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Examining the Psychometric Properties of a Shared Leadership Inventory for the Study of Athlete Leadership

Mason B. Sheppard
University of Windsor

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Mason B. Sheppard

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Mason B. Sheppard

APPROVED BY:

_____

K. Gorey
School of Social Work

_____

K. Munroe-Chandler
Department of Kinesiology

_____

T. Loughead, Advisor
Department of Kinesiology

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ABSTRACT

Athlete leadership researchers have examined the leadership behaviours of athletes with inventories that were originally developed from other fields of research (e.g., military leadership). The approach typically adopted was to assess athlete leadership by rating the behaviours of a few selected athlete leaders (e.g., captains). The problem with this approach is that athlete leadership is a shared phenomenon consisting of numerous athletes (Loughead, 2017). In fact, within the definition of athlete leadership is the notion that the leadership behaviours exhibited by athletes are shared amongst numerous teammates (Loughead et al., 2021). Yet, the inventories used to assess athlete leadership do not fully capture the shared essence of this construct. Grille and Kauffeld's (2015) Shared Professional Leadership Inventory for Teams (SPLIT) fills this need of a shared leadership measurement tool. However, this inventory was originally developed for organizational research and not for the sport athlete domain. Thus, the purpose of this study was to modify the items of the SPLIT and test its validity using an athlete population. First, the items of the SPLIT were transformed to fit an athlete leadership context using a think-aloud protocol with athletes. Second, an expert panel was utilized to evaluate and provide suitability of the items for an athlete population. Third, an Exploratory Factor Analysis (EFA) was conducted to explore the factor structure of the modified inventory. Then, a Confirmatory Factor Analysis (CFA) was conducted on athletes to assess the SPLIT's factorial validity. The results of the CFA offer a three-factor solution for the assessment of shared leadership behaviours of athletes. Lastly, a correlation analysis was conducted to test the relationship between the athlete leadership behaviours of the SPLIT, and the most studied variable, cohesion. The results indicated a moderately strong relationship between each of the variables.

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RESEARCH ARTICLE

Introduction

Researchers in the field of athlete leadership have often assessed the leadership behaviours of athletes with measures that were originally developed from other fields of leadership research (e.g., sport coaching, military leadership). Derived from the Multidimensional Model of Leadership (MML; Chelladurai, 2007, see Figure 1) and the Full Range Model of Leadership (FRML; Avolio, 1999, see Figure 2), the measurement of athlete leader behaviours is grounded in transformational, individual, and situational leadership theories. In particular, based upon the MML, the Leadership Scale for Sport (LSS; Chelladurai & Saleh, 1980) was originally developed for athletes to rate perceptions of coaches' leadership behaviours, whereas the FRML influenced the creation of the Differentiated Transformational Leadership Inventory (DTLI; Hardy et al., 2010), which was originally used to measure military recruits' perceptions of their superiors' leadership behaviours. Whether the context was sport or the military, the approach taken to assess leadership was the same, whereby the research participants rated the leadership behaviours of a superior (e.g., head coach or platoon leader). This approach to the examination of leadership is known as *traditional leadership*, where a top-down or vertical system is viewed as a hierarchal process (Locke, 2003).

Often thought as an acceptable approach in the sporting realm (i.e., players are the subordinates and the coach is the leader), the traditional approach to leadership focuses typically on individual leaders, and by extension, on vertical leadership processes. In contrast, shared approaches to leadership questions this individual level approach suggesting that it focuses heavily on one individual as the leader and disregards the perspective that others can provide leadership. Often thought of as lateral or horizontal leadership, a shared leadership approach

occurs when team members are interdependent and members influence each other. This approach focuses on the group, rather than individuals within a group. In sport, the idea that the main source of leadership within a team stems from the coach or manager (top-down) has been expanded to include athletes. This form of leadership is labeled *athlete leadership* and is defined as an athlete occupying a formal or informal leadership role within a team who influences team members to achieve a common goal (Loughead et al., 2006). Derived from this definition is the idea that numerous athletes exhibit leadership (Loughead, 2017), who occupy formal and informal leadership roles. Often, teams designate formal leaders (e.g., captain/assistant captain), while informal leaders emerge organically (e.g., veteran athlete). When athlete leadership is viewed as being composed of both formal and informal leadership roles, it suggests that leadership is a shared process in which every member of a team has the ability to perform leadership behaviours (Loughead et al., 2021; Pearce & Conger, 2003). Consequently, Loughead et al. (2021) argued that athlete leadership is a shared process and defined it as an emergent and dynamic team process that includes mutual influence and shared responsibility distributed amongst team members, who lead each other toward the achievement of team goals. Shared athlete leadership is a complex process that includes multiple functions a leader needs to fulfill that would be difficult for one individual to successfully complete (Maechel et al., 2020).

Given that athlete leadership is viewed as a shared process (Loughead et al., 2006; Loughead et al., 2021), researchers measuring the leadership behaviours of athletes have primarily relied on two inventories. Specifically, the LSS (Chelladurai & Saleh, 1980) and DTLI (Callow et al., 2009) have been found to be valid and reliable measures of athlete leadership behaviours. The LSS measures five leadership behaviours that include *Training and Instruction* (e.g., behaviours of an athlete leader targeted at improving the performance), *Democratic*

Behaviour (e.g., the degree to which an athlete leader includes team members in the decision-making process), *Autocratic Behaviour* (e.g., the degree of independence that an athlete leader uses to make a decision), *Social Support* (e.g., the degree to which an athlete leader engages in satisfying the needs of others), and *Positive Feedback* (e.g., the degree to which an athlete leader encourages teammates). The DTLI measures six transformational and one transactional leadership behaviours. The six transformational leadership behaviours are *Individual Consideration* (e.g., the degree to which an athlete leader pays attention to teammates feelings and needs); *Inspirational Motivation* (e.g., the extent an athlete leader energizes teammates and is optimistic about future team goals); *Intellectual Stimulation* (e.g., an athlete leader's ability to challenge teammate assumptions and promote creativeness within the team); *Fostering Acceptance of Group Goals and Promoting Teamwork* (e.g., the degree to which an athlete leader promotes goal setting and cooperation within teammates), *High-Performance Expectations* (e.g., striving for excellence), and *Appropriate Role Modeling* (e.g., the extent to which athlete leaders are positive role models for teammates) are used to measure transformational leadership. The sole transactional leadership behaviour is *Contingent Reward* (e.g., an athlete leader's tendency to provide positive reinforcement when teammates meet expectations).

While the LSS (Chelladurai & Saleh, 1980) and DTLI (Callow et al., 2009) have been shown to be valid and reliable inventories when assessing athlete leader behaviours (Loughead, 2017), both inventories fail to capture shared leadership as a collective team process. More specifically, the LSS and DTLI focus on athlete leader behaviours through individualized stems (e.g., *my athlete leader(s), my team captain/leader*), which suggest athletes may be rating one athlete leader (e.g., captain), multiple individuals (e.g., assistant captains) or a small group of

individuals (e.g., a leadership group, a combination of captains and assistant captains) (Loughead et al., 2006; Gronn, 2002). It is unfortunate that the LSS and DTLI does not incorporate the sharedness of leadership as a complete team process, as the literature provides evidence that shows athlete leadership is a shared process that involves all members of a team. For instance, Duguay et al. (2019) employed a social network approach to measure the sharedness within soccer teams and found that all team members within each of the four teams demonstrated leadership. Furthermore, Yukl (2012) advanced a conceptual model that examines leadership behaviours at a team-level, rather than an individual-level. Within the model, Yukl (2012) proposed a team-level taxonomy that includes four dimensions of leadership behaviours labeled as *task-oriented*, *relations-oriented*, *change-oriented*, and *external-oriented* leadership. Although Yukl's model is increasingly being referenced within the sport literature (e.g., Maechel et al., 2020), the model was originally developed and tested within the organizational realm, where it was demonstrated to be valid and reliable when examining shared leadership (Grille & Kauffeld, 2015). In the realm of organizational research, shared leadership undoubtedly takes a similar form to that of athlete leadership. Consequently, Maechel et al. (2020) tested whether Yukl's four dimensions were appropriate to be used within an athlete leadership context. The results showed that Maechel et al. did not test the validity of items that constitute these four dimensions. Rather, Maechel and colleagues examined the applicability of the factors in relation to a shared athlete leadership context. Despite finding positive connection to shared athlete leadership, the next step is to examine the validity of a shared leadership inventory within the context of athlete leadership.

In order to assess these four dimensions of shared leadership, Grille and Kauffeld (2015) advanced the Shared Professional Leadership Inventory for Teams (SPLIT) for organizational

leadership research. The SPLIT is operationalized using Yukl's (2012) four shared leadership dimensions that include *task-oriented* (e.g., planning, problem solving, clarifying), *relations-oriented* (e.g., supporting, developing, empowering), *change-oriented* (e.g., advocating and envisioning change, encouraging innovation) and *external-oriented* (e.g., networking) leadership behaviours. The SPLIT uses two qualifiers (i.e., *As a team, We)* within their items in order to capture the leadership provided by all members of a team, rather than followers rating a leader(s) or a leadership group, which has been the approach taken while measuring athlete leadership using the LSS (Chelladurai & Saleh, 1980) and the DTLI (Callow et al., 2009). Gockel and Werth (2010) noted that the approach used in an inventory such as the SPLIT is known as "Rating the Team" and is viewed as a viable method in assessing shared leadership.

Thus, the overall objective of this study was to modify the original SPLIT (Grille & Kauffeld, 2015) to fit into an athlete leadership context. (Grille & Kauffeld, 2015). The first phase was to examine the factorial validity of the SPLIT in an athlete leadership setting. Although the inventory was originally developed and validated within an organizational setting, it has not been implemented in a sport setting. Through an Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), it is hypothesized that a valid model will provide adequate fit to the data. The second phase is to examine the predictive validity of the SPLIT by examining its relationship to cohesion. The construct of cohesion was selected due to the fact that in the realm of athlete leadership, cohesion has been the most studied variable (Callow et al., 2009; Loughead, 2017; Vincer & Loughead, 2010). In general, the results of athlete leadership-cohesion studies have shown a positive relationship between these two constructs. It was hypothesized that the modified athlete leadership version of the SPLIT would be positively

related to cohesion. Given the exploratory nature of this study, no a priori hypotheses were advanced.

Method and Results

Phase 1: Factorial Validity of the Athlete Leadership Version of the SPLIT

Stage 1: Item Modification

The original version of the SPLIT (Grille & Kauffeld, 2015), conceptualized for organizational settings, was modified to assess athlete leadership. The original version of the SPLIT is a 20-item inventory asking participants to rate four dimensions of shared leadership behaviours on a 6-point Likert scale, ranging from 0% (*does not apply at all*), 20%, 40%, 60%, 80%, to 100% (*fully applies*). Thus, higher scores reflect a greater degree of perceived shared leadership. The shared leadership behaviours that are measured in the SPLIT are *task-oriented* leadership (5 items; e.g., Clearly assign tasks), *relations-oriented* leadership (5 items; e.g., Takes sufficient time to address each other's concerns), *change-oriented* leadership (5 items; e.g., Helps each other to correctly understand ongoing processes in our team) and *external-oriented* leadership (5 items; e.g., Ensures our team is supported with necessary resources to fulfil the task).

Grille and Kauffeld (2015) originally created a pool of 84-items that was assessed for content validity and readability. Then, the authors condensed the item pool to 30 items, where item analyses were conducted on each item. The results showed that the item loading was significant and mostly high (>.50), leading the authors to the final 20 items that currently constitute the SPLIT. Based upon commonly recommended cut-off criteria, model fit was found to be acceptable in a correlated four-factor model (i.e., RMSEA=0.05, CFI=0.94, SRMR=0.05) and a second-order factor model (i.e., RMSEA=0.05, CFI=0.94, SRMR=0.05; Grille & Kauffeld,

2015). Also, the authors noted that correlations between the factors were significant (r = 0.53 – 0.83) and the items loaded highly onto their intended factors.

When modifying the items of the original SPLIT (Grille & Kauffeld, 2015), two assumptions were made concerning conceptualization and operationalization of the construct (Eys et al., 2009). First, it was assumed that the original conceptualization of a team (i.e., organizational teams) is relevant to the population under examination (i.e., sport teams). Given the transferability of research across organizational psychology and sports psychology (Loughead, 2017), this is a reasonable assumption. The second assumption relates to testing the scale with an appropriate sample group. The original SPLIT was created for adults working in an organizational setting. The modified athlete leadership version of the SPLIT was administered to adults as well playing team sports.

The first step in modifying the items of the SPLIT (Grille & Kauffeld, 2015) involved reviewing the definitions of the four leadership behaviours that constitute this inventory (i.e., task-, relations-, change-, external-oriented leadership). The original leadership behaviours of the SPLIT were operationalized from Yukl's (2012) team level taxonomy. The following are the definitions put forward by Yukl:

Task-oriented leadership: This leadership behaviour refers to actions that aid in accomplishing team outcomes. Specific behaviours may include planning and organizing team-related tasks, clarifying roles and objectives, monitoring team operations and resolving problems within the team.

Relations-oriented leadership: This leadership behaviour refers to actions that lead to the enhancement of skills and interpersonal relationships within the team. Specific behaviours include supporting teammates, developing skills, and empowering teammates.

Change-oriented leadership: This leadership behaviour refers to actions that increase innovation, collective learning and adapting to external situations. Specific behaviours include advocating for teammates, providing teammates with inspiration and motivation, and emphasizing collective learning.

External-oriented leadership: This leadership refers to accessing external resources that are necessary for the team. Specific behaviours include networking and communicating with external experts, monitoring external trends and representing the team.

The second step in modifying the SPLIT involved the development of new items that were appropriate for athlete leadership research. The original version of the SPLIT contained 5 items for each of the four leadership behaviours. A total of 14 new items were created for each of the four leadership behaviours: task-oriented (n = 4), relations-oriented (n = 4), change-oriented (n = 4), and external-oriented leadership (n = 2). Thus, a total of 34 items were utilized for the cognitive interviews. An example of a newly created task-oriented item is: *As a team, we clearly assign team-oriented tasks*. An example of a relations-oriented item is: *As a team, we always support each other*. An example of a change-oriented modification is: *As a team, we help each other to correctly understand team dynamics*. Finally, an example of an external-oriented modification is: *We use external resources to support our team's performance*.

Stage 2: Cognitive Interviews

Given the goal of modifying the SPLIT (Grille & Kauffeld, 2015) was to create a valid and reliable inventory for athlete leadership, conducting interviews with athletes across multiple sports team was deemed important. Cognitive interviews were conducted with six athletes playing on varsity teams at the University of Windsor (Hoffmann & Loughead, 2019). Cognitive interviews using a think-aloud approach were conducted as a technique to detect problematic

items (Drennan, 2003). Think-aloud techniques are often thought of as one of the most effective ways to assess higher-level thinking processes (Olson et al., 1984) as the think-aloud technique allows researchers to gain insight into the process of working memory (Charters, 2003). The notion of working memory as the theoretical basis was put forth by Ericsson and Simon (1980) where it was noted that working memory allows concurrent reasoning, which takes place in verbal form. Ericsson and Simon (1980) also suggested that verbal reports are a reliable source of data, even if a participant's thought processes are incomplete due to working memory recall. Each athlete verbally completed the 34-item questionnaire while reflecting on the shared leadership experience within their team. The research team adapted six codes from McCorry et al.'s (2013) coding framework. Each response for the 34-items was assigned an individual code from the following: *no problems* (participant experienced no problems with the items), *not applicable* (participants expressed the item was not appropriate), *different question* (participant interpreted item differently than intended), *confusion* (participant expressed difficulty understanding the item), *missing* (item was omitted) and *repeated item* (participant repeated the item due to initial difficulty understanding it). It should be noted that the code of *incongruent response* (written and verbal responses were clearly incongruent) was omitted in the present study, as participants did not complete a written version of the modified SPLIT. The interviews were conducted on Microsoft Teams, where informed consent was obtained. The interviews were recorded and transcribed verbatim following each interview. All participants followed instructions that were adapted by McCorry et al. (2013) and Gardner and Tang (2014):

I am interested in what you think about when completing the following questionnaire in regards to the current leadership on your team. In order to do this, I am asking you to THINK ALOUD as you answer all questions. What I mean by "think aloud" is that I would like you to

tell me EVERYTHING you are thinking from the time you read the questionnaire's instructions until the time you answer the last question. You do not need to answer the question, more so, tell me what you are thinking about when you read each item (i.e., does it make sense, would you prefer it stated differently). I don't want you to plan out what you say, just act as if you are alone in the room speaking to yourself. It is important that you keep talking. If you are silent for a long period of time, I will ask you to talk. Please try to speak as clearly as possible, as I will be recording you as you speak.

Gardner and Tang (2014) suggested that the interviewer only speak after the participant falls silent for more than 10 seconds, so standardized probes developed in advance were used throughout each interview to further a participant's thinking about some items. An example of a standardized probe was "Can you describe a time this leadership behaviour was used on your team". Any item that received a code other than *no problems* identified by two or more participants was considered problematic. The principal investigator (Mason Sheppard) and his advisor (Dr. Todd Loughead) discussed a course of action (i.e., leave item as is, revise, or remove) before continuing to Stage 3. Items were only removed at this stage if the principal investigator (Mason Sheppard) and his advisor (Dr. Todd Loughead) deemed it acceptable based on the feedback from the cognitive interviews (i.e., all participants were displeased by the item).

Six one-on-one cognitive interviews were conducted using a think-aloud approach were conducted. In particular, the three of the participants identified themselves as female and the other three identified themselves as male with a mean age of 22 years (*SD*= 1.89). All six participants were current varsity athletes competing at the U Sports level (i.e., governing body of Canadian University athletics) competing in five intercollegiate sports: football (n = 1), volleyball (n = 1), soccer (n = 2), hockey (n = 1) and track and field/cross country (n = 1). This

sample of six athletes aligns with other research where athletes participated in think-aloud interviews for the purpose of item development (Hoffmann & Loughead, 2019).

Table 1 displays the frequency in which each of McCorry et al.'s code was given by the six participants. Table 1 indicates that one item was identified as having no problems by all participants while a total of six items were considered to have less than one problem as indicated by the participants. Based on McCorry et al. (2013) criteria, 28 items were considered to be problematic by more than two participants. Of these 28 problematic items, 10 items received the minimum of two negative responses to be considered a problematic item. Four out of 27 problematic items receive six negative responses.

For the purpose of this study, minimal revisions to the items were made at this stage of the research process. Dunn et al. (1999) noted that during early stages of item development, researchers are able to acquire an "intuitive feel" for item dimensionality. Thus, the research team decided that it was appropriate to remove as few items as possible during this stage. As a result of the feedback from the cognitive interviews, the research team removed five items (see Table 1), and added nine items. The nine items that were added were based upon the qualitative feedback that was received during the cognitive interviews. Thus, a new item-pool was created with 38-items, consisting of task- (n = 12), relations- (n = 10), change- (n = 9) and external-oriented (n = 7) leadership items (see Table 2). The new items scored a 65.1 on the Flesch Reading Ease scale and were identified to read at a grade level of 6.5 on the Flesch-Kincaid grade level scale. This suggests that the revisions that were made did not drastically impact the readability of the items and are adequate for our targeted population (i.e., athletes 18 years and older).

Stage 3: Expert Rating Panel

The expert rating panel consisted of six individuals, none of which had any prior involvement with the study. Based on Lynn's (1986) recommendations, at least five judges must be included to control against chance agreements. Experts were professors or mental performance consultants in sport psychology, group dynamics, and/or leadership domains from Canadian and International institutions. Twelve experts were invited via email with 10 agreeing to participate. The professional positions of the experts included assistant/adjunct professor (n = 4), full professor (n = 2), postdoctoral fellow (n = 2) and mental performance consultant (n = 2). Seven participants were recruited from Canadian institutions, while three participants were recruited from international institutions. Participants were identified based upon recent publications or active work in the field of sport psychology, group dynamics and/or leadership. Participants had no prior involvement with developing items and were recruited via email addresses made public by an institution or business. Participants who accepted to serve on the expert panel were provided a link to an online questionnaire that was hosted by Qualtrics.

Following informed consent, the participants completed the revised pool of 38 items where they rated the degree to which each item corresponded to the proposed dimensions. The participants were provided with a description of the four leadership behaviour dimensions (e.g., task-, relations, change- and external-oriented leadership), but to reduce potential rating bias, were not told which items corresponded with each dimension. The participants were provided with the following descriptions of the four leadership behaviours. *Task-oriented leadership* refers to actions that aid in accomplishing team outcomes. Specific behaviours may include planning and organizing team-related tasks, clarifying roles and objectives, monitoring team operations and resolving problems within the team. *Relations-oriented leadership* refers to actions that lead

to the enhancement of skills, intra-team relationships, and identification to the team. Specific behaviours may include supporting teammates, developing skills, recognizing, and empowering teammates. *Change-oriented leadership* refers to actions that increase innovation, collective learning and adapting to external situations. Specific behaviours may include advocating for teammates, providing teammates with inspiration and motivation, and emphasizing collective learning. Lastly, *external-oriented leadership* refers to accessing external resources that are necessary for the team. Specific behaviours may include networking and communicating with external experts, monitoring external trends and representing the team. Participants rated each item on a 5-point Likert scale; 1 (*poor match*), 2 (*fair match*), 3 (*good match*), 4 (*very good match*) and 5 (*excellent match*) and were given an opportunity to provide qualitative feedback.

Participants' responses were analyzed for congruency and discrepancies amongst each of the 10 experts. Content validity was evaluated using Aiken's (1985) Validity (*V*) Index. Judgements for retaining, revision or removing items were based upon the *V* Index and qualitative feedback provided by the experts. *V* coefficients range from 0 to 1, where coefficients closer to 1(i.e., rating of 5 on the 5-point Likert scale) suggest greater agreement by the experts, where a value closer to 0 (i.e., rating of 1 on the 5-point Likert scale) indicates discrepancies between judges' ratings. In order to identify statistical significance, *V* coefficients were compared to Aiken's (1985) right tailed probabilities table. 95% confidence intervals were used to detect precision of *V* estimates (Penfield & Giacobbi, 2004), where upper and lower confidence intervals were calculated.

Coefficients greater than 0.7 were considered statistically significant at the 0.05 level. The results showed that 26 of the 38 items (68.4%) were found to be statistically significant at the 0.05 level, with *V* coefficients ranging from 0.7 to 1 with a moderately narrow 95%

confidence interval. The average interval length of significant items was 0.18, which significs precision of *V* based upon Penfield and Giacobbi's (2004) recommendations. The length of an interval signifies the need to increase the number of experts who are providing ratings in order to decrease the interval length at a 95% confidence interval. In this case, additional experts were not required. Table 2 displays the frequencies and mean item ratings and validity coefficients from the expert rating panel. Overall, two task-oriented items did not meet the required significance. Five relations-oriented did not meet the required cut-off and five change-oriented items did not meet the required significance level. Unlike Stage 2, no revisions were made to of the items at this project. The research team decided that it was valuable to use the current pool of 38 items during the final stage in order to have complete understanding of validity of the modified items.

Further, planned contrasts were used to determine whether the items measured their intended dimension and did not overlap with items from the three other dimensions. The mean ratings of the items from the 10 experts were used to compare each of the four dimensions of leadership. In order to determine the content relevance of each item, Cohen's (1988) effect size for dependent means were calculated to interpret the difference between two means. Cohen (1988) suggests that the cut-offs of 0.2 (small effect), 0.5 (medium effect) and 0.8 (large effect) be used to interpret effect size. Dunn et al. (1999) suggests that to determine whether an item reflects its intended subscale, a moderate to large effect must be seen. Table 3 displays the effect sizes from the planned contrasts based on the mean ratings from the expert rating panel. Out of 114 planned contrasts, a large effect size ($d > 0.80$) was found in 63 contrasts. Further, 25 planned contrasts showed a moderate effect size. ($d > 0.5$).

Stage 4: Factor Analysis

Factor analysis is a term that represents a variety of statistical techniques to evaluate whether the collected data assesses what they are purported to measure (Tabachnick & Fidell, 2019). Given the results that showed some discrepancies from the cognitive interviews and the expert panel, two types of factor analysis were used in this stage of the study: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA).

Exploratory Factor Analysis

Exploratory Factor Analyses (EFA) allow researchers to identify a factor structure when exploring item development and scale creation. Due to the discrepancies in understanding from the cognitive interviews, as well as the expert panel, an EFA was used to explore the best factor structure of the items. Howard (2016) recommended five decisions that are critical to achieving valid results when conducting an EFA. More specifically, researchers must make decisions on (1) data inspection techniques, (2) factor analytic method, (3) factor retention method, (4) factor rotation method and (5) factor loading cut-offs.

First, in terms of data inspection techniques, the data were inspected for preliminary assumptions using Bartlett's test for sphericity (Bartlett, 1950; Dziuban & Shirkkey, 1974) and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (Dziuban & Shirkkey, 1974; Kaiser, 1970). Barlett's tests of sphericity was significant ($p < .001$), and the KMO test scored 0.95, which according to Kaiser and Rice (1974) equates to "marvellous," meaning no assumptions were violated. Second, a factor analytic method was selected. It should be noted that multiple factor analytic methods exist, whereby the Principal Components Analysis (PCA) is considered the most popular because it is the default method in SPSS, although it is not a true form of factor analysis (Costello & Osborne, 2005). A Principal Axis Factoring (PAF) estimation

method was chosen for this study as this test produces a set of factor loading estimates that reproduce the common variance within a correlation matrix (De Winter & Dodou, 2012) and is recommended if a researcher is not analyzing model fit indices. Third, when making decisions on a factor retention method, a visual scree plot was analyzed using Eigenvalues above 1 (Kaiser, 1960) to understand variances within the measured variables. The results of the scree plot showed the presence of four factors that accounted for 55.2% of the variance. It should be noted that a fifth factor was discarded, as it only retained one item and only accounted for 2.4% of the variance. In order to interpret the data, individual variable loadings must be analyzed. Fourth, the data must be rotated in order to interpret the results of the EFA. Two rotational techniques are often used: orthogonal rotation and oblique rotation. Orthogonal rotation assumes the rotated factors are not correlated, while oblique rotations assume the rotated factors are correlated. Due to the multidimensionality of athlete leadership, an oblique rotation was used. Within oblique rotations, two methods are used to order the variables: promax and direct oblimin. Promax rotation allows factors to correlate and raises the factors loadings to a specified power, whereas a direct oblimin rotates the factors to the final solution. Thus, an oblique oblimin rotation was used to rotate the data. Fifth, to satisfy Howard's (2016) final decision, a cut-off point of 0.40 (Hinkin, 1995) was determined as it is the most popular cut-off to identify "good" factor loadings. Although Costello and Osborne (2005) suggests a cut-off point of 0.3 is also acceptable. All factor loadings were above the cut-off of 0.4.

In order to meet the recommendations for required power to run an EFA (e.g., 200-500 participants; de Winter & Dodou, 2009), 300 participants (M_{age} = 37.03, *SD* = 12.91) were used for this analysis. The data were collected from Prolific, which is an online data recruitment portal. A convenient feature of Prolific is that the researcher is entitled to all of the raw data,

which allows the opportunity to inspect and clean the data. Following clearance from the University of Windsor Research Ethics Board, participants were recruited from the United Kingdom, United States of America, Canada, New Zealand, and Australia. The five countries were selected based on the notion that participants would be familiar with the leadership structure of sports teams. All of the participants completed a demographic measure that assessed the current sport they were playing, years playing their current sport, level of sport, hours spent with the team each week, gender, age, and ethnicity (see Appendix A) along with the modified athlete leadership version of the SPLIT (see Appendix B) and letter of information (see Appendix C).

From the 300 participants, 126 participants identified as a Woman/Girl, 173 as a Man/Boy, and one participant as non-binary, genderqueer or similar gender. This sample consisted of a wide range of ethnicities, where participants identified as White/Caucasian (*n* = 255, 84.7%), Other (*n* = 12, 4.0%), South Asian (*n* = 10, 3.3%), African American (*n* = 8, 2.7%), Chinese (*n* = 7, 2.3%), Latin American (*n* = 3), South-East Asian (*n* = 3), Filipino (*n* = 1) and Korean (*n* = 1). For this sample, 56.1% played recreational level sport, 38.2% of the participants played club level sport, 4% were varsity/intercollegiate level athletes, 1% played National/International level of sport, and 0.3% of the sample played professionally. The most frequently listed team sport that participants identified as their primary sport was soccer (41.6%) followed by netball (13.6%) and basketball (5.3%).

An Exploratory Factor Analyses (EFA) was conducted using JASP (version 0.16.2), an open-source software. The results of the EFA indicated a four-factor model. More specifically, the EFA yielded a first factor which explained 24.9% of the total variance, a second factor which explained 15.9%, a third factor which explained 13.5%, and a fourth factor which explained

0.9%, totalling 55.2% of explained variance. An examination of the first factor showed that eight task-oriented leadership items and one change-oriented item comprised this factor, and was labeled task-oriented leadership. Item TOL2 ("As a team, we monitor goal achievement") cross-loaded onto the fourth factor, thus it was removed (see Table 4). The second factor was labeled relations-oriented leadership as it consisted of eight relations-oriented items and three change-oriented items. The third factor was labeled as external-oriented leadership and consisted of five external-oriented leadership items. Item EOL2 ("We ensure that our team is supported with necessary external resources to satisfy team needs") cross-loaded onto a fifth factor. This item was removed. The fourth factor was a new factor that was labeled as *recognition and rewards-oriented leadership.* This new factor refers to the importance of complimenting teammates and giving positive feedback on their performances to maintain motivation. This factor is similar to Chelladurai and Saleh's (1980) dimension of positive feedback from the Leadership Scale for Sports. This factor was comprised of two relations-oriented items, one change-oriented item, and one task-oriented leadership item.

Confirmatory Factor Analysis

As the results from the EFA suggested a four-factor model that was different from the original structure of the SPLIT, the fit of the EFA model was tested using CFA. Several indices were used to evaluate model fit that include the chi-square statistic (χ^2), comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). Commonly adopted recommendations from Hu and Bentler (1999) for model fit were used as acceptable cut-offs; CFI $\geq$ .95, SRMR $\leq$ .08 and RMSEA $\leq$.06.

In order to meet the required power to run a CFA, a new sample of 300 participants (M_{age} = 36.99, *SD* =13.01) from Prolific was collected. In total, 152 participants self-identified as a

woman/girl, 147 self-identified as a man/boy, and 1 self-identified as non-binary or genderqueer. This sample consisted of White/Caucasian (*n* = 234, 77.7%), South Asian (*n* = 16, 5.3%), Other (*n* = 15, 5.0%), African American (*n* = 12, 4.0%), South-East Asian (*n* = 10, 3.3%), Chinese (*n* = 5, 1.7%), Latin American (*n* = 3, 1.0%), Arab (*n* = 3, 1.0%) and Korean (*n* = 3, 1.0%). In terms of level of sport, 58.5% of participants indicated playing at a recreational level, 33.9% indicated playing at a club level, 5% were intercollegiate/varsity athletes, 2% played at the National/International level, and 0.7% of played professionally. Within this sample, the primary sports played by the participants were soccer (41.1%), netball (14.6%) and volleyball (5.0%) and basketball (4.6%).

The CFA was conducted in JASP (version 0.16.2) with the maximum likelihood estimator (Muthén & Muthén, 2017). A total of 29 items were included based upon the results of the EFA. Three CFAs were conducted in order to determine appropriate model fit. The first CFA was a single factor model to test a unidimensional model of shared athlete leadership. The CFA results indicated that the single factor model showed unacceptable fit, χ^2 (377) = 1413.30, p < .001, CFI = 0.80, RMSEA = 0.096, 90% Confidence Intervals (CIs) [.090, .101], SRMR = 0.067. The second model tested was an uncorrelated model to test the four factors from the EFA (task-, relations-, change- and recognition and rewards leadership). The CFA results indicated that the uncorrelated model showed unacceptable fit, χ^2 (377) = 1816.01, *p* < .001, CFI= 0.73, RMSEA= 0.077, 90% Confidence Intervals (CIs) [.077, .082], SRMR= 0.062.

The third model tested was a correlated model where the four leadership factors were correlated to one another. The results of the correlated model showed unacceptable fit, χ^2 (371) = 1029.22, *p* < .001, CFI= 0.87, RMSEA= 0.08, 90% Confidence Intervals (CIs) [.076, .085], SRMR= 0.065. However, modifications were made to this correlated model by analyzing

parameter estimates of factor loadings and modification indices (e.g., cross loadings). The results of the modified model showed adequate fit, χ^2 (62) = 135.45, $p < .001$, CFI = 0.97, RMSEA = 0.063, 90% Confidence Intervals (CIs) [.048, .077], SRMR= 0.046. In order to achieve adequate model fit, 16 items were removed. First, parameter estimates were analyzed. Items that had factor-loadings of < 0.70 were removed and the model was retested. Lastly, cross-loading items were removed. The results of these modifications showed that the best fitting model was a three-factor model, consisting of task-oriented leadership, relations-oriented leadership, and external-oriented leadership. The fourth factor of recognition and rewards-oriented leadership was removed as a result of the modifications made to the model.

Taken together this three-factor model consisted of 13 items comprised of five items for task-oriented leadership (α = .89), five items for relations-oriented leadership (α =.84), and three items for external-oriented leadership (α = .80) behaviours. Table 5 indicates the items that were removed to create the best fitting model. Further, Table 5 indicates the items that were original items from Grille and Kauffeld's (2015) SPLIT and the items that were added during the first three stages of the project. Table 6 indicates a summary of the descriptive statistics for the best fitting model of the CFA.

Phase 2: Concurrent Validity of the Shared Athlete Leadership Inventory

The results of Phase One indicated a three-factor model (task-, relations-, and external-oriented leadership) as the best fitting model for the SPLIT (Grille & Kauffeld, 2015) in an athlete leadership context. In Phase Two, a bivariate correlation was conducted to test the concurrent validity of the three-factor model in relation to cohesion. Researchers have shown that there is a positive relationship between athlete leadership behaviours and cohesion (Loughead, 2017).

Participants

A subset of the participants were randomly selected from those who participated in Phase Two. G*Power (Faul et al., 2009) was used to calculate the number of participants required to conduct bivariate correlation analysis. Using an effect size (d = 0.15), α = .05, and power = 0.8, it was estimated that 129 participants would be required. As a result, the participants were 150 female and male (M_{age} = 37.50, SD =13.73) were used for the analyses. In total, 48 participants identified as a woman/girl, 101 participants identified as a man/boy and one participant identified as non-binary, genderqueer or similar gender.

Measures

Athlete leadership. Athletes' leadership behaviours was measured with the modified version of the SPLIT, based upon the results of Phase one. The modified version of the SPLIT is a 13-item questionnaire comprised task-oriented leadership, relations-oriented leadership and external-oriented leadership. The modified version of the SPLIT measure shared athlete leadership behaviours using a 6-point Likert type scale, ranging from 1 (*does not apply at all*) to 6 (*fully applies*). The three dimensions of the modified version of the SPLIT are *task-oriented leadership* (TOL; 5 items; e.g., As a team, we clearly assign team oriented tasks), *relations-oriented leadership* (ROL; 5 items; e.g., As a team, we take sufficient time to address each other's concerns) and *external-oriented leadership* (EOL; 3 items; e.g., We use external resources to support our teams performance).

Cohesion. Athletes' perception of cohesion was measured using the positively worded version Group Environment Questionnaire (GEQ; Carron et al., 1985; Eys et al., 2007, see Appendix D). The GEQ is an 18-item inventory used to measure four dimensions of cohesion on a 9-point Likert scale, plus one attention check item (i.e., My team is not cohesive), ranging from

1 (*strongly disagree*) to 9 (*strongly agree*). The four dimensions of cohesion are *individual attractions to the group-task* (ATG-T; 4 items; e.g., I like the style of play on this team), *individual attractions to the group-social* (ATG-S; 5 items; e.g., Some of my best friends are on this team), *group integration-task* (GI-T; 5 items; e.g., Our team is united in trying to reach its goals for performance) and *group integration-social* (GI-S; 4 items; e.g., Members of our team stick together outside of practices and games).

Correlation Analysis

The means and standard deviations were calculated for each of the dimensions of athlete leadership and cohesion. In terms of athlete leadership, *task-oriented leadership* was rated the highest on a 5-point Likert scale (M = 4.53, SD = 0.92), followed by *relations-oriented leadership* (M = 4.33, SD = 1.00) and *external-oriented leadership* (M = 3.60, SD = 1.18). Cohesion was measured on a 9-point Likert type scale, where *individual attractions to group-social* was rated the highest (M = 7.19, SD = 1.23), followed by *group integration-task* (M = 6.95, SD = 1.28), *individual attractions to group-task* (M = 6.56, SD = 1.60), and *group integration-social* (M = 6.24, SD = 1.62).

A bivariate correlation analysis was conducted to determine the relationships between the three factors of the modified SPLIT and the four dimensions of cohesion. Assumptions were tested for normality (Shapiro-Wilk's Test=0.884, $p < .001$) and confirmed. Table 7 provides a summary of the correlations among all of the variables. Overall, a moderate positive, significant relationship was found between each of the dimensions of athlete leadership behaviours and cohesion. More specifically, task-oriented leadership showed the strongest correlation with GI-T (r = 0.61, p <.001) and ATG-T (r = 0.44, p <.001), followed by GI-S (r = 0.39, p <.001) and ATG-S (r =0.32, p <.001). Relations-oriented leadership had the strongest correlation with GI-T

(r = 0.75, p <.001) and ATG-T (r =0.55, p <.001) followed by GI-S (r =0.49, p <.001) and ATG-S (r =0.42, p <.001). Finally, external-oriented leadership had a small to moderate, positive relationship with each of the four dimensions of cohesion, including GI-T (r =0.49, p <.001), GI-S (r =0.38, p <.001), ATG-T (r = 0.29, p <.001) and ATG-S (r = 0.26, p <.001). In regards to cohesion, ATG-T had the strongest correlation with relations-oriented leadership (r = 0.54, p <.001), followed by task-oriented leadership (r = 0.43, p <.001) and EOL (r = 0.29, p <.001). Similarly, ATG-S had the strongest correlation with relations-oriented leadership (r = 0.42, p <.001), followed by task-oriented leadership (r = 0.32, p <.001) and external-oriented leadership (r = 0.26, p <.001). GI-T also showed the strongest correlation with relations-oriented leadership (r = .74, p <.001), followed by task-oriented leadership (r = 0.61, p <.001) and external-oriented leadership (r = 0.48, p <.001). Finally, GI-S had the strongest correlation to relations-oriented leadership (r = 0.49, p <.001), followed by task-oriented leadership (r = 0.39, p <.001) and external-oriented leadership (r = 0.38, p <.001).

Discussion

Previous scales, such as the Leadership Scale for Sport (LSS; Chelladurai and Saleh, 1980) and the Differentiated Transformational Leadership Inventory (DTLI; Callow et al., 2009) have shown excellent psychometric properties after modification from the original domain to athlete leadership. Both the LSS and DTLI are primary measurement tools in the athlete leadership literature, yet, neither scale was originally developed to measure athlete leadership behaviours. However, other attempts to transform organizational leadership scales to an athlete leadership context have not been as successful. Both the Multifactor Leadership Questionnaire (MLQ-5X; Bass & Avolio, 2000) and Team Multifactor Leadership Questionnaire (TMLQ; Avolio et al., 2003) have been sparingly used in athlete leadership research. Thus, the purpose of

the present study was two-fold. The first purpose of the study was to transform the SPLIT (Grille & Kauffeld, 2015), a valid and reliable inventory from organizational psychology and modify it fit into an athlete leadership context. It was hypothesized that an athlete leadership version of the SPLIT would provide adequate model fit to the data. This hypothesis was partially supported using two factor analysis techniques (EFA and CFA). In sum, a three-factor model comprised of task-, relations-, and external-oriented leadership was found to be the best fitting model in terms of assessing athlete leadership. The second purpose of this study was to examine the concurrent validity of this three-factor model of athlete leadership with one of its strongest correlate; cohesion. It was hypothesized that the modified model of the SPLIT would be positively correlated with cohesion. Using the three-factor model of the SPLIT, this hypothesis was confirmed, where each of the four dimensions of cohesion were found to positively correlate to each of the factors from modified SPLIT.

The present study involved multiple stages that provide rationale and expand on the overall results found in this project. An overarching result with the cognitive interviews showed that there was some confusion with some of the survey's items. In particular, it was evident that the participants did not fully understand the external-oriented leadership items, as well as change-oriented leadership items. Given the fact that external-oriented leadership is one of the three original athlete leader behaviours (Loughead et al. 2006; Rees & Segal, 1984), this result was surprising. The confusion showed towards the external-oriented leadership items may be due to the situational context in which the SPLIT was developed for. A majority of the original items from the external-oriented leadership subscale of the SPLIT revolve around "networking", which is considered to be a fundamental part of leader effectiveness in the organizational realm (Yukl et al., 2002). Previous organizational literature described networking as relationships with

external others who can provide useful information and resources to the group (Maechel et al., 2020). Perhaps, this is a case in which athletes do not have the opportunity to utilize this type of leadership behaviour. Previous researchers have shown that external-oriented leadership was utilized by a smaller number of athletes compared to task and social types of athlete leadership (Loughead et al., 2006).

Contrastingly participants showing confusion towards change-oriented items was not a surprising finding. In particular, change-oriented leadership is a relatively new construct within the athlete leadership literature. Maechel et al. (2020) appear to be the first researchers who provided empirical evidence that change-oriented leadership predicted athlete leadership effectiveness. Interestingly, Maechel et al. (2020) also found that change-oriented leadership was the strongest correlate of relations-oriented leadership. The findings of the current study may be an indicator that change- and relations-oriented leadership are similar leadership behaviours as noted by the athletes in the cognitive interviews. Similar findings were found in the present study's EFA as items from both relations-oriented leadership and change-oriented leadership merged to form a single factor.

Moreover, the expert rating panel shared similar findings to the cognitive interviews, in which the panel experts were able to correctly identify task-oriented leadership and external-oriented leadership items but had difficulty identifying change-oriented and relations-oriented items. Although previous research suggests athletes' view change-oriented leadership as an important athlete leadership behaviour (Maechel et al. 2020), it is evident that discrepancies found in the present study (i.e., cognitive interviews and expert rating panel) raise questions as to whether the items measuring this factor are fully captured for an athlete population. Interestingly, Maechel and colleagues (2020) found that the inclusion of change-oriented leadership increased

model-fit compared to a three-factor model (e.g., task, relations and external). However, Maechel et al. used general statements in their study, while the current used more specific items to capture change-oriented leadership.

The EFA provided similar results as to the cognitive interviews and expert panel. Task-oriented leadership items and external-oriented leadership items for the most part retained their intended items. In contrast, relations-oriented leadership items and change-oriented leadership items were merged into a single factor. This result provided evidence that relations-oriented and change-oriented leadership may be conceptually similar due to their convergence onto a single factor. Maechel et al. (2020) noted that change-oriented leadership shares some aspects of motivational leadership (Fransen et al. 2014). However, motivational leadership does not fully encompass the entirety of change-oriented leadership (Maechel et al. 2020). Although Fransen et al. (2014) has shown motivational leadership to be empirically relevant in the sporting realm, perhaps the merger of relations- and change-oriented leadership into one factor is better conceptualized as social leadership due to the nature of its description (e.g., solving interpersonal conflicts, supporting teammates, involving teammates; Loughead et al., 2006). Further, the EFA also showed a fourth factor that combined items from relations-, change- and task-oriented leadership. Previous literature indicates this factor is similar to Chelladurai and Saleh's (1980) leadership behaviour of Positive Feedback from their LSS inventory. As such, the items from the SPLIT centred around leaders providing recognition to teammates and rewarding positive performance. Similarly, Chelladurai and Saleh described Positive Feedback as rewarding athletes and providing positive feedback for their efforts and performance.

Based upon the results from the EFA, a CFA was conducted that started from the premise of a four-factor model. However, once the CFA was completed, the best fitting model was a

three-factor solution which aligns with previous research that measured athlete leadership behaviours using a three-factor model (Loughead et al. 2006). The fourth factor, labeled recognition and rewards-oriented leadership, appeared to be conceptually related to Chelladurai and Saleh's (1980) leadership behaviour of Positive Feedback and was removed. Thus, the three-factor solution of task-, relations- and external-oriented leadership aligned with Loughead et al.'s (2006) conceptualization concerning athlete leadership. This finding is critical as the original conceptualization of a three-factor model has created the framework for understanding the leadership behaviours that athletes exhibit. Considering the fact that the SPLIT was modified from business literature, it is interesting that the final CFA aligned with original athlete leadership research, rather than the leadership behaviours from which the SPLIT was derived (Yukl, 2012). Although Maechel et al. (2020) found a stronger model fit with change-oriented leadership included in the leadership taxonomy (in addition to task-, relations-, and external-oriented leadership), the results of the present study point to relations- and change-oriented leadership items being similar in nature. Within the two dimensions of relations and change-oriented leadership, the behaviour of empowering teammates is seen throughout both sets of items. Empowering teammates, a behaviour within the definition of relations-oriented leadership parallels the behaviours of inspiring and motivating teammates, which may indicate a major similarity between the two leadership behaviours. For example, a relations-oriented item is: "*We take sufficient time to address each other's concerns"*, whereas a change-oriented item is: "*We help each other to correctly understand team dynamics"*. In order to understand the dynamics on a team, athlete leaders must be able to identify problematic situations that may arise and address them accordingly. Likewise, the notion of developing skills from the definition of relations-oriented leadership may be seen as similar to that of collective learning that is seen within

change-oriented leadership. For example, often times on a team, learning takes place during the development of new skills. In order to implement new ideas, a team must learn the foundation of these skills to be able to implement them within a game setting.

In general, many key observations were found in the first phase of the present study. Surprisingly, Grille and Kauffeld (2015) found strong psychometric properties using a four-factor model during the original development of the SPLIT. Yet, the present study showed support for a three-factor model when using the SPLIT in an athlete leadership context. Given that task and social factors provide the foundation for group dynamic research in sports teams (Carron et al. 1985), the inclusion of these factors withing the best fitting model was expected. Further, seeing that external leadership is an original athlete leader behaviour (Loughead et al., 2006), this was also expected to be included within the best fitting model. However, a key observation is the inclusion of networking within the description of external leadership. Given that networking is a critical skill seen within the organizational literature (Yukl et al., 2002), it is a rather new construct within the athlete leadership literature. Thus, the relevancy of networking for athlete leaders needs to be analyzed further to gain a better understanding of the dimension of external-oriented leadership. Finally, excluding change-oriented leadership questions the applicability of the SPLIT for athlete leaders.

The results of the second phase of the present study are encouraging. It is noted that all three of the athlete leadership factors had moderate correlations to each other. This result indicates that conceptually, each of the factors are measuring some aspect of leadership but the factors are not redundant with one another. This type of finding highlights that athlete leadership is a multifaceted construct. In fact, researchers have utilized a variety of inventories to assess athlete leadership. For example, Chelladurai and Saleh's (1980) Leadership Scale for Sport

(LSS) measures five behaviours; *Training and Instruction*, *Democratic Behaviour*, *Autocratic Behaviour, Social Support* and *Positive Feedback,* whereas the Differentiated Transformational Leadership Inventory (DTLI; Callow et al., 2009) measures behaviours such as; *Individualized Consideration, Inspirational Motivation, Intellectual Stimulation, Fostering Acceptance for Group Goals and Teamwork, High Performance Expectations*, *Appropriate Role Modeling* and *Contingent Reward*. Taken together, by showing that there are numerous athlete leadership behaviours aligns theoretically to Avolio's (1999) contention that effective leaders use a variety of leadership behaviours. Although, Avolio made this contention in regards to leadership in organizational settings, it would appear that the same premise is relevant within athlete leadership. As for the correlations between athlete leadership and cohesion, the results in the present study are similar to previous research findings. Vincer and Loughead (2010) found moderately strong relationships between four dimensions of the LSS and cohesion. In fact, the dimension of GI-T shared similar correlation coefficients to the results of the present study. Vincer and Loughead (2010) showed GI-T to have the strongest correlation to the dimensions of the LSS, a similar finding to the present study. Similarly, Callow et al. (2009) found that task cohesion in general had the strongest correlation to the athlete leadership behaviours measured by the Differentiated Transformational Leadership Inventory. The results from the present study coupled with those from previous research indicate that the athlete leadership-cohesion relationship is a robust one and that efforts to develop athlete leadership and in turn cohesion is important. In fact, Duguay et al. (2016) found that developing athlete leadership behaviours helped to positively influence the cohesiveness of a team. In particular, Duguay et al. (2016) found that on a team with high cohesiveness, developing athlete leader behaviours help to maintain high levels of cohesion with a team.

Limitations

While this study is one of the first to examine the validity of the SPLIT in an athlete leadership context, there are a few limitations that warrant discussion. First, the demographic sample used in the EFA and CFA may offer two limitations. The average age of the participants was higher than in previous athlete leadership research. Throughout the athlete leadership literature, studies have primarily used university aged (e.g., Burkett et al., 2014) or youth (e.g., Paradis & Loughead, 2012) participants, so this makes it more challenging to make comparisons based on age. Furthermore, the level of sport played by the participants also makes it more challenging to make comparisons to previous research. Some research uses similar level of sport (Callow et al., 2009), however, previous athlete leadership literature often uses intercollegiate or varsity level of athletes as participants (Loughead et al., 2006). That is, the current study had a more heterogenous sample than previous athlete leadership studies that can make direct comparisons difficult. Another potential limitation to the present study involves the countries of our participants. Prolific allows its users to select countries in which the participants are sampled from. Participants were selected from Canada, United States of America, United Kingdom, Australia, and New Zealand. Although the sample may be representative of the countries selected, having the ability to pick where are participants hinders the representative nature of this project. Another final limitation of the present study revolves around the recruitment process. In using a recruiting website, we were unable to recruit intact teams completing the questionnaires, thus, we could not complete team level analyses. Having the ability to run both individual and team level analyses would have provided comparable data to previous literature surrounding athlete leadership behaviours (Vincer & Loughead, 2012).

Future Directions

The results of this study provide many avenues for future shared athlete leadership research. Based on the results of the present study, it may be beneficial to develop a sport-specific inventory designed to assess shared athlete leadership. It was clear that athletes did not have a clear understanding of shared athlete leadership. Using qualitative methods (e.g., focus groups) may provide researchers with an in-depth assessment as to what shared athlete leadership means to athletes. Also, collaborating with athletes to better understand which leadership behaviours they believe are crucial for success will help provide more context to the field of athlete leadership. In doing so, this would help create a foundation to develop a measurement tool that is specific for shared athlete leadership. Seeing that transforming measurement tools does not always achieve strong psychometric results, developing a specific shared athlete leadership questionnaire will be a critical step to advance the literature in the area of athlete leadership.

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TABLES

Table 1

Frequency and Nature of Problems Experienced by Participants During Cognitive Interviews

	No Problems	Not Applicable	Different Question	Confusion	Missing	Repeated Question	Total Negative Response
Task-Oriented Items							
1. As a team, we clearly assign tasks. [a]	1	0	0	5	0	0	5
2. As a team, we clearly assign team-oriented tasks. [b]	5	0	0	1	0	0	1
3. As a team, we clearly communicate our expectations. [b]	5	0	0	1	0	0	1
4. As a team, we provide each other with work relevant information. [a]	2	0	0	4	0	0	4
5. As a team, we provide each other with game/practice relevant information. [b]	5	0	0	1	0	0	1
6. As a team, we ensure everyone knows their tasks. [a]	0	1	1	4	0	0	6
7. As a team, we ensure everyone knows their roles. [b]	5	0	0	1	0	0	1
8. As a team, we monitor goal achievement. [a]	4	0	0	0	0	2	2
9. As a team, we monitor the achievement of our goals. [a]	2	0	0	2	0	2	4
Relations-Oriented Items							
10. As a team, we take sufficient time to address each other's concerns. [a]	4	0	0	1	0	1	2
11. As a team, we recognize good performance. [a]	2	0	1	2	0	1	4
12. As a team, we acknowledge good performance. [a]	2	0	1	2	0	1	4
13. We promote team cohesion. [a]	4	0	1	1	0	0	2
14. We promote team chemistry. [a]	3	0	0	3	0	0	3
15. We support each other in handling conflicts within the team. [a]	4	0	0	1	0	1	2
16. We support each other in handling team conflicts. [a]	2	0	0	3	0	1	4
17. As a team, we never let each other down. [ac]	1	0	0	5	0	0	5
18. As a team, we always support each other. [b]	6	0	0	0	0	0	0
Change-Oriented Items							
19. We help each other to correctly understand ongoing processes in our team. [a]	1	0	0	3	0	2	5
20. We help each other to correctly understand team dynamics. [a]	4	0	0	1	0	1	2
21. As a team we help each other to learn from past events. [a]	4	0	0	1	0	1	2
22. As a team, we help each other to learn from past mistakes. [ac]	1	0	1	3	0	1	5
23. As a team, we help each other to correctly understand current company events. [ac]	0	1	1	4	0	0	6
24. As a team, we help each other to correctly understand the state of our team/current team issues. [a]	3	0	1	2	0	0	3
25. As a team, we can inspire each other for ideas. [a]	4	0	0	2	0	0	2
26. As a team, we look to each other for ideas/motivation. [a]	4	0	0	2	0	0	2
27. As a team, we support each other with the implementation of new ideas. [a]	4	0	0	1	0	1	2
External-Oriented Items							
28. We use networks to support our teams work.[a]	0	0	0	6	0	0	6
29. We use external resources to support our teams performance. [b]	5	0	0	1	0	0	1
30. We ensure that our team is supported with necessary resources to fulfil the task. [a]	3	0	0	2	0	1	3
31. As a team, we assist each other to network. [ac]	0	4	1	1	0	0	6

32.	We establish contacts with important experts valuable for our team. [a]	3	0	0	3	0	0	3
33.	We establish contacts with important experts to promote our team. [ac]	4	0	0	2	0	0	2
34.	As a team, we are open to external assistance in case of internal team problems. [a]	3	0	0	3	0	0	3

Note.

[a] Indicates items that are deemed acceptable for revisions due to receiving more than 2 negative responses.

[b] Indicates items that were not deemed acceptable for revisions due to receiving less than 2 negative responses.

[c] Indicates items that were removed after Stage 2: Cognitive Interviews.

Table 2

Frequency of Rating to the Items' Specified Behaviour and Mean Item Content Ratings and Validity Coefficients from Expert Rating Panel

		Very Poor	Poor	Moderate	Good	Excellent	*M*	*V*	95% CI
Task-Oriented Items									
1.	As a team, we clearly assign tasks.	0	0	0	2	8	4.8	0.95	0.83-0.98
2.	We clearly assign team-oriented tasks.	0	0	0	1	9	4.9	0.98	0.87-0.99
3.	As a team, we clearly assign task-oriented roles. [a]	0	0	0	1	9	4.9	0.97	0.87-0.99
4.	As a team, we clearly communicate our expectations.	0	1	2	0	7	4.3	0.82	0.68-0.91
5.	As a team, we hold each other accountable. [a]	0	2	2	4	2	3.2	0.56	0.41-0.70
6.	As a team, we provide each other with work relevant information.[*]	0	1	3	4	2	3.7	0.67	0.52-0.79
7.	As a team, we provide each other with game/practice relevant information.	0	0	3	2	5	4.2	0.8	0.65-0.89
8.	As a team, we provide each other with task relevant information. [a]	0	0	0	2	8	4.8	0.95	0.83-0.98
9.	As a team, we ensure everyone knows their tasks.	0	0	0	2	8	4.8	0.95	0.83-0.98
10.	As a team, we ensure everyone knows their roles.	0	0	0	3	7	4.6	0.90	0.78-0.96
11.	As a team, we monitor goal achievement.	0	0	0	2	8	4.7	0.94	0.82-0.98
12.	As a team, we monitor the achievement of our goals.	0	0	0	4	6	4.6	0.9	0.76-0.96
Relations-Oriented Items									
13.	As a team, we take sufficient time to address each other's concerns.[*]	1	1	2	3	3	3.6	0.65	0.49-0.77
14.	As a team, we take sufficient time to address each other's questions.[*a]	3	1	2	2	2	2.9	0.47	0.32-0.62
15.	As a team, we recognize good performance.[*]	3	3	1	2	1	2.4	0.36	0.23-0.51
16.	As a team, we acknowledge good performance.[*]	4	2	1	2	1	2.4	0.35	0.22-0.50
17.	We promote team cohesion.	0	1	0	3	6	4.4	0.85	0.70-0.92
18.	We promote team chemistry.	0	0	1	5	4	4.3	0.82	0.68-0.91
19.	We promote team harmony. [a]	0	0	1	1	8	4.7	0.92	0.80-0.97
20.	We support each other in handling conflicts within the team.	1	1	2	1	5	3.8	0.7	0.54-0.81
21.	We support each other in handling team conflicts.[*]	1	1	1	4	3	3.7	0.67	0.52-0.79
22.	As a team, we support each other.	0	0	1	5	4	4.3	0.82	0.68-0.91
Change-Oriented Items									
23.	We help each other to correctly understand ongoing processes in our team.[*]	1	4	2	3	0	2.7	0.42	0.28-0.57
24.	We help each other to correctly understand team dynamics.[*]	2	3	2	3	0	2.6	0.4	0.26-0.55
25.	We help each other in understanding team processes. [*a]	2	2	5	1	0	2.5	0.37	0.24-0.52
26.	As a team, we help each other to learn from past events.	0	0	3	5	2	3.9	0.72	0.57-0.83
27.	As a team, we help each other to correctly understand current team events.[*b]	3	3	4	0	0	2.1	0.27	0.16-0.42
28.	As a team, we help each other to correctly understand the state of our team.[*b]	3	3	2	1	1	2.4	0.35	0.22-0.50
29.	As a team, we can inspire each other for ideas. [b]	0	1	0	2	7	4.5	0.87	0.73-0.95
30.	As a team, we look to each other for motivation. [a]	1	0	1	1	7	4.3	0.82	0.68-0.91
31.	As a team, we support each other with the implementation of new ideas.	0	0	2	3	5	3.8	0.7	0.54-0.81
External-Oriented Items									
32.	We use external resources to support our team's work.	0	0	0	3	7	4.7	0.92	0.80-0.97

33.	We use external resources to support our team's performance.	0	0	0	2	8	4.8	0.95	0.83-0.98
34.	We ensure that our team is externally supported with necessary resources to satisfy team needs. [b]	0	0	0	1	9	4.9	0.97	0.87-0.99
35.	We ensure that our team is supported with necessary external resources to satisfy team needs. [a]	0	0	0	1	9	4.9	0.97	0.87-0.99
36.	As a team, we assist each other to develop external relationships valuable for our team.[a]	0	0	0	3	7	4.7	0.92	0.80-0.97
37.	We establish connections with outside experts valuable for our team. [b]	0	0	0	0	10	5	1	0.91-1
38.	As a team, we are open to external assistance. [b]	0	0	0	2	8	4.8	0.97	0.86-0.99

Note.

[*] Indicates item did not meet the required *V* Index score (*V*=0.7).

[a] Indicates a new item added after Stage 2: Cognitive Interviews.

[b] Indicates an item that was modified from its original version.

Table 3

Mean-Difference Effect Sizes for Expert Rating Panel

Item	Contrast 1	Contrast 2	Contrast 3
1. e	e-t (0.93)	e-r (0.97)	e-c (0.96)
2. r	r-t (-0.63)	r-c (0.14)	r-e (0.56)
3. c	c-t (0.62)	c-r (0.61)	c-e (0.84)
4. t	t-r (0.95)	t-c (0.97)	t-e (0.98)
5. c	c-t (-0.24)	c-r (0.08)	c-e (0.51)
6. t	t-r (0.94)	t-c (0.83)	t-e (0.98)
7. t	t-r (0.94)	t-c (0.96)	t-e (0.97)
8. t	t-r (0.94)	t-c (0.96)	t-e (0.97)
9. r	r-t (0.70)	r-c (0.78)	r-e (0.91)
10. t	t-r (0.94)	t-c (0.96)	t-e (0.98)
11. r	r-t (0.83)	r-c (0.85)	r-e (0.96)
12. c	c-t (0.84)	c-r (0.63)	c-e (0.92)
13. t	t-r (0.48)	t-c (0.46)	t-e (0.84)
14. e	e-t (0.98)	e-r (0.96)	e-c (0.97)
15. t	t-r (0.93)	t-c (0.86)	t-e (0.97)
16. t	t-r (0.84)	t-c (0.93)	t-e (0.97)
17. r	r-t (-0.47)	r-c (-0.18)	r-e (0.51)
18. r	r-t (-0.03)	r-c (-0.10)	r-e (0.64)
19. t	t-r (0.95)	t-c (0.95)	t-e (0.99)
20. e	e-t (0.95)	e-r (0.95)	e-c (0.95)
21. c	c-t (-0.35)	c-r (0.07)	c-e (0.56)
22. c	c-t (-0.42)	c-r (-0.05)	c-e (0.24)
23. r	r-t (0.07)	r-c (0.41)	r-e (0.48)
24. r	r-t (0.36)	r-c (0.82)	r-e (0.95)
25. e	e-t (0.92)	e-r (0.97)	e-c (0.97)
26. t	t-r (0.66)	t-c (0.57)	t-e (0.82)
27. t	t-r (0.72)	t-c (0.66)	t-e (0.90)
28. c	c-t (0.66)	c-r (0.72)	c-e (0.92)
29. t	t-r (0.52)	t-c (0.73)	t-e (0.89)
30. e	e-t (0.94)	e-r (0.99)	e-c (0.98)
31. c	c-t (-0.09)	c-r (-0.29)	c-e (0.65)
32. c	c-t (0.70)	c-r (0.60)	c-e (0.88)
33. r	r-t (0.23)	r-c (0.67)	r-e (0.78)
34. e	e-t (0.88)	e-r (0.93)	e-c (0.90)
35. r	r-t (0.81)	r-c (0.87)	r-e (0.95)
36. c	c-t (-0.33)	c-r (-0.04)	c-e (0.65)
37. r	r-t (0.27)	r-c (0.37)	r-e (0.78)
38. e	e-t (0.95)	e-r (0.98)	e-c (0.89)

Note.

Letters indicate the subdimensions that each item was designed to measure; t., task-oriented leadership, r, relations-oriented leadership, c, change-oriented leadership and e, external-oriented leadership.

Table 4

Factor Loadings of the Exploratory Factor Analysis

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness
TOL5	1.119					0.331
TOL9	0.936					0.377
TOL1	0.855					0.608
TOL3	0.781					0.351
TOL8	0.657					0.378
TOL4	0.647					0.508
COL2	0.574					0.484
TOL6	0.436					1.150
TOL2	0.434			0.513		0.818
TOL10	0.432					0.775
ROL6		0.961				0.504
ROL8		0.956				0.448
ROL7		0.792				0.512
ROL10		0.670				0.463
COL7		0.596				0.454
ROL3		0.563				0.501
ROL5		0.500				0.616
COL8		0.483				0.404
ROL9		0.482				1.051
COL9		0.441				0.397
ROL2		0.407				0.537
EOL5			1.143			0.781
EOL4			1.021			0.523
EOL3			0.958			0.632
EOL6			0.804			0.840
EOL7			0.787			0.800
EOL2			0.515		0.587	0.556
ROL1				0.638		0.354
ROL4				0.546		0.310
COL1				0.535		0.443
TOL7				0.495		0.588
EOL1						0.674
COL3						0.594
COL4						0.382
COL5						0.433
TOL11						0.517
COL6						0.647
TOL12						0.525

Note.

Item abbreviations are Task-oriented leadership (TOL), Relations-oriented leadership (ROL), Change-oriented leadership (COL) and External-oriented leadership (EOL).

Table 5

Items Removed to Create Best Fitting Model

TOL6	As a team, we hold each other accountable.	Modified Item
TOL10	As a team, we provide each other with work relevant information.	Original Item
COL2	We help each other to correctly understand ongoing processes in our team.	Original Item
TOL8	As a team, we ensure everyone knows their roles.	Modified Item
ROL6	We support each other in handling conflicts within the team.	Original Item
ROL7	We promote team chemistry.	Modified Item
ROL3	We promote team harmony.	Modified Item
ROL9	As a team, we support each other.	Modified Item
ROL2	We promote team cohesion.	Original Item
COL9	We help each other in understanding team processes.	Modified Item
EOL6	As a team, we assist each other to develop external relationships valuable for our team.	Modified Item
EOL7	As a team, we are open to external assistance.	Modified Item
ROL1	As a team, we recognize good performance.	Modified Item
ROL4	As a team, we acknowledge good performance.	Modified Item
COL1	As a team, we look to each other for motivation.	Modified Item
TOL7	As a team, we monitor the achievement of our goals.	Modified Item

Table 6

Descriptive Statistics of the Best Fitting Model from the CFA

	M	SD
TOL5: As a team, we clearly assign tasks.	4.51	1.19
TOL9: As a team, we clearly assign task-oriented roles.	4.54	1.12
TOL1: As a team, we clearly assign team-oriented tasks.	4.51	1.12
TOL3: As a team, we ensure everyone knows their tasks.	4.85	1.10
TOL4: As a team. We provide each other with task relevant information.	4.56	1.19
ROL1: As a team, we recognize good performance.	5.26	0.88
COL7: As a team, we help each other to correctly understand team dynamics.	4.33	1.13
ROL5: As a team, we take sufficient time to address each other's questions.	4.55	1.19
COL8: As a team, we support each other with the implementation of new ideas.	4.42	1.08
ROL8: As a team, we support each other in handling team conflicts.	4.64	1.12
EOL5: As a team, we establish connections with outside experts valuable for our team.	3.37	1.54
EOL4: As a team, we use external resources to support our team's performance.	3.86	1.39
EOL3: AS a team, we use external resources to support our team's work.	3.82	1.40

Table 7

Correlations Between Athlete Leader Behaviours and Cohesion

Variable		TOL	ROL	EOL	ATGT	ATGS	GIT	GIS
1. TOL	Pearson's r	—						
	p-value	—						
2. ROL	Pearson's r	0.733***	—					
	p-value	< .001	—					
3. EOL	Pearson's r	0.531***	0.600***	—				
	p-value	< .001	< .001	—				
4. ATGT	Pearson's r	0.436***	0.547***	0.291***	—			
	p-value	< .001	< .001	< .001	—			
5. ATGS	Pearson's r	0.324***	0.421***	0.262**	0.557***	—		
	p-value	< .001	< .001	0.001	< .001	—		
6. GIT	Pearson's r	0.611***	0.749***	0.485***	0.662***	0.564***	—	
	p-value	< .001	< .001	< .001	< .001	< .001	—	
7. GIS	Pearson's r	0.391***	0.491***	0.384***	0.438***	0.612***	0.571***	—
	p-value	< .001	< .001	< .001	< .001	< .001	< .001	—

* $p < .05$, ** $p < .01$, *** $p < .001$

LITERATURE REVIEW

The purpose of the proposed study is to examine the psychometric properties of the Shared Professional Leadership Inventory for Teams (SPLIT; Grille & Kauffeld, 2015), with a sample of athletes. The instrument was originally developed for the use in organizational groups. In particular, the proposed study will test the factorial and concurrent validity of the SPLIT in the context of athlete leadership. This literature review will focus on the areas of athlete leadership, shared athlete leadership, and cohesion.

Athlete Leadership

The construct of athlete leadership will be defined and the characteristics of athlete leadership will be outlined. Next, three conceptual models will be described in regard to athlete leadership behaviours. Finally, two common questionnaires, and a third measurement tool will be reviewed.

Defining Athlete Leadership

Glenn and Horn (1993) suggested that in addition to the coach, a team requires one or two athletes to provide leadership to their teammates. Based on this suggestion, it was assumed that athletes are needed to fulfill leadership roles within a team. Pearce and Conger (2003) argued that leadership is not determined by positions of authority, but how individuals can influence their team. This notion that athletes influence each other became the theoretical underpinnings of the construct known as athlete leadership. Before addressing some of the current theoretical underpinnings of athlete leadership, it is important to note that early theorizing (Cotterill, 2013; Glenn & Horn, 1993; Loughead et al., 2006) suggested that teams used a vertical, top-down approach, suggesting that only designated captains or assistant captains provided leadership to a team. This vertical, top-down approach to athlete leadership was

reinforced by Gould et al. (1987) who found that coaches believed having athletes take on leadership roles was crucial for effective team performance, highlighting the need for designated leaders on a team.

This vertical, top-down approach to athlete leadership was a prevailing theory until the turn of the century when Loughead et al. (2006) advanced a definition of athlete leadership, referring to it as "an athlete occupying a formal or informal role within a team who influences a group of team members to achieve a common goal" (Loughead et al., 2006, p. 143). This definition views athlete leadership as a horizontal structure where a group utilizes formal and informal athlete leaders in order to contribute to team success (Loughead et al., 2006). This definition was formulated using Northouse's (2001) conceptualization of leadership where he identified four critical characteristics of leadership. First, defining leadership as a *process* indicates that it is not a trait or characteristic but rather a series of events that occurs between individuals within a group. Second, leadership involves influence. Leadership is concerned with how individuals affect others and the communication that occurs between these individuals. Third, leadership occurs in groups. A key component of leadership is that it involves influencing a group of individuals towards a common goal. Fourth, leadership contains the attainment of common goals in that individuals within the group have a mutual purpose they are working towards. In turn, it increases the likelihood that individuals will work together to achieve a common good. In addition to these four characteristics from Northouse, a fifth inherent characteristic of the athlete leadership definition is that it is a shared endeavor (Loughead, 2017). Pearce and Conger (2003) suggested that leadership is "a dynamic, interactive process among individuals in groups for which the objective is to lead one another to the achievement of group or organization goals or both" (p. 1).

Consequently, Loughead et al.'s (2006) definition of athlete leadership suggests that there are multiple athletes performing leadership. The definition also highlights the roles of two distinct types of leaders that are essential for team functioning. A formal athlete leader refers to an individual who has been designated to a leadership role (e.g., captain or assistant captain) by the organization (e.g., coach or management) or team (e.g., team vote; Loughead et al., 2006). An informal athlete leader emerges as a result of the interactions that occur within the group (Loughead et al., 2006). As such, informal athlete leadership roles are not designated by the organization or coach, and do not have an official role within the team. Given this conceptualization, it can be assumed that athlete leadership is available to every team member (Loughead & Hardy, 2005, Loughead, 2017).

The definition of athlete leadership advanced by Loughead et al. (2006) assumes that leadership is a collective process where a set of functions is carried out by the group (Gibb, 1954). The importance of leadership being viewed as a collective process was highlighted by DeRue and Ashford (2010) who found that leadership was a dynamic process shaped by the interactions of multiple, interdependent individuals. As a result, the definition of athlete leadership inherently suggests that leadership is a shared phenomenon (Loughead, 2006). Thus, Loughead et al. (2021) revised a definition of shared athlete leadership, from the original definition of athlete leadership to suggest that shared athlete leadership is an emergent and dynamic team process consisting of mutual influence and shared responsibility that is shared amongst team members, who lead each other toward the achievement of team goals (Loughead et al., 2021). From this definition, Loughead et al. (2021) highlighted four characteristics involved in shared athlete leadership. The first is lateral influence whereby formal and informal leadership roles are able to impact one another. The second characteristic is that a sport team is

an emergent property, meaning it is shared collectively amongst teammates. The third characteristics revolves around the distribution of influence, where leadership responsibility does not fall on one single leader (e.g., captain), but is spread amongst a group of team members. The final characteristic notes that shared athlete leadership is dynamic in nature. Taken together, researchers have shown that shared athlete leadership is an ever-changing, dynamic process that is crucial for team success by increasing cohesion, resiliency, and performance (Fransen et al., 2014; Loughead et al., 2016).

Conceptual Models of Athlete Leadership

In the field of athlete leadership, two conceptual models have typically been used to guide research. In particular, the Multidimensional Model of Leadership (MML; Chelladurai, 2007) and the Full Range Model of Leadership (FRML; Avolio, 1999). More recently, Loughead et al. (2021) advanced a working model to further the understanding of athlete leadership in sport. Each of these three models will be discussed below.

Chelladurai's (2007) MML was originally advanced in order to study sport coaching leadership (see Figure 1). However, the model's applicability was expanded to examine athlete leadership (Chelladurai, 2007). The MML is a linear model composed of antecedents, throughputs, and outcomes. Within the model, the antecedents include three aspects that directly influence the throughputs. The antecedents consist of *Leader* (e.g., personality, age, gender, experience), *Member* (e.g., gender, age, personality, ability), and *Situational* (e.g., environmental factors, norms, groups goals, task type, group compositions) factors. The MML also includes three throughputs that are operationalized as Leader behaviour; *Required Behaviours* (i.e., actions that are needed in certain situations and are directly influenced by the aforementioned member and/or situational antecedents), *Preferred Behaviours* (i.e., actions that individuals

desire to see from their leaders), and *Perceived p Behaviours* (i.e., influenced by member characteristics and/or situational characteristics). Perceived behaviours are composed of actual behaviours which are influenced by leader characteristics, as well as required and preferred leader behaviours.

The Full Range Model of Leadership (FRML; Avolio, 1999) was originally advanced to examine leadership behaviours within organizational psychology (see Figure 2). Similar to the MML (Chelladurai, 2007), it has been utilized to examine athlete leadership (Avolio, 1999). The leadership styles are separated into three broad categories, ranging from ineffective to effective. The least effective and most passive form of leadership is known as Laissez-faire leadership, in which the leader avoids taking action. Second, a more effective and active form of leadership is known as Transactional leadership, whereby the leader focuses on exchanges that occur between the followers to meet own self-interests. Transactional leadership behaviours include *Contingent Rewards* (i.e., where a leader clarifies to the follower what task to complete in order to be compensated), *Management-by-Exception Active* (i.e., where a leader monitors performance and makes corrections to follower performance), and *Management-by-Exception Passive* (i.e., where a leader is known to wait for problems to occur prior to making the corrections of followers). The third, and most effective and active form of leadership behaviour is transformational leadership. Transformational leadership is an expansion of transactional leadership, where the leader moves beyond self-interest, towards the collective interests of a group, while performing four categories of behaviours (Bass, 1985). Transformational leadership behaviours consist of what Bass (1985) labeled the four I's: *Individualized Consideration, Idealized Influence, Inspirational Motivation,* and *Intellectual Stimulation*. Further advancement by Podsakoff et al. (1990) led to the addition of three other transformational leader behaviours; articulating a vison,

providing an appropriate model, and fostering acceptance of group goals. In summary, research has shown that the most effective leaders often use both transactional and transformational leadership behaviours (Avolio, 1999).

Over the last 20 years, the MML (Chelladurai, 2007) and FRML (Avolio, 1999) have been instrumental in advancing athlete leadership research, however both conceptualize athlete leadership at the dyadic level. That is, both the MML and FRML explain athlete's leadership in relation to teammates but does not include the influence at a team level. In response to these shortcomings, Loughead et al. (2021) put forward a working model of athlete leadership that conceptualizes athlete leadership based upon the current literature. In using an ecological perspective, Loughead et al. argued that the display of athlete leader behaviours occurs as a result of interactions between the individual and situation. To this end, Loughead et al. incorporated the MML and FRML to depict a model that combined both individual and team level factors to achieve effective leadership. The central component of the working model views athlete leadership as a shared phenomenon. Loughead et al. categorizes three levels of influence on athlete leaders: psychological (e.g., characteristics and psychological factors of athlete leaders, teammates and coaches at an individual level), social (e.g., situational characteristics, team level outcomes), and organizational (e.g., team culture, team characteristics) (See Figure 3).

Measuring Athlete Leadership

In order to test relationships within the MML (Chelladurai, 2007) and FRML (Avolio, 1999), researchers in the field of athlete leadership have primarily used two questionnaires to assess leadership behaviours used by athlete leaders. In regard to the MML, the Leadership Scale for Sports (LSS; Chelladurai & Saleh, 1990) was developed for the purpose of measuring coaches' leadership behaviours in a sport setting. It has since been adapted to assess athlete

leader behaviours (Loughead & Hardy, 2005; Vincer & Loughead, 2010; Paradis & Loughead, 2012), by modifying the stem from *My coach* to *My athlete leader(s)*. In total, the LSS contains 40 items assessing five different leader behaviours that includes; *Training and Instruction*, (e.g., athlete leader behaviours targeted towards teaching the skills and tactics of the sport to improve team performance), *Democratic Behaviour* (e.g., the degree that an athlete leader includes other teammates in making decisions that impact the team, *Autocratic Behaviour* (e.g., the degree that an athlete leader makes decisions independently of the team), *Social Support* (e.g., the degree in which an athlete leader provides support to teammates away from the sport), and *Positive Feedback* (e.g., the degree in which a leader provides positive reinforcement and encourages teammates to perform at a high level). The LSS is measured on a 5-point Likert scale, from 1 (*never*) to 5 (*always*). The LSS has been shown to be a valid and reliable measure of athlete leadership behaviours. Vincer and Loughead (2010) tested factorial validity of the LSS on athlete leaders, using Hu and Bentler's (1999) psychometric criteria (i.e., Comparative Fit Index and Tucker-Lewis Index close to .95 and Root Mean Square Error of Approximation close or lower than .06). The Comparative Fit Index (CFI) reported was .99, Tucker-Lewis Index (TLI) was .98, and the Root Mean Square Error of Approximation (RMSEA) was .05 indicating a reasonably good fit to the data.

In reference to the FRML (Avolio, 1999), the majority of research has utilized the Differentiated Transformational Leadership Inventory (DTLI; Callow et al., 2009) to measure aspects of transformational and transactional forms of athlete leadership. Callow et al. (2009) developed the DTLI using items from Podsakoff et al.'s (1990) Transformational Leadership Inventory (TLI) and Bass and Avolio's (2000) Multifactor Leadership Questionnaire-5x (MLQ-5x). In total, Callow et al. (2009) created 31 items measuring seven leadership behaviours. More

specifically, the DTLI consists of six transformational leadership behaviours and one transactional leadership behaviour. The transformational leader behaviours include *Individual Consideration* (e.g., the degree to which an athlete leader promotes teammate development through coaching and compassion), *Inspirational Motivation* (e.g., the degree that athlete leaders convey optimism and enthusiasm, while adopting a shared vision of the team), *Intellectual Stimulation* (e.g., the degree to which an athlete leader promotes creativity and problem solving, while experimenting with new tactics), *Fostering Acceptance of Group Goals and Promoting Teamwork* (e.g., the degree to which an athlete leader promotes individual and team goal-setting to increase team performance), *High-Performance Expectations* (e.g., promoting the expectation of high-level performance and excellence within a team), and *Appropriate Role Modelling* (e.g., the extent in which a leader sets a good example during play and away from sport for teammates). The DTLI also measures one transactional leader behaviour; *Contingent Reward* (e.g., providing positive reinforcements when teammates perform to a specific standard during practices and games). The DTLI is measured on a 5-point Likert scale; 1 (*not at all*) to 5 (*all of the time*). Callow et al. (2009) have deemed the DTLI to be valid based on Hu and Bentler's (1999) criteria by reporting a CFI of .98, a RMSEA of .05, and a Standardized Root Mean Square Residual (SRMR) of .06.

Although the LSS (Chelladurai & Saleh, 1980) and the DTLI (Callow et al., 2009) are frequently used for measuring athlete leader behaviours, another quantitative measure has been used to measure athlete leadership. Unlike the LSS and DTLI, the social network analysis (SNA) approach examines relationships between individuals and in this case between teammates. Social networks are composed of a set of network members (nodes) that are connected by one or more types of relations (ties) (Wasserman & Faust, 1994). SNA is a diverse measurement tool, seeing

that the structure and properties of networks can be assessed at various levels: actor level, dyad, and triad level, subgroup level, and/or network level (Prell, 2012). The resulting social networks are often presented in graphical form (e.g., sociogram) that identifies, measures, and compares patterns within a network (Martínez-López et al., 2009). Within the field of athlete leadership, the results of an SNA are often presented in a sociogram showing the social links that teammates have to one another. For instance, SNA allows researchers to understand and measure the relationships between team members (e.g., cohesion, leadership, in-game tactics) and individual-level attributes (e.g., age, playing position, leadership status) (Lusher et al., 2010). One benefit of using SNA is that it can measure athlete leadership as a shared phenomenon through statistics such as degree centrality (individual level), degree centralization (e.g., network level), and network density (e.g., network level) (Gockel & Werth, 2010). For instance, a node (e.g., athlete leader) with high indegree centrality would be interpreted as a player that teammates look to for leadership. A high degree of network centralization occurs when leadership influence revolves around one player, whereas a low degree of network centralization occurs when leadership is a shared amongst multiple team members (Gockel & Werth, 2010). When measuring shared athlete leadership, researchers often use roster-based questionnaires to assess the leadership that each athlete provides to the team. By using roster-based questionnaires to collect data, researchers are able to obtain a complete view of leadership as teammates rate the frequency in which they look to all other players for leadership.

Cohesion

The construct of cohesion will be defined and its characteristics will be reviewed. Further, the conceptual model of cohesion will be explored, followed by an examination of a widely accepted measurement tool for cohesion. Finally, a review of previous literature will

occur. The relationship between athlete leadership and cohesion will be highlighted using various measurement tools.

Defining Cohesion

Since the 1930's, areas such as sociology, counselling psychology, social psychology, organizational psychology, sport psychology, and military psychology have highlighted the importance of individuals being a member of a group. Lewin (1935) advanced the term group dynamics, in which two fundamental processes occur in a group: cohesion and locomotion. According to Lewin, cohesion revolves around the development and maintenance of a group, whereas locomotion is the objective that a group wishes to achieve. Cattell (1948) supported the notion of two processes occurring within a group, and further suggested that the cohesion and locomotion are random. Thus, without group maintenance, locomotion cannot occur. Carron (1982) noted that the most basic form of cohesion is the tendency to stick together and remain united, which inherently suggests cohesiveness directly impacts group maintenance and indirectly relates to locomotion (Carron et al., 1985). For that reason, some authors have suggested cohesion is the most important small group variable (Lott & Lott, 1965).

Given the importance of cohesion, authors have attempted to define it, with the earliest definition suggesting cohesion is "the total field of forces that act on members to remain in the group" (Festinger et al., 1950, p. 164). This definition indicates cohesion is a result of an individual and the forces that attract an individual to remain with a group. Another critical aspect of the definition suggests that cohesion is the result of numerous factors that attract people to a group. Later that year, Festinger (1950) reinterpreted his original definition based on the idea that the forces on a group depend on; the attractiveness or unattractiveness of the group, members in the group and/or the activities in which the group participates in, suggesting cohesion is "the

resultant of all the forces acting on members to remain in a group" (p. 274). Festinger (1950) suggested that if the attraction to the group is zero, no forces will pressure members to remain in a group, but if the forces to remain in a group increase than members will feel pressure to remain. Consequently, Gross and Martin (1952) challenged the Festinger (1950) definition as it failed to consider the group as a whole and argued that cohesion is more about the resistance of a group to disruptive forces.

Seeing the limitations of previous definitions, Carron et al. (1982) advanced what is considered to be the most widely accepted definition of cohesion used in sport research (Loughead & Hardy, 2006). Carron et al. (1982) noted that every group has a goal or objective, which is imperative in the development of the group. This viewpoint suggests members stick together as a unit to achieve a common goal, thus, the gold-standard definition of cohesion suggests the construct is "a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives" (Carron et al., 1982, p. 124). Carron et al. (1998) later revised the original definition to include an affective component by stating cohesion to be "a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (p. 213). The revised definition suggested four characteristics of cohesion. The first characteristic identifies the idea that multiple factors impact a group to remain united, rather than the attractiveness to the group, and means control. Further, the second characteristic of Carron et al.'s. (1998) definition is the notion that cohesion is dynamic in nature, such that it is not a fixed trait, and that factors can changed over time to impact the unity of a group. The third characteristic is the instrumental nature of groups. The authors state that all groups form for a specific purpose, with an objective in mind to fulfil the

needs of participants. Finally, the fourth characteristic of cohesion is the inclusion of an affective component. This suggests that social interactions within a group may already exist or develop over time, regardless of the orientation of the group (e.g., task-oriented).

Conceptual Model of Cohesion

Carron et al. (1985) created a conceptual model for cohesion based on the definition put forth by Carron et al. (1982). Prior to developing the conceptual model, Carron et al. (1982) noted three fundamental assumptions were used in the foundation of the conceptual model of cohesion. The basis of the model used Bandura's (1986) Social Cognition Theory (SCT), in which the group property, cohesion, can be assessed through the perceptions of individual group members. From SCT, Carron et al. (1998) believe that a group has observable properties (e.g., structure, relationships) where members experience social situations and develop a set of beliefs towards a group. As a member forms a social perception towards a group, estimations of the group unity can occur, and cohesion can be measured. Although a major issue in group dynamics literature has been the lack of clarity between the group and the individual (Cattell, 1948), Carron et al.'s (1998) second assumption suggests that the cognitions that each group member holds in relation to the cohesiveness of a group is related to the totality and the manner in which a group satisfies personal needs and goals. In doing so, the authors describe two categories of social cognition; *Group Integration* (e.g., individual's perceptions of closeness, similarity and bonding within a team) and *Individual Attractions to the Group* (e.g., individual's perceptions of personal goals acting to stay in the group, and personal feelings about the group). The final assumption noted by Carron et al. (1998) is based off the need to articulate the difference between task and social orientations of groups (Festinger et al., 1950). In order to differentiate between the two categories, Carron et al. (1998) advanced a general definition of *task-*

orientation (i.e., general orientation or motivation towards achieving group goals) *and social-orientation* (e.g., general orientation or motivation toward developing and maintaining social relationships within a group) as two fundamental group perceptions.

Based on the three assumptions, Carron et al.'s (1985) model advocated for the differentiation of the individual and the group, as well as task versus social distinctions. In order to disassociate the individual and the group, Carron et al. (1985) created two categories. *Individual Attractions to the Group* (ATG; e.g., a member's personal attraction to the group) and *Group Integration* (GI; e.g., a member's perception of the group as a totality). The two main categories are divided into four subsections, seeing that members' perceptions of the group and the perceptions of the group's attraction can revolve around a task or social foundation. Thus creating *Individual Attractions to Group-Task* (ATG-T; e.g. individual's perceptions of personal involvement in task aspects of a group), *Individual Attractions to Group-Social* (ATG-S; e.g., individual's perceptions of involvement in social aspects of a group), *Group Integration-Task* (GI-T; e.g., individual's perceptions of the degree of unity within a group in regards to task aspects) and *Group Integration-Social* (GI-S; e.g., individuals perceptions of the degree of unity within a group in regards to social aspects). Within the model, Group Integration represents the closeness, similarity and bonding of a group as a whole. Individual Attractions to Group represents the interaction of motives pushing the individual to remain in the group. Research has shown that a crucial aspect of development and maintenance is social relations that occur within members of a group. In contrast, task orientation is critical for pushing a group to achieving its goals over the course of time.

Measurement of Cohesion

Following Carron et al.'s (1985) conceptualization of cohesion, the authors also developed the Group Environment Questionnaire (GEQ) to assess each of the four dimensions of cohesion (e.g., ATG-T, ATG-S, GI-T, GI-S). According to Eys et al. (2007), the GEQ is the most widely used inventory to assess cohesion in sport. The GEQ is an 18-item inventory that measures each item on a 9-point Likert scale, from 1 (*strongly disagree*) to 9 (*strongly agree*) with higher scores representing stronger perceptions of cohesion. The cohesion dimension of ATG-T (e.g., This team gives me enough opportunities to improve my personal performance) is represented by four items. ATG-S (e.g., Some of my best friends are on this team) is composed of five items. GI-T (e.g., Our team is united in trying to reach its goals for performance) is assessed by five items, and lastly, GI-S (e.g., Members of our team would like to spend time together in the off season) is represented by four items. Carron et al. (1985) reported that the GEQ had strong content validity, however, the authors noted a mixed review in regard to factorial validity. Schultz et al. (1994) found a poor fit (e.g., extremely high ratio of chi-square to degrees of freedom $\chi^2/df = 4.6$) based on Carmines and McIver's (1981) acceptable value of 2.0, and found Bollen's (D_2 =.84) to be well below the recommended value of .90 (Bentler, 1990). Meanwhile, Li and Harmer (1996) found an adequate factorial validity (e.g., χ^2/df values ranged from 2.89 to 2.13 in a first order model and 2.19 to 2.12 in a second-order model. Carron et al. (1985) reported suitable Cronbach's alphas (α) for ATG-T, α=.75; GI-T, α=.70; and GI-S; α= .76, while Li and Harmer (1996) reported ATG-S, α=.74, demonstrating that the GEQ has good internal consistency based on Nunnally (1978) recommendations (α>.70) for adequate internal consistency. However, it should be noted that some researchers have reported less than ideal internal consistencies (e.g., Jowett & Chaundy, 2004; Schultz et al., 1994; Jowett & Chaundy, 2004). This is likely due to the fact that 12 of the 18 items of the GEQ are negatively worded

(Eys et al., 2007). According to Nunnally (1978), negative worded items could invalidate the results from psychometric testing. When Eys et al. (2007) transformed all of the items of the GEQ into positively worded items and tested the internal consistency. In this study, Eys et al. compared the internal consistencies between the original version of the GEQ (containing 12 negative worded items) and the modified version of the GEQ contained all positively worded items. The results showed that the internal consistency was significantly better for ATG-S, GI-T, and GI-S for the positively worded version of the GEQ, with only ATG-T being the same between the two inventories.

Research on Athlete Leadership and Its Correlates

Loughead (2017) suggested that when examining athlete leadership, cohesion has been the most common correlate studied. This section highlights cohesion as a critical variable in athlete leadership research. Given the amount of research on the relationship between athlete leadership and cohesion, the following review of literature will analyze the leadership-cohesion relationship through various quantitative and qualitative approaches. A majority of athlete leadership research uses the DTLI (Callow et al., 2009), LSS (Chelladurai & Saleh, 1990) to assess athlete leadership and GEQ (Carron et al., 1985) to measure cohesion. The research section will review the DTLI and cohesion, LSS and cohesion, other measurement tools that have assessed athlete leadership and cohesion. This section of the literature review will conclude with an examination of qualitative research examining athlete leadership and cohesion.

Athlete Leadership and Cohesion

DTLI and Cohesion

Researchers have found a positive association between many of the athlete leadership behaviours, as measured by the DTLI (Callow et al., 2009), and cohesion. Callow et al. (2009)

were some of the first researchers to utilize the DTLI to measure athlete leadership in relation to cohesion. The sample consisted of 309 club-level ultimate frisbee players who completed both the DTLI and GEQ (Carron et al., 1985). In their first set of analysis, the authors examined the factorial validity of the DTLI and found support for a seven-factor model. In their second analysis, the authors tested the strength of relationship between the DTLI and cohesion. The results showed that the DTLI dimensions of fostering acceptance of group goals and promoting teamwork, high performance expectation and individual consideration predicted task cohesion. Also, fostering acceptance of group goals and promoting teamwork predicted social cohesion. One result that was unexpected was the lack of relationship between intellectual stimulation and cohesion. Overall, this study helped confirm the relationship between the athlete leadership, as assessed by the DTLI, and cohesion.

When a relationship between two variables is found (i.e., athlete leadership and cohesion), researchers often look to identify other variables that may influence that relationship. For instance, the next progression in confirming a relationship is the identifying of mediating variables. MacKinnon (2011) notes that a mediator variable becomes relevant once two variables are related, and one variable (i.e., leadership) causes a mediating variable, which then causes a dependent variable (i.e., cohesion). In social science research, when a mediator is found within a relationship, that variable is often the emphasis of development.

Using a mediational framework, Smith et al. (2012) examined the relationship between the DTLI (Callow et al., 2009) and task cohesion in sport with intrateam communication serving as the mediating variable. The authors hypothesized intrateam communication is a crucial skill for teams to possess to optimize team performance. Smith et al. (2012) hypothesized that communication would mediate the relationship between the athlete leadership behaviours (as

measured by the DTLI) of individual consideration, fostering acceptance of group goals and teamwork and the outcome of task cohesion. Smith et al. (2012) recruited 199 ultimate frisbee athletes competing in the British Universities and Colleges Sport Indoor National Finals and asked the participants to complete the DTLI to assess athlete leadership, the GEQ to measure cohesion, and the Scale for Effective Communication in Team Sports-British (SECTS-B; Sullivan & Callow, 2005) to assess communication. Similar to the results from Callow et al. (2009), this study demonstrated a positive relationship between the athlete leadership behaviours (i.e., individual consideration, fostering acceptance of group goals and teamwork) and task cohesion. This is a critical finding, as the authors further identified a positive relationship between athlete leadership and cohesion. Furthermore, the authors found that communication served as a partial mediator between the athlete leadership behaviours of individual consideration and fostering acceptance of group goals and task cohesion. The findings help researchers to identify a variable (i.e., intrateam communication) that should be targeted in leadership development programs.

Similar to Smith et al. (2012), Bosselut et al. (2018) examined the mediating role of interactional justice in the athlete leadership-cohesion relationship. The term justice is often referred to as fairness, thus, interactional justice is more frequently described as the treatment followers receive when a decision by leaders is made. Interactional justice is often dependent on a leadership behaviour, and transformational leadership behaviours are likely to positively influence the variable of interactional justice. For the purpose of this study, the authors highlighted two sub-dimensions of interactional justice: informational (i.e., justify the fairness of the decisions made) and interpersonal (i.e., establish relationships with followers) justice. First, the authors hypothesized that all of the DTLI (Callow et al., 2009) athlete leadership behaviours

would be positively related to the four dimensions of cohesion, as assessed by the GEQ (Carron et al., 1985). Further, the authors anticipated interactional justice would mediate this relationship. To test their hypotheses, 315 athletes from 25 teams (e.g., baseball, soccer, handball, rugby, and volleyball), playing at various levels of sport (i.e., district, regional, national) in France completed translated versions of the DTLI, GEQ, and Colquitt's (2001) inventory to measure justice. The authors examined the relationships at both an individual and team level. Overall, the results indicated that the variable of interactional justice was a mediator in the athlete leadership-cohesion relationship. Based on the results, interpersonal justice was found to be related to social cohesion, whereas informational justice was found to be related with task cohesion. This is likely due to specific characteristics of each type of justice (i.e., informational justice revolves around truthfulness and justification which relates to qualities of task cohesion, whereas interpersonal justice revolves around respect and propriety, which relates to qualities of social cohesion). The authors also found that the mediators were dependent on the level of interaction (i.e., individual or team). They found that at an individual level, all of the DTLI leadership behaviours were related to task cohesion with informational justice serving as a mediator, and with the exception of appropriate role modelling, all of the leadership behaviours were also related to social cohesion with interpersonal justice serving as a mediator. At a team level, no evidence was found for interactional justice being a mediating variable within the athlete leadership-cohesion relationship. Although the DTLI athlete leadership behaviours were still related to cohesion, only intellectual stimulation and social cohesion were found to be mediated by informational justice. The authors attributed the difference to the athletes' perceptions of leadership behaviours. The authors attenuated the difference in individual versus team level results to multiple other

variables impacting the athletes' perceptions of rating their team, whereas at an individual level, athletes were able to rate their perceptions of singular leaders.

LSS and Cohesion

In addition to the DTLI (Callow et al., 2009), the relationship between athlete leadership behaviours and cohesion has been examined using the LSS (Chelladurai & Saleh, 1980). Using a sample of intercollegiate athletes, Vincer and Loughead (2010) administered the LSS and GEQ (Carron et al., 1985) to 312 athletes from 25 varsity and club level teams (e.g., ice hockey, soccer, volleyball and basketball). Similar to Callow et al. (2009), Vincer and Loughead found that the athlete leadership behaviours of Training and Instruction, Social Support and Democratic Behaviour were related to cohesion. This study was the first to confirm the relationship between athlete leadership and cohesion using the LSS. The results showing a positive relationship between these two variables allowed for the examination of other variables that may influence the nature of this relationship.

One shortcoming of the Vincer and Loughead (2010) study was that both formal and informal athlete leaders were examined together. To overcome this shortcoming, Paradis and Loughead (2012) surveyed youth soccer and basketball athletes and had them rate separately formal and informal athlete leaders in relation to LSS (Chelladurai & Saleh, 1980) along with assessing task and social cohesion. In doing so, the authors introduced a moderating variable of leadership status (formal and informal) into the examination of athlete leadership-cohesion relationship. To test both formal and informal leadership behaviours, the authors recruited 205 competitive youth sport athletes between the ages of 13-17. Participants completed the Youth Sport Environment Questionnaire (YSEQ; Eys et al. 2009) to assess cohesion, the LSS, and the Athlete Satisfaction Questionnaire (ASQ; Riemer & Chelladurai, 1998) to measure the athlete's

satisfaction with their team. The examination of formal and informal athlete leaders as a potential moderating variable made this study critical in the advancement of the athlete leadership-cohesion relationship. These results helped further the notion that multiple athlete leaders can exhibit behaviours on the same team, thus, leading to the notion that athlete leadership is a shared process. Paradis and Loughead found that at both the formal and informal level, task and social cohesion were related to athlete leadership and athlete satisfaction. The results indicated that leadership status is a moderator in the athlete leadership-cohesion relationship due to the variance in the results.

Similar to Paradis and Loughead (2012), Burkett et al. (2014) further examined the moderating variable of leadership role in the athlete leadership-cohesion relationship. In addition, the authors also examined gender as another moderating variable of the athlete leadership-cohesion relationship. Burkett et al. sampled 55 Division III NCAA basketball athletes, with 39 identifying themselves as an informal leader (e.g., leader with no formal designation), and 16 reported themselves as serving in a formal leadership role (e.g., captain). The athletes completed the LSS (Chelladurai & Saleh, 1980) and GEQ (Carron et al., 1985) to assess athlete leadership and cohesion, respectively. The authors found no differences between formal and informal athlete leaders in the leadership behaviours of Training and Instruction, Democratic Behaviour, Autocratic Behaviour, and Positive Feedback and in perceptions of cohesion. The only significant difference between formal and informal athlete leaders was for the leadership behaviour of social support. Specifically, informal athlete leaders showed more social support compared to formal athlete leaders. Although this indicates leadership roles to be a potential moderating variable in the athlete leadership-cohesion relationship, the authors attribute the limited differences between formal and informal leaders to be due to a lack of role clarity and

leadership development within the teams of each participant. More research is needed to confidently identify leadership roles as a moderator in the athlete leadership-cohesion relationship. In regards to gender, the results of the study found no evidence for this as a potential moderating variable in the leadership-cohesion relationship. The results confirmed the authors' hypothesis, in which gender would not be a moderating variable in the athlete leadership-cohesion relationship.

Crozier et al. (2013) used an open-ended questionnaire to further examine the moderating variable of athlete leadership role. In particular, the authors wanted to determine the ideal number of formal and informal athlete leaders required for optimal team functioning. The results of this study found that approximately 85% of team members should ideally fulfill a leadership role. When this occurs, athletes reported an increase in the level of cohesion on a team. Furthermore, participants expressed that having the ideal number of athlete leaders made members of the team work together more effectively, increased focus for the task, and increased cohesion amongst the team. Participants also expressed that having the ideal number of formal and informal athlete leaders increased perceptions of belonging allowing them to feel a part of the team. The results of this study are critical when examining the leadership-cohesion relationship in an applied setting, where athlete leadership programs can be aimed towards developing the leadership capacity of all athletes knowing that it will positively impact overall cohesion within a team.

Studies Using Both the DTLI and LSS to Study Cohesion

Both the LSS (Chelladurai & Saleh, 1980) and DTLI (Callow et al., 2009) have been used separately to examine the athlete leadership-cohesion relationship, Avolio (1999) argued that effective leaders use a variety of leadership behaviours. Given that the DTLI and LSS

measure different athlete leadership behaviours, Duguay et al. (2016) used both measurement inventories in following Avolio's contention of measuring a wide variety of leadership behaviours. The authors measured the leadership behaviours from the LSS and DTLI to examine two female varsity teams (i.e., women's basketball and volleyball), as well as the GEQ (Carron et al., 1985) to measure cohesion in their intervention study on athlete leadership. The authors measured athlete leadership and cohesion pre- and post-intervention. The athletes reported using the majority of leadership behaviours significantly more after completing the athlete leadership development program. As for cohesion, the results showed that the intervention helped to maintain levels of cohesion, further confirming the positive relationship between athlete leadership behaviours and cohesion.

Similarly, Boisvert (2018) recruited male hockey players at the Under-18 year old level from one team competitive team. 18U is the second highest level of minor hockey in Canada. Using the same athlete leadership development program as Duguay et al. (2016), Boisvert (2018) implemented and evaluated this leadership program with the aim of enhancing leadership behaviours, cohesion, and collective efficacy. Athletes were assed using the LSS (Chelladurai & Saleh, 1980) and DTLI (Callow et al., 2009) to measure leadership behaviours, along with the Youth Sport Environment Questionnaire (YSEQ; Eys et al., 2009) to measure cohesion, and the Collective Efficacy Questionnaire for Sports (CEQS; Short et al., 2005) to assess collective efficacy. Similar to the results of Duguay et al., the athlete leadership development program did not increase cohesion pre-post intervention, but rather helped maintain the levels of cohesion over the course of a season. Boisvert noted that at pre-intervention, athletes scored fairly high on cohesion. Based on prior intervention studies (i.e., Senécal et al., 2008), this result was not surprising. Taken together, the results from both Duguay et al. (2016) and Boisvert (2018)

indicate that regardless of the measurement tool being used, the relationship between leadership behaviours and cohesion in sports is important.

Other Measures of Athlete Leadership and Cohesion

Although the LSS (Chelladurai & Saleh, 1980) and DTLI (Callow et al., 2009) are valid and reliable measures of athlete leadership, other measurement tools have been used to assess the relationship between athlete leadership and cohesion. Using the Multifactor Leadership Questionnaire (MLQ-5x; Bass & Avolio, 2004), Price and Weiss (2013) measured transformational athlete leadership and the relationship with cohesion. The authors recruited 412 female competitive adolescent soccer players who completed two versions of the MLQ-5x, one to assess their coaches and one to assess their teammates who they consider to be leaders on the teams. For the purpose of this literature review, only the results from the athlete leadership portion will be reviewed. The results showed that the leadership behaviours from the MLQ-5x were significantly related to cohesion. At the individual level, the authors found that transformational leadership behaviours were related to enjoyment and intrinsic motivation. At the team level, transformational leadership was found to positively relate to task and social cohesion.

In another study, Price and Weiss (2011) analyzed female adolescent soccer players between the ages of 15 to 18 playing competitive soccer in the United States. In order to examine athlete leadership, the authors used the Sport Leadership Behaviour Inventory (Glenn & Horn, 1993) and the Peer Sport Leadership Behaviour Inventory (Glenn, 2003) in combination with the GEQ (Carron et al., 1985) to measure the leadership-cohesion relationship. The results suggested athletes who rated themselves higher in peer leadership behaviours reported higher levels of task

and social cohesion. Further, athletes who were rated higher by their teammates reported higher levels of social cohesion.

Loughead et al. (2016) used a social network analysis (SNA) approach in two studies to measure the athlete leadership-cohesion relationship. The first study examined general leadership qualities and the GEQ, while the second study involved four leadership behaviours (e.g., task, motivational, social, and external) and their relationship to cohesion. In Study 1, 25 Belgian sports teams participated, where at least 75% of the rosters rated the general leadership quality of each teammate and completed the GEQ. A SNA showed a significant positive and moderate correlation between general leadership and task and social cohesion. The authors found that when perceived athlete leadership was greater within a team, the unity and closeness of each team was increased, which was similar to the results of Vincer and Loughead (2010) and Callow et al. (2009). Study 2 examined 21 different sport teams where each participant was asked to rate the members on their team for each of the four leadership behaviours outlined by Loughead et al. (2016). The results showed positive correlations between each behaviour (e.g., task, motivational, social, and external) and both task and social cohesion. Further extending on the results of Study 1, meaning athletes with a higher level of leadership perception also experienced greater levels of cohesion.

Qualitative Research and Cohesion

Although a majority of research into the leadership-cohesion relationship has taken the form of quantitative measures, some researchers have used qualitative approaches such as semi-structured interviews to explore the leadership and cohesion relationship. Caron et al. (2016) explored the leadership behaviours of Paralympic athletes and their impact on team cohesion. The results of the semi-structured interviews found athletes using a democratic leadership style

to motivate, support and communicate with teammates developed close, personal relationships with teammates which increased team cohesion. The Paralympic athletes also reported organizing social team gatherings away that resulted in teams to be strongly unified on the playing surface, due to their increased cohesion. The use of interviews has allowed researchers to learn in greater detail the consequences of how the leadership behaviours of athletes impacts the team environment.

Given the importance of the athlete leadership-cohesion relationship, it becomes important to understand how coaches can develop the leadership in their athletes in order to foster a better team environment. As such, Duguay et al. (2020) interviewed 15 U Sports (governing body of university sport in Canada) and Canadian Collegiate Athletics Association (CCAA) coaches on the importance of developing shared athlete leadership within their teams. Coaches within the study discussed the desire to create a positive team environment that would allow for many athletes to develop leadership. The coaches discussed various ways to enhance player-to-player relationships, as well as strategies to decrease hazing within their teams. Through the development of shared leadership within their teams, the coaches noted that increasing the quality of leadership within the dressing room is positively related to task and social cohesion.

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FIGURES

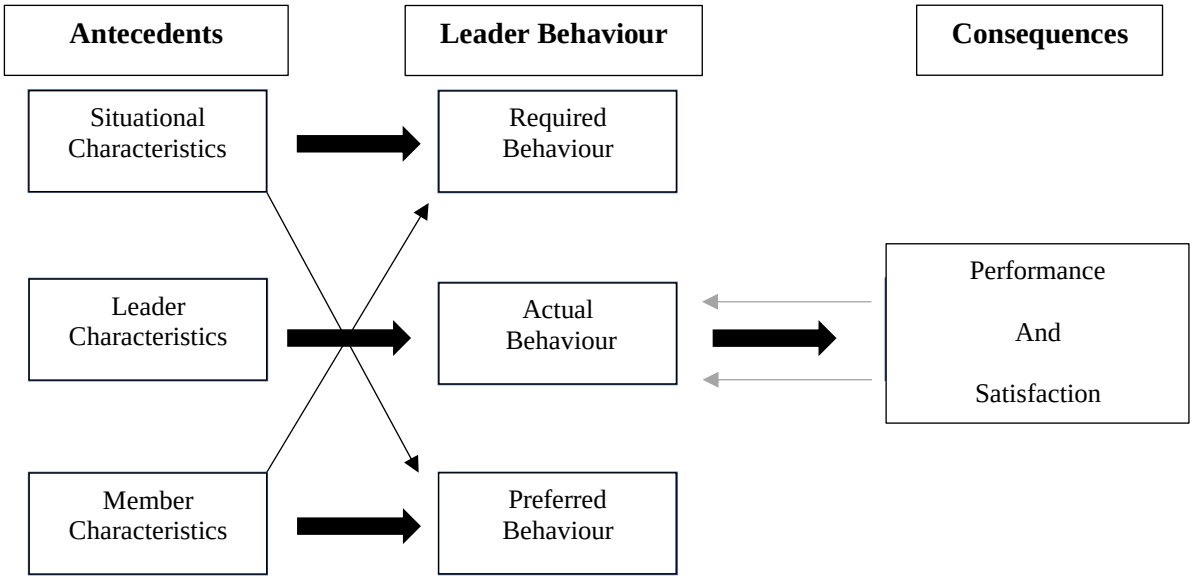

Figure 1. Multidimensional model of leadership. Adapted from "Leadership in sport" by Chelladurai, P., 2007, *Handbook of Sport Psychology, 3,* 113-135.

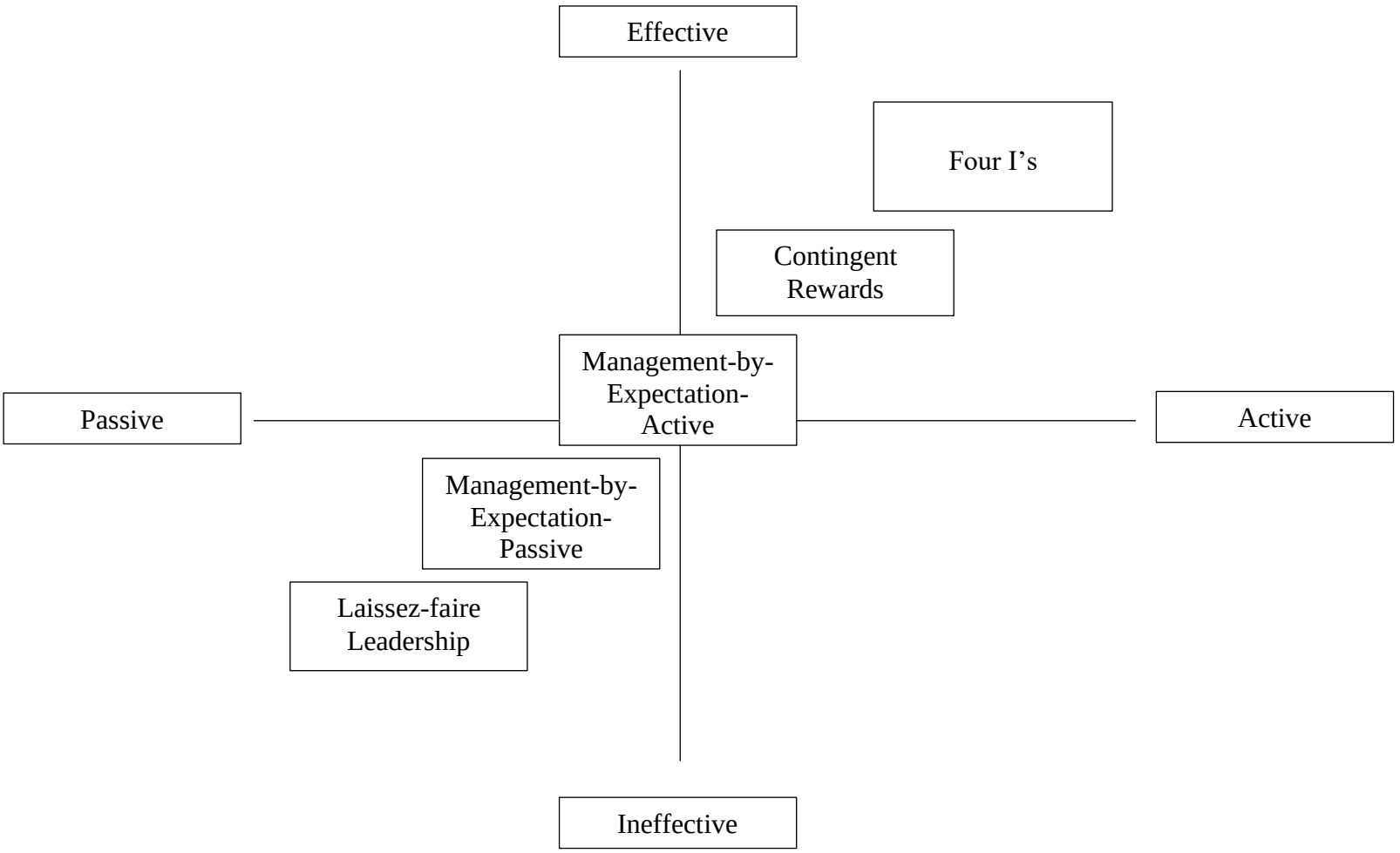

Figure 2. Full range model of leadership. Adapted from "Is there universality in the full range model of leadership?" by Avolio, B. J. (1999). *Full leadership development: Building the vital forces in organizations.* Sage.

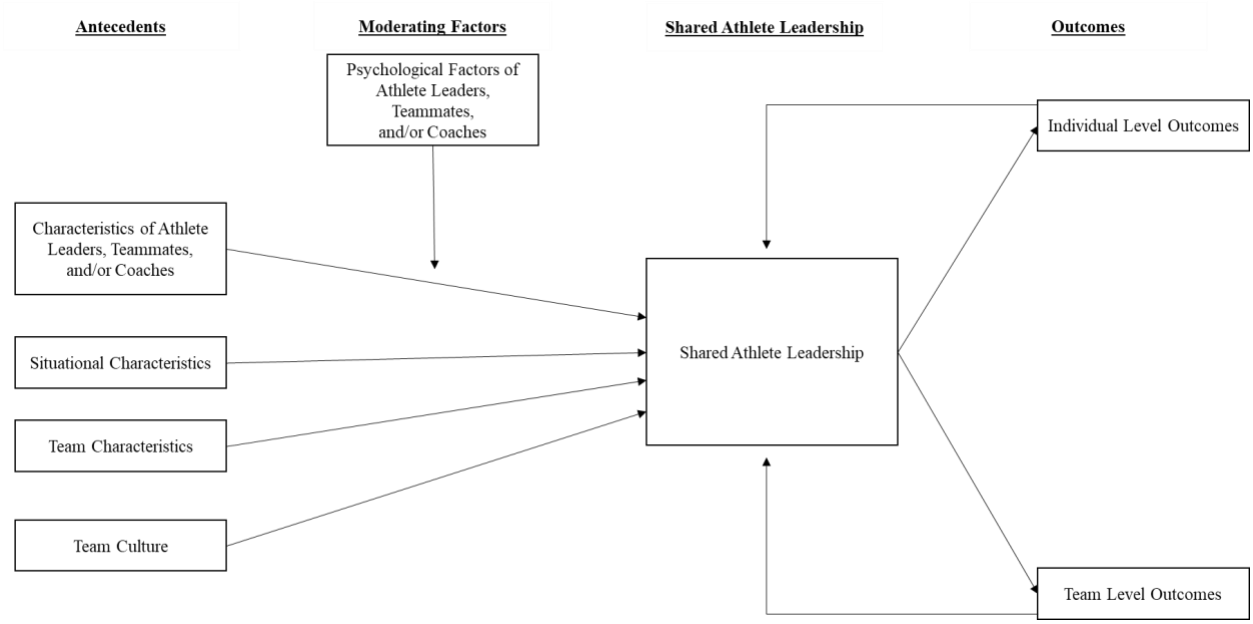

Figure 3: A Working Model for the Study of Athlete Leadership. Adapted from Loughead, T. M., Munroe-Chandler, K. J., Boisvert, M. M., & Hirsch, K. E. (2021). Athlete leadership. In E. Filho & I. Basevitch (Eds.), *Sport, exercise and performance psychology: Research directions to advance the field* (1st ed., 161-177). Oxford.

APPENDICES

APPENDIX A

Athlete Demographic Questionnaire

1. What is your current age in years? _____.
2. Please indicate the ONE response that best describes your current gender identity.
    a. Woman/Girl
    b. Man/Boy
    c. Indigenous or other cultural identity
    d. Non-binary, genderqueer, or similar identity
3. Please indicate the ethnicity that best describes you:
    a. Arab
    b. African American
    c. Chinese
    d. Filipino
    e. Indigenous
    f. Japanese
    g. Korean
    h. Latin American
    i. South Asian
    j. South East Asian
    k. West Asian (Iranian, Afghan)
    l. White/Caucasian
    m. Other

4. Please indicate the primary team sport you participate in: _____.
5. Please indicate the level at which you play your primary team sport:
    a. Recreational
    b. Club
    c. Varsity/Intercollegiate
    d. National/International
    e. Professional
6. How many years have you been involved with your current team? _____.
7. Indicate, on average, the number of hours spent training, practicing, and/or competing with your team each week: _____.
8. What position do you play on your current team? _____.
9. What is your current leadership status?
    a. Formal Leader (e.g., at athlete is selected by the team or coach to be in a leadership position. Such as captain, co-captain or assistant captain).
    b. Informal Leader (e.g., established through interactions with team members, not formally appointed by coach or team).
    c. At the moment, I do not occupy a leadership role.

APPENDIX B

Shared Professional Leadership Inventory for Teams

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

The following statements are designed to assess your feelings about YOUR PERSONAL INVOLVEMENT with this team. Please CIRCLE a percentage from 0% to 100% to indicate your level of agreement with each of these statements.

1. As a team, we clearly assign tasks.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

2. As a team, we clearly communicate our expectations.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

3. As a team, we provide each other with work relevant information.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

4. As a team, we ensure that everyone knows their tasks.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

5. As a team, we monitor goal achievement.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

6. As a team, we take sufficient time to address each other’s concerns.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

7. As a team, we recognize good performance.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

8. We promote team cohesion.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

9. We support each other in handling conflicts within the team.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

10. As a team, we never let each other down.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

11. We help each other to correctly understand ongoing processes in our team.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

12. As a team, we help each other to learn from past events.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

13. As a team, we help each other to correctly understand current company events.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

14. As a team, we can inspire each other for ideas.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

15. As a team, we support each other with the implementation of ideas.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

16. We use networks in order to support our team's work.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

17. We ensure that our team is supported with necessary resources to fulfil the task.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

18. As a team, we assist each other to network.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

19. We establish contact with important experts valuable for our team.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

20. As a team, we are open to external assistance in the case of internal team problems.

0%	20%	40%	60%	80%	100%
Does not apply at all					Fully Applies

APPENDIX C

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: *Examining the Psychometrics of a Shared Leadership Inventory for the Study of Athlete Leadership*

You are asked to participate in a research study conducted by Mason Sheppard (Master's Student) and Dr. Todd Loughead (Faculty Supervisor) from the Department of Kinesiology at the University of Windsor. The results will contribute to Mr. Sheppard's master's thesis.

If you have any questions or concerns about the research, prior to consenting to participate or after participation in the study, please feel to contact Mr. Mason Sheppard at shepp113@uwindsor.ca or Dr. Todd Loughead at loughead@uwindsor.ca

PURPOSE OF THE STUDY

The purpose of this study is to examine the validity of a leadership questionnaire for athletes. You must be 17 years of age or older to participate.

PROCEDURES

If you volunteer to participate in this research study you will be asked to follow the instructions sent to you via Prolific regarding how to access the online questionnaire. You are asked to first read and complete the letter of informed consent. Consent will be provided by clicking "Yes, I agree to participate" once the participant opens the Qualtrics link provided. If consent is provided, you will then be asked to evaluate a questionnaire on a 6-point Likert scale, from 0 (strongly disagree) to 6 (strongly agree) for each statement. Completion of the survey should take about 8 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

You may experience discomfort when sharing information concerning the understanding and readability of the questionnaire items. To minimize any discomfort, you may skip a question at any point without consequence.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

There are no direct benefits to you, however, the current study will extend the literature on athlete leadership in terms of understanding more about the leadership behaviours that are shared amongst athletes. The current study is the first to implement the questionnaire into sport, thus, future research on shared athlete leadership can attempt to better understand how athletes share leadership responsibilities with their teammates.

COMPENSATION FOR PARTICIPATION

You will be compensated by Prolific. You must complete the entire survey to receive the completion code. Then you will input the code into your Prolific account to be compensated.

CONFIDENTIALITY

All information collected for this project will be kept strictly confidential and there will be no identifiable information from the interview responses. All responses will be kept in strict confidence. The results from this study may be published and presented at scientific conferences, however your identity will not be revealed in the results . All personal identifiers will be removed and inputted into a quantitative data analysis software with an associated participant number. The data will be stored on a password

protected computer and destroyed 2 weeks after completion. By consenting to this research, you give us permission to use your data in the preparation of published articles and research presentations.

PARTICIPATION AND WITHDRAWAL

Participation in this study is voluntary. You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time during the interview. You may also refuse to answer any questions and still remain in the study. To withdraw after having begun the online survey, participants must click the "discard" button located on webpage. Doing so will discard participants' data or by closing the browser. The investigators may withdraw you from this research if circumstances arise which warrant doing so. If you choose to not participate in this study or withdraw during the study, this has no bearing on a relationship you may have with any of the investigators (if relevant). However, you will not receive the compensation from Prolific if you choose to withdraw from the study.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

A summary of the results will be posted at the University of Windsor's Research Ethics Board website by July 2022 (https://scholar.uwindsor.ca/research-result-summaries/). If you have any additional concerns or questions, you can email the investigators at the email addresses above.

Web address: https://scholar.uwindsor.ca/research-result-summaires/
Date when results are available: July 2022

SUBSEQUENT USE OF DATA

These data may be used in subsequent studies, in publications and in presentations.

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

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I understand the information provided for the study *Examining the Psychometrics of a Shared Leadership Inventory for the Study of Athlete Leadership* as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Should your choose to consent, you will be asked for written consent prior to beginning the survey, by checking the box "Yes, I agree to participate, I am not a robot"

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ 01/31/22

Signature of Investigator Date

APPENDIX D

Group Environment Questionnaire

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

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

1. I enjoy being a part of the social activities of this team.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

2. I am happy with the amount of playing time I get.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

3. I am going to miss my teammates when the season ends.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

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

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

5. Some of my best friends are on this team.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

6. This team gives me enough opportunities to improve my personal performance.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

7. I enjoy team parties more than other parties.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

8. I like the style of play on this team.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

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

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

The following statements are designed to assess your perceptions of YOUR TEAM AS A WHOLE. Please CIRCLE a number from 1 to 9 to indicate your level of agreement with each of these statements.

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

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

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

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

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

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

13. Our team members party together often.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

14. Our team members have the same aspirations regarding the team's performance.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

15. Members of our team would like to spend time together in the off season.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

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

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

17. Members of our team stick together outside of practices and games.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

18. Members of our team communicate freely about each athlete's responsibilities during competition or practice.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

VITA AUCTORIS

NAME:	Mason B. Sheppard
PLACE OF BIRTH:	Burlington, Ontario
YEAR OF BIRTH:	1998
EDUCATION:	Lester. B. Pearson High School, Burlington, Ontario, 2012-2016
	University of Windsor, Windsor, Ontario, Bachelor of Human Kinetics, 2016-2020
	University of Windsor, Windsor, Ontario, Master of Human Kinetics, 2020-2022