess the level of awareness, control, and utilization of emotions in relation to hitting and pitching statistics. The results showed that pitching demonstrated a stronger relation to emotional intelligence than hitting.

Stough, Clements, Wallish, & Downey (2009) surveyed elite basketball players in order to explore the relationship between the players’ level of EC and their ability to perform an array of offensive and defensive moves. Overall there was a statistically significant relationship between a player’s level of emotional competence and its statistically measured performance.

Using a sample of 79 National Hockey League (NHL) players, Perlini and Halverson (2006) compared the average EI level of those elite athletes versus that of the general population. They also examined if EI could predict sport performance. Utilizing Bar-On’s EQ-i (1997) to measure EI, the authors found that the NHLers’ average level of EI was above that of the general
population. Moreover, they found that the years spent in the NHL were unrelated to the EI score (Perlini & Halverson, 2006).

Two studies have examined the difference between team sport athletes versus individual sport athletes in relation to EI and found no differences in the level of EI (Kajbafnezhad, Ahadi, Heidarie, Askari, & Enayati, 2011; Laborde, Dosseville, Guillén, & Chávez, 2014). Moreover, three studies explored whether there were gender differences in EI. Two of the studies concluded that males had higher levels of trait EI (Costarelli & Stamou, 2009; Laborde et al., 2014) than females, while the remaining study found that female athletes had higher EI on the emotion management than male athletes (Dunn et al., 2007).
References


Figure 7: Conceptual Framework for the Study of Sport Teams

Figure 7. Adapted from “The development of an instrument to assess cohesion in sport teams: The Group Environment Questionnaire” by A. V. Carron, L. R. Brawley, & N. W. Widmeyer, 1985, Journal of Sport Psychology, 7, p.248.
Figure 8: Conceptual Model of Cohesion

Figure 9: Conceptual Model of Trust in Leadership

![Figure 9: Conceptual Model of Trust in Leadership](image-url)

Figure 9. Adapted from “Trust in leadership in sport: Its antecedents and its consequences”, by Z. Zhang, 2004, p. 23. Doctoral dissertation; Ohio State University.
APPENDICES

Appendix A

Attribute Variable – Emotional Competence Questionnaire (S-PEC)

For this section of the survey, please rate yourself by selecting the answer which best represents you.

<table>
<thead>
<tr>
<th>1 Strongly Disagree</th>
<th>2 Disagree Somewhat</th>
<th>3 Neutral</th>
<th>4 Agree Somewhat</th>
<th>5 Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When I am touched by something, I immediately know what I feel</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If I wanted, I could easily make someone feel uneasy</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I do not understand why the people around me respond the way they do</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I find it difficult to handle my emotions</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I find it difficult to explain my feelings to others even if I want to</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. When I see someone who is stressed or anxious, I can easily calm them down</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I find it difficult to listen to people who are complaining</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. When I am feeling low, I easily make a link between my feelings and a situation that affected me</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. My emotions inform me about changes I should make in my life</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Quite often I am not aware of people’s emotional state</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Other people tend to confide in me about personal issues</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I am good at describing my feelings</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I do not always understand why I respond in the way I do</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. If someone came to me in tears, I would not know what to do</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I am good at sensing what others are feeling</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I never base my personal life choices on my emotions</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. When I am angry, I find it easy to calm myself down</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Most of the time, I understand why the people feel the way they do</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. I can easily get what I want from others</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. When I feel good, I can easily tell whether it is due to being proud of myself, happy or relaxed</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B

**Social Network Variable – Athlete Leadership Questionnaire**

For this section of the survey, please rate your teammates by selecting the answer which best represents each one of them.

<table>
<thead>
<tr>
<th>Question 1</th>
<th>Very poorly</th>
<th>Poorly</th>
<th>Acceptably</th>
<th>Well</th>
<th>Very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well does [Player 1] energize you by presenting an optimistic view of the future concerning the team’s goals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does [Player 2] energize you by presenting an optimistic view of the future concerning the team’s goals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does [Player 3] energize you by presenting an optimistic view of the future concerning the team’s goals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2</th>
<th>Very poorly</th>
<th>Poorly</th>
<th>Acceptably</th>
<th>Well</th>
<th>Very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well does [Player 1] serve as a role model for you?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does [Player 2] serve as a role model for you?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does [Player 3] serve as a role model for you?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 3</th>
<th>Very poorly</th>
<th>Poorly</th>
<th>Acceptably</th>
<th>Well</th>
<th>Very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well does [Player 1] cooperate with you in working towards the team’s goals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does [Player 2] cooperate with you in working towards the team’s goals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does [Player 3] cooperate with you in working towards the team’s goals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Question 4</td>
<td>Very poorly</td>
<td>Poorly</td>
<td>Acceptably</td>
<td>Well</td>
<td>Very well</td>
</tr>
<tr>
<td>------------</td>
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<td>-----------</td>
</tr>
<tr>
<td>How well does <strong>[Player 1]</strong> stress the importance of striving for excellence by having high personal performance standards?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does <strong>[Player 2]</strong> stress the importance of striving for excellence by having high personal performance standards?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does <strong>[Player 3]</strong> stress the importance of striving for excellence by having high personal performance standards?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 5</th>
<th>Very poorly</th>
<th>Poorly</th>
<th>Acceptably</th>
<th>Well</th>
<th>Very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well does <strong>[Player 1]</strong> challenge you to view problems from different perspectives?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does <strong>[Player 2]</strong> challenge you to view problems from different perspectives?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does <strong>[Player 3]</strong> challenge you to view problems from different perspectives?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 6</th>
<th>Very poorly</th>
<th>Poorly</th>
<th>Acceptably</th>
<th>Well</th>
<th>Very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well does <strong>[Player 1]</strong> show an interest in your own development as a player on this team?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does <strong>[Player 2]</strong> show an interest in your own development as a player on this team?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How well does <strong>[Player 3]</strong> show an interest in your own development as a player on this team?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix C
Social Network Variable – Cohesion Questionnaire

For this section of the survey, please rate your teammates by selecting the answer which best represents each one of them

<table>
<thead>
<tr>
<th>Question 1</th>
<th>Not United at all</th>
<th>Minimally United</th>
<th>Moderately United</th>
<th>Rather United</th>
<th>Extremely United</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate the extent to which you feel united with [Player 1] in order to achieve the team’s goals and objectives</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which you feel united with [Player 2] in order to achieve the team’s goals and objectives</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which you feel united with [Player 3] in order to achieve the team’s goals and objectives</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2</th>
<th>Not United at all</th>
<th>Minimally United</th>
<th>Moderately United</th>
<th>Rather United</th>
<th>Extremely United</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate the extent to which you feel united with [Player 1] in order to maintain good social relationships within the team</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which you feel united with [Player 2] in order to maintain good social relationships within the team</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which you feel united with [Player 3] in order to maintain good social relationships within the team</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
## Appendix D

### Social Network Variable – Trust Questionnaire

For this section of the survey, please rate your teammates by selecting the answer which best represents each one of them.

<table>
<thead>
<tr>
<th>Question 1</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate the extent to which [Player 1] has abilities that can increase your own performance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which [Player 2] has abilities that can increase your own performance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which [Player 3] has abilities that can increase your own performance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate the extent to which [Player 1] looks out for what is important for you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which [Player 2] looks out for what is important for you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Indicate the extent to which [Player 3] looks out for what is important for you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### Question 3

<table>
<thead>
<tr>
<th>Indicate the extent to which [Player 1] acts with integrity towards you. She adheres to a set of behaviors that you find acceptable</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicate the extent to which [Player 2] acts with integrity towards you. She adheres to a set of behaviors that you find acceptable</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicate the extent to which [Player 3] acts with integrity towards you. She adheres to a set of behaviors that you find acceptable</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Question 4

<table>
<thead>
<tr>
<th>Indicate the extent to which [Player 1] is just and fair towards you. She is consistent in her acknowledgement and reward for your contributions to the team</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicate the extent to which [Player 2] is just and fair towards you. She is consistent in her acknowledgement and reward for your contributions to the team</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicate the extent to which [Player 3] is just and fair towards you. She is consistent in her acknowledgement and reward for your contributions to the team</th>
<th>Not at all</th>
<th>Slight</th>
<th>Moderate</th>
<th>To some extent</th>
<th>To a great extent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Subject: Participation in a research study

Dear [insert general manager’s name],

My name is Marie Desrosiers and I am a master’s student in sport psychology at the University of Windsor. I am currently recruiting women hockey teams to take part in my study about group dynamics. With your permission, I would like to have the players from your team take part in my research. As a former university and professional hockey player myself, it would be a privilege for me to have some of the best female hockey players in the world as participants, and I believe that it would be a great way for the players to contribute to the advancement of knowledge in women’s hockey.

To provide you with more details about my research, my project will use a technique called social network analysis to examine the relationship between athlete leadership and key team dynamic variables including team chemistry, trust, and emotional competence. The players would complete an online questionnaire that takes about 30 minutes to complete. Given the players’ busy schedule, an online questionnaire is available to the players. There may be potential emotional or social discomforts associated with participation in this study because of the required identification of the participants. However, every effort will be made to minimize any potential risks and discomforts, including de-identification of the data prior to dissemination.

Your assistance and cooperation with this research is greatly appreciated. Please let me know if you would be willing to grant me permission to survey your players by replying to this email. If you have any questions or concerns, please feel free to contact me or my advisor.
Marie Desrosiers: 519-253-3000 ext. 4997 or desro113@uwindsor.ca
Dr. Todd Loughead: 519-253-3000 ext. 2450 or loughead@uwindsor.ca

Regards,

Marie Desrosiers
M.H.K. Candidate
Department of Kinesiology
University of Windsor
401 Sunset Ave.
Windsor, ON. N9B-3P4
Appendix F

Recruitment Email

Dear [insert general manager’s name],

We are thrilled that [insert team’s name] are interested in the project. I’ve attached to this email an information letter for the players. In addition to sending the information out via email to the players, could you also print out a copy and post it in the player’s locker room (or any common team area where it will be visible for the players).
Please do not hesitate to contact me if you have any questions,

Thank you,

Marie Desrosiers

Hello [insert team’s name],

My name is Marie Desrosiers and I am a master’s student in sport psychology at the University of Windsor. As part of my Master’s thesis project, I am recruiting women hockey teams to take part in my study about athlete leadership and I am very interested in having players from your team participate.

Specifically, my research examines the relationship between athlete leadership, team chemistry, trust, and emotional competence. You are asked to complete an online survey that takes about 30 minutes to fill out. Your participation in this study is voluntary and you can withdraw at any time.

Participating in this study is a great way for you to contribute to the advancement of women’s hockey. Additionally, a $10 gift certificate will be offered as a thank you to every athlete who completes a survey.

If you are interested in participating in this survey or want to learn more about it, please contact me for additional information.

Ms. Marie Desrosiers at 519-253-3000 ext. 4997 or desro113@uwindsor.ca or Dr. Todd Loughead at 519-253-3000 ext. 2450 or loughead@uwindsor.ca.

Thank you,

Marie Desrosiers
M.H.K. Candidate – University of Windsor
Appendix G

Players’ Information Email

Dear [insert player’s name],

We are thrilled by your interest in the project. This email contains additional information about the study as well as the link for the online survey.

This study utilizes a statistical/analytical technique called Social Network Analysis, for that reason, it is impossible to ensure anonymity of the participants. When using this type of technique, each player will self-rate and rate their teammates. However, the player’s name will only be seen by my advisor, Dr. Todd Loughead and myself. As soon as the data are inputted into the software program, we will remove any information that makes any player identifiable. Confidentiality will be highly enforced as none of your teammates or coaching staff will see any of the responses.

Once you click on the link and open the survey, you will be directed to a consent form. There is a lot of information on that page, so make please read it carefully. Because of the format of the survey, it is advised to use either a computer or a tablet. A smartphone might not be ideal for this type of format.

You will be able to quit the survey at any point by exiting the survey webpage, or to withdraw your data by contacting me.

Here is the link to the survey that you can access simply by clicking on the link or by copying and pasting this website address into a new tab.
http://fluidsurveys.uwindsor.ca/s/Leadership/Thunder/

Should you have any questions or concerns, do not hesitate to contact us: Marie Desrosiers desro113@uwindsor.ca at 519-253-3000 ext. 4997 or Dr. Todd Loughead loughead@uwindsor.ca at 519-253-3000 ext. 2450.

Thank you,

Marie

Marie Desrosiers
M.H.K. Candidate
Department of Kinesiology
University of Windsor
401 Sunset Ave.
Windsor, ON. N9B-3P4
Title of Study: Assessing the Group Dynamic Variables of Athlete Leadership, Cohesion, Trust, and Emotional Competence Utilizing a Social Network Approach

You are asked to participate in a research study conducted by Marie Desrosiers (Master’s Student) and Dr. Todd Loughead (Ph.D., Faculty Supervisor), from the Department of Kinesiology at the University of Windsor. This study has received clearance from the University of Windsor Research Ethics Board.

If you have any questions or concerns about the research, please feel to contact Ms. Marie Desrosiers at 519-253-3000 ext. 4997 or desro113@uwindsor.ca, or Dr. Todd Loughead at 519-253-3000 ext. 2450 or loughead@uwindsor.ca.

PURPOSE OF THE STUDY
The purpose of the current study is to examine the structural nature of athlete leadership, cohesion, trust and emotional competence.

PROCEDURES
If you volunteer to participate in this study, you will be asked to complete a survey about athlete leadership, cohesion, trust and emotional competence within your team, along with general information about yourself. This survey should take approximately 40 minutes to complete and requires you to rate yourself and your teammates on several questions. Likewise, your teammates will rate you on the same questions. This process is completed through a roster-based survey where each athlete’s name (including your name) will appear prior to the questions (e.g., How well does [teammate’s name] serve as a role model for you). In order to map out your team’s athlete leadership structure, we will need you to give us your name when filling out the survey. The data collected will be used as part of a thesis study. Data in the reports will be presented as social network maps like this one:
POTENTIAL RISKS AND DISCOMFORTS
Every effort has and will be made to minimize any potential risks and discomforts; however, there may be potential emotional or social discomforts associated with participation in this study. These include, (a) perceiving feelings of self-consciousness knowing that you are rating your teammates and they are rating you on questions pertaining to leadership, (b) loss of confidentiality, potentially resulting in feelings of self-consciousness or embarrassment. Additionally, there may be a disruption to team dynamics if answers are discussed among teammates following survey completion.

As previously mentioned, every effort has and will be made to minimize any potential risks and discomforts. First and foremost, all data will be de-identified prior to dissemination (e.g., replacing the names of athletes and teams with pseudonyms or numbers). Furthermore, data will be presented as coming from an elite women’s hockey team (no name will be included). These precautionary measures will make it near impossible to accurately link the athletes within the network. Additionally, we ask that you do not discuss your responses with teammates, coaches, or others during or following the completion of your survey.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY
Through the completion of the survey and the associated process of reflection that it will entail, athletes may gain insight into the group dynamics of their team. This may include what they look for in an effective leader and who they look to most for leadership. They may also develop a better understanding of the concept of shared leadership within sport teams.

In addition, results of the current study will help researchers, coaches, and athletes gain a more detailed understanding of the structure of athlete leadership within sport teams. From an applied perspective, this may help inform future athlete leadership development efforts and athlete leadership research in general. Furthermore, the use of social network analysis within sport is an emerging practice. Given the relational nature of sport, the current study may offer unique insight into team dynamics and may help encourage continued research using such methods.
COMPENSATION FOR PARTICIPATION
Participants will receive a compensation of 10$ (in form of a gift card) for completing the study. The reward will be issued exclusively to the participants who fully complete the survey, therefore participants withdrawing before the end of the survey won’t receive any compensation.

CONFIDENTIALITY
Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. All data will be kept on a password protected computer in a locked office, only accessible by the research team.
In addition, all data will be properly de-identified prior to dissemination for academic presentations or publications.

PARTICIPATION AND WITHDRAWAL
Participation in this study is voluntary. You may withdraw your participation at any time without penalty prior to, during, or following the completion of the survey (until the data collection is completed, at which time data will be strip of identifiers [e.g., names replaced with pseudonyms or numbers] in preparation for academic dissemination). At any point, if you decide to withdraw from the study and want all your information to be removed you can simply exit the survey and contact one of the investigators to advise them of your withdrawal. The investigators’ contact information is to be found at the top of this page.

Additionally, if you decide not to participate in the current study and you do not want any data associated with you to be used you can simply select that option at the end of the current page.

The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS
The overall results of the study will be available to the participants. They will have to contact the investigators at the phone numbers or emails above to receive an overview of the research results.

SUBSEQUENT USE OF DATA
These data, properly de-identified, may be used for subsequent scholarly presentations and publications.

RIGHTS OF RESEARCH PARTICIPANTS
If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e mail: ethics@uwindsor.ca
Consent to participate

Please check one of the following:

• □ I agree to participate in the current study (i.e., I will rate my teammates and my teammates will rate me)

• □ I do not agree to participate in the current study but you can include my teammate’s ratings of me

• □ I do not agree to participate in the current study and I do not want any of my data to be included
VITA AUCTORIS

<table>
<thead>
<tr>
<th>NAME:</th>
<th>Marie-Hélène Desrosiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLACE OF BIRTH:</td>
<td>Chicoutimi, QC</td>
</tr>
<tr>
<td>YEAR OF BIRTH:</td>
<td>1983</td>
</tr>
<tr>
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<td>CÉGEP de St-Jérôme, St-Jérôme, QC, 2003</td>
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<td>Northeastern University, B. A. Sociology, Boston, MA, 2008</td>
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<td>University of Windsor, M. H. K., Windsor, ON, 2017</td>
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