Positive Youth Development: A Measurement Framework for Sport

by

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Reprinted from

International Journal of
Sports Science & Coaching

Volume 7 · Number 3 · 2012

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ABSTRACT
The 4Cs of positive youth development (PYD; competence, confidence, connection, and character) have been advocated as desirable athlete outcomes of sport participation, and in effect, a useful proxy measure of coaching effectiveness. However, a shortcoming of this framework has been a lack of tangible ways to accurately measure these constructs in athletes. This article reviews the sport literature and presents a concise toolkit made up of existing questionnaires and measurement techniques that can collectively be used to assess coaches' ability to facilitate PYD in athletes in organized youth sport settings. This integrative approach to the measurement of PYD in athletes is not designed to replace similar questionnaires in sport, but is simply a measurement approach grounded in the PYD literature that can be applied across a range of sport contexts. Implications for the use of this framework and toolkit in both coaching research and practice are discussed.

Key words: Athlete Development, Character, Competence, Confidence, Connection, Measurement, Psychological Inventories, Youth Sport

INTRODUCTION

Positive youth development (PYD) is a perspective on adolescence that suggests that all young people possess the potential for positive, successful, and healthy development [1], which largely opposes the prevailing traditional view of adolescence as a time of "storm and stress" [2]. In response to a relative lack of agreed upon indicators reflective of constructive, valued, and healthy developmental behaviors in childhood and adolescence, Lerner et al. [1] proposed the 5Cs of PYD, which built upon a 4Cs model put forth by Little [3]. The original 4Cs were competence, confidence, connection, and character [3], upon which Lerner et al. [1] added the fifth C – caring/compassion. The 5Cs represent latent constructs which culminate to produce the higher order factor of PYD. The resultant model has been described as one of the most popular conceptualizations of PYD and has also been recognized as a functional framework for researching PYD in sport [4].

Reviewers: Tania Cassidy (University of Otago, New Zealand)
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More specifically, Fraser-Thomas et al. [4] have recommended that future researchers examine successful sport programs that foster the 5Cs to determine salient features of these youth sport settings. Further, while much research has been performed on youth development programs using Lerner et al.'s [1] 5Cs model [1, 5], there has been little empirical research on the 5Cs in a sport setting. In fact, the majority of PYD research in sport has been theoretical and cross-sectional in nature. In order to advance our understanding of PYD in sport, there is a need to conduct longitudinal research to track changes in PYD over time in groups of athletes. Similarly, if sport programs are supposed to promote PYD in athletes, there needs to be research that clearly demonstrates this change in athletes over time.

Measuring PYD in sport, however, can be challenging. A recent study by Jones et al. [6] tested the 5Cs model in a group of youth-sport camp participants using measures adopted from Lerner and colleagues' line of research. A factor analysis failed to find support for the existence of the 5Cs among the athletes, and exploratory factor analyses instead suggested the presence of a two factor model made up of pro-social values and confidence/competence.

It is possible that Jones et al. [6] failed to find confirmation of the model in their sample because Lerner et al.'s [1] conceptualization of the 5Cs may not be entirely relevant or appropriate to the sport domain. Furthermore, the measures employed by Jones et al. were a modified version of an instrument used by Phelps et al. [5] that focused on general PYD constructs that were not specifically related to sport. The questionnaires that were used were not adapted or validated for use in youth sport settings, which highlights the importance and need for context-specific models and measures of PYD in sport research.

Côté et al. [7] recently suggested a collapsed framework of 4Cs (competence, confidence, connection, and character) with the integration of caring and compassion into the character domain. In their review of athletes' developmental needs using the C's framework, these authors found that caring, compassion, and character were not well differentiated in the sport development literature, with much conceptual overlap in the relevant sport-based research. Thus, they argued for collapsing all three constructs into a singular 'character' domain within the sport context. The resultant 4Cs mark a return to the original conceptualization first proposed by Little [3]. Côté et al. [7] have advocated for the use of this modified framework in future sport PYD research, and there is a need to empirically test this collapsed framework in a sport setting.

Even though the PYD literature in sport is based on the tenet that sport participation has significant effects on other life domains [8], this relationship is not well understood. Before sport programs can claim to foster positive personal development outside of sport, it must first be determined that these programs produce positive sport-related developmental outcomes. For this reason, the present conceptualization of the 4Cs differs from the popularized definitions put forth by Lerner et al. [1] - the present focus is specific to sport.

When discussing athlete outcomes in sport, it is important to also consider the factors that play critical roles in determining these outcomes. The coach is one such factor that is recognized as playing an influential role in fostering positive developmental outcomes in athletes [4]. Researchers have also suggested numerous strategies to aid coaches in facilitating PYD in their athletes [9-11]. However, a longstanding limitation in research has been the difficulty in evaluating coaching outcomes and effectiveness [9, 12]. To address this limitation, the 4Cs have recently been suggested as a framework of desirable athlete outcomes that can also be used to measure coaching effectiveness [9]. Effective coaching should result in either positive sport performance or psychosocial outcomes in athletes [13]. The 4Cs provide a concise yet comprehensive framework to measure performance (competence) and psychosocial outcomes (confidence, connection, and character) in athletes.

Together, these four constructs represent a novel, holistic approach to athlete development that incorporates traditional goals of youth sport programs (e.g., skill development and performance) with an added emphasis on positive psychosocial development.

Côté and Gilbert [9] have presented an integrative definition of coaching effectiveness and expertise that incorporates the development of the 4Cs in athletes: "The consistent application of integrated professional, interpersonal, and intrapersonal knowledge to improve athletes' competence, confidence, connection, and character in specific coaching contexts" (p. 316). This definition is comprised of three components: coach knowledge, coaching contexts, and athlete outcomes. Coach knowledge extends beyond the commonly examined area of professional knowledge (sport-specific knowledge) to include both interpersonal (connection with others) and intrapersonal (openness to continued learning and self-reflection) forms of knowledge. Coaching contexts refers to the varied sport settings in which coaching can take place. Côté and Gilbert [9], for example, suggested the use of a typology originally put forth by Côté et al. [14], which divides coaches into four contexts based on a participation-performance continuum and the varying developmental stages of athletes. The four contexts are 1) participation coaches for children (sampling years), 2) participation coaches for adolescents and adults (recreational years), 3) performance coaches for young adolescents (specializing years), and 4) performance coaches for older adolescents and adults (investment years). The final component of the integrative definition is athlete outcomes, which are defined as the previously mentioned 4Cs. Côté and Gilbert [9] stated that effective coaches require a specific mix of professional, interpersonal, and intrapersonal knowledge to develop the 4Cs in athletes of a specific context (e.g., adolescent recreational sport). However, while the nature of the knowledge required by coaches of different sporting contexts is highly variable, the 4Cs remain stable as the ultimate indicator of athlete outcomes and coaching effectiveness.

Côté and Gilbert's [9] integrative definition of coaching effectiveness and expertise has since been well-received and has been cited in research in the areas of coaching and PYD [15], coaching knowledge [16], and coaching philosophy [17]. The authors have also continued working to further develop each component of the definition, including coach knowledge [18] and athlete outcomes [7]. However, despite this growing body of work, the issue of how to actually measure desirable athlete outcomes and coaching effectiveness (the 4Cs) remains unresolved.

The present article is the final of a series of three concept papers based on comprehensive literature reviews across sport participation, personal development, and coaching that aimed to review the literature on sport participation, personal development, and coaching [7, 9] to ultimately propose a framework for measuring PYD in sport. In the two previous studies, more than 200 articles on youth sport and coaching were reviewed. Content analysis of these articles resulted in four meta-indicators that captured the essence of to-be-defined characteristics that could result from sport participation: competence, confidence, connection, and character—the 4Cs. The purpose of the present review is to use the 4Cs as latent constructs from which a viable measurement framework could be derived to account for positive development in youth sport.

THE 4CS: A REVIEW OF THE MEASURES IN SPORT

A broad initial search was conducted in the sport literature to compile a list of existing questionnaires that could be utilized to measure the 4Cs. The search returned 27 potential measures for competence (9), confidence (4), connection (7), and character (7). The potential measures were reviewed and compared according to the following criteria: 1) specific to the

sport domain; 2) able to measure developmental change over time in a reliable and valid manner; and 3) concise so that the entire battery of questionnaires could be feasibly administered to youth in one sitting. The measure best fitting these criteria for each of the 4 C's was selected for inclusion in the toolkit. If, after this review, no suitable existing measure was found for any of the constructs, then a new measurement strategy was developed based on well-accepted measurement techniques. A summary of the proposed instruments to measure the 4Cs can be found in Table 1.

The proposed framework and toolkit does not represent the ultimate method of measuring PYD in sport; rather it is a practical example of how to measure each construct using pre-existing instruments and/or techniques. Moreover, we offer this concise framework to address criticism that measuring coaching goals (e.g., PYD) are difficult, if not impossible to measure in practice [12]. The proposed framework is intended for use in research but also aims to be accessible enough to practitioners that it could be used in applied settings to measure coaching effectiveness and athlete outcomes. A number of implications are suggested to advance research on PYD and coaching using the proposed framework and measurement toolkit. Work establishing the real-world validity and practicality of the toolkit in applied settings is currently being conducted.

Table 1. Proposed Measures of the 4Cs

	Instrument	Source
Competence	Sport Competence Inventory	Adapted from Causgrove Dunn et al. [28]
Confidence	Self-Confidence Subscale of CSAI-2R	Cox et al. [30]
Connection (coach-athlete)	Coach-Athlete Relationship Questionnaire	Jowett and Ntoumanis [31]
Connection (athlete-athlete)	Peer Connection Inventory	Adapted from Coie and Dodge [35]; Coie et al. [36]
Character	Prosocial and Antisocial Behavior in Sport Scale	Kavussanu and Boardley [45]

COMPETENCE

In sport, competence can be conceptualized as a high level of achievement, performance, or athletic ability. More specifically, sport competence can be broken down into three main dimensions: technical skills, tactical skills, and physical skills, which are adapted from Martens' [19] celestial map of sport skills. Technical skills refer to an athlete's ability to move and perform the tasks necessary to achieve success in their sport (e.g., passing, shooting, guarding, and skating). Tactical skills focus on the specific actions and decisions that athletes make during competition to gain an advantage over their opponents (e.g., decision-making, reading the play, and strategy). Finally, physical skills refer to physical fitness and functional qualities that allow athletes to the perform sports skills and meet the sport's physical demands (e.g., speed, agility, and endurance; [19, 20]). The goal of measuring competence in the context of the 4Cs framework is to obtain an accurate rating of an athlete's ability in a given sport. While it would be ideal to collect completely objective measures of athletes' sport competence (e.g., timed physical tests), this toolkit is designed to provide a simple and practical way to collect data at regular intervals throughout a sport season. In this case, a tool is required that finds a practical middle ground between subjective ratings of athletes' self-perceived competence and objective tests of actual physical ability. By attempting to target athletes' actual competence as opposed to self-perceived competence,

this framework stays in line with the proposition of the 4Cs as desirable outcomes of youth sport participation, whereby competence targets physical performance while the other three constructs (i.e., confidence, connection, and character) target psychosocial outcomes [9].

In light of this definition, existing self-report questionnaires aimed at measuring perceived competence (e.g., [21]) would not provide a true measure of the present conceptualization of competence. The physical competence subscale of Harter's [21] Perceived Competence Scale for Children has been a popular choice for the measurement of perceived physical competence in youth sport [22-24]. In fact, this subscale has even been adapted for sport-specific applications [25]. Despite this considerable body of research, this type of self-report instrument fails to grasp the move toward a more objective or accurate view of one's competence in sport. Traditional instruments measure competence by asking athletes how competent they feel they are in a sport, rather than targeting how competent athletes actually are in that setting.

As this toolkit has been designed for the concise and straightforward measurement of the 4Cs in young athletes, pencil-and-paper questionnaires have been selected to measure each construct. For this reason, other methods such as direct observation or skill testing, which may also provide acceptable and more objective measures of athletes' sport competence, were not selected for inclusion in the framework. However, employing a multi-perspective approach of measuring players' competence from the point of view of multiple individuals (i.e., peers and coaches) will help to ensure more accurate and objective rating of competence in sport. There is a recognized need to utilize multiple rating perspectives when measuring youth behavior [26]. The combination of multiple ratings for a given athlete will provide a composite score that is far more accurate and indicative of the athlete's actual abilities than relying on a single perspective alone. This is similar to a method that is widely used in youth social competence research where multiple ratings (e.g., teachers, peers, and parents) are used to create a single combined score of a child's social competence [27].

SPORT COMPETENCE INVENTORY

The design of this instrument is based upon the methods used by Causgrove et al. [28] to measure athletic ability in school children. In that study, students rated their own and their classmates' athletic ability using a single-item indicator. While this procedure showed good reliability, the authors cited a number of limitations including over-reliance on a single-item measure and a lack of teacher ratings. The proposed sport competence instrument addresses these limitations by using multiple items and will include versions for coaches and peers.

The sport competence questionnaire includes three versions (self, coach, and peer) that share the same structure but are worded slightly differently to reflect who is being rated. In all three versions of the instrument, athletes' sport competence is broken down into three items: technical skills, tactical skills, and physical skills. Competence in these areas is rated on a 5-point Likert scale ranging from *'not at all competent'* to *'extremely competent'*. The self-rated competence questionnaire includes these three items while the peer and coach-rated competence questionnaires include multiple copies of the set of items so that coaches and athletes can rate each teammate or group member.

Given the varied nature of youth sport environments, it may not be possible to obtain competence ratings from coaches, teammates, and the athletes themselves. While it is ideal to attain all three types of competence ratings, each sport context provides unique constraints and so researchers must adapt their methods accordingly. Regardless of the specific sport context, the mean of all available competence ratings (i.e., from all sources) can be used as the index for athletes' sport competence. This triangulation affords us with the most accurate

measure of athletes' competence in sport [27] while adhering to the criteria for the measurement framework.

CONFIDENCE

The definition of confidence is rooted in Vealey's [29] work on self-confidence in sport. Sport confidence is defined as "the belief or degree of certainty individuals possess about their ability to be successful in sport" [29, p. 222]. In the context of the 4Cs we were primarily concerned with trait sport confidence, which is the level of sport confidence that an individual usually possesses. The main function of this framework is to provide a method of measuring changes in developmental outcomes (the 4Cs) over an extended period of time (e.g., a season or time period of similar length). Therefore, in considering the construct of confidence, we are interested in whether an athlete's sport experiences over time lead to significant lasting changes in sport confidence. If state sport confidence was measured, it would be difficult to determine whether an athlete's level of confidence was solely a product of the specific situation when it was measured, or whether it reflected the athlete's general level of confidence.

SPORT CONFIDENCE INVENTORY

The self-confidence subscale of the Revised Competitive State Anxiety-2 (CSAI-2R) [30] was selected as the basis for the Sport Confidence Inventory. The CSAI-2R is a recently revised version of the questionnaire that is designed to measure somatic and cognitive anxiety and self-confidence. The self-confidence subscale is made up of 5 items (e.g., 'I'm confident I can meet the challenge') that are scored on a 4-point Likert scale ranging from *'not at all'* to *'very much so'*. As the original version of the CSAI-2R targeted state confidence, the directions provided prior to completing the questionnaire were adapted by the current authors to target trait sport confidence (i.e., "indicate how you *generally* feel" rather than "indicate how you feel *right now*"). This modification is in line with similar differences between measurement of trait and state sport confidence in other existing instruments [29].

This instrument was selected as the measure of confidence because it more closely met the previously outlined selection criteria compared to other indices of confidence, such as Vealey's [29] sport confidence inventories. In particular, it is succinct (5 items), which is desirable when administering multiple questionnaires to youth athletes. Vealey's [29] sport confidence inventories are much longer (15 items), and consequently, the subtle differences between many of the items may prove to be difficult for younger athletes to comprehend. While these inventories have been widely used in sport research, the authors feel as though the approach put forth by Cox et al. [30] would be more suitable to a wide range of sport settings and age groups. The self-confidence subscale of the CSAI-2R was developed and validated specifically for sport, but the items are still general enough that they could be applied across any number of sports. In fact, Cox et al. [30] validated this version of the CSAI with two independent samples of athletes and urged further research to continue to test and apply this instrument to different samples in sport. A confirmatory factor analysis of the revised version of the questionnaire revealed that the self-confidence subscale demonstrates good psychometric properties with standardized path coefficients of .69 to .80 [30]. However, further testing should take place to assess the psychometric properties of the scale in its proposed application to measure sport confidence at the trait level.

CONNECTION

Connection is conceptualized as a measure of the quality of relationships and degree of interaction with peers and coaches in the immediate sport environment. In order to promote PYD, adolescents need to engage in meaningful and positive relationships with the individuals in their environments. Given the significant differences between peer and coach-athlete relationships in sport, two different measures are proposed to assess these separate aspects of connection.

COACH-ATHLETE RELATIONSHIP QUESTIONNAIRE

The Coach-Athlete Relationship Questionnaire (CART-Q) [31] is an 11-item self-report questionnaire that measures the nature of the coach-athlete relationship from the perspectives of both the coach and athlete. The questionnaire is composed of three subscales that break down the coach-athlete relationship into closeness (emotions), commitment (cognitions), and complementarity (behaviors). Both versions of the instrument (coach and athlete) are identical except that the wording is reversed in certain areas to reflect the individual being evaluated. For example, athletes are asked to respond to the item 'I trust my coach', while coaches are asked to respond to the item 'I trust my athlete'. Participants answer each item based on a 7-point Likert scale ranging from '*not at all'* to *'extremely'*.

The CART-Q was selected as the instrument to measure athletes' connection with coaches because it is concise and directly targets the perceived quality of coach-athlete relationship rather than perceptions of specific interaction styles or behaviours, regardless of sport or specific context. These are necessary qualities for the purpose of this measurement framework because it is intended to be applicable across a wide range of contexts in youth sport. Initial analyses of the instrument with adolescent athletes and their coaches showed good validity and reliability with α coefficients ranging from .82 to .89 [31].

PEER CONNECTION INVENTORY

A sociometric nomination approach has been proposed to measure the peer dimension of connection. Sociometry is a commonly used method in developmental psychology to measure peer perceptions and social status in children and adolescents [32]. Despite its popularity in other fields, a relatively recent review of the literature revealed that this methodology has been under-utilized in the study of peer relations in sport [33]. In fact, while some researchers have employed sociometric techniques in physical activity settings with school children (e.g., [28]), few have employed a similar technique in a sport setting [33]. The validity of this specific strategy in sport has yet to be established, but extensive reviews of sociometric research have shown that this approach is well-accepted and appropriate for use with children and adolescents [34].

A positive and negative nomination-based approach was adapted from Coie and colleagues [35, 36]. In the Peer Connection Inventory, participants are instructed to nominate the three teammates or peers that they enjoy participating in sport with the most and the three teammates or peers that they enjoy participating in sport with the least. This method was selected over a rating scale approach, where participants would rate the extent to which they enjoy participating in sport with each of their teammates [37]. Employing a nomination approach allows for the differentiation of participants based on a two-dimensional sociometric classification system: social impact and social preference [38]. Social impact relates to the relative degree to which participants are noticed by their peers while social preference relates to the degree to which participants are liked or disliked by their peers [38]. In a rating scale approach, participants rate each peer in the group, which makes it difficult

to gather information on isolated individuals or social visibility [39]. Furthermore, nomination-based techniques are often favored over rating scales due to the relative ease of data collection and analysis. Rating scales can be tiring and time-consuming for participants to complete [39], thus potentially influencing the validity of participants' responses; this is of particular concern with respect to the proposed measurement model since participants will be required to complete a battery of questionnaires at one time.

Sociometric data have been used to classify participants into five groups in previous research: popular, rejected, neglected, controversial, and average [32]. Popular participants receive a high number of positive nominations by their peers, while rejected participants receive a high number of negative nominations. These two groups would also score highly on social impact since they receive many nominations from their peers. Neglected participants, on the other hand, receive few nominations at all, and therefore score low on social impact. Controversial participants are interesting in that they receive a high number of both positive and negative nominations. Finally, average participants are those who do not meet the criteria for any of the other groups and instead receive an average number of both positive and negative nominations. A large body of literature has demonstrated that children and adolescents classified into these sociometric groups display distinctive behavioral characteristics (see [32] for a review). For example, popular children tend to display a greater ability to maintain positive social relations [40], while rejected children are usually found to be more aggressive than their peers [32]. The majority of research using this method has been conducted in a school setting; its application in sport would prove useful to extend and verify the salient behavioral correlates of these sociometric groups.

This sociometric approach might be used in sport to measure changes in peer connection over time based on the number of athletes that meet the statistical criteria for the different groups at each time point [36]. This classification system is based on standard scores derived from the number and type of nominations received [36]. Hypothetically, a positive social environment with an 'effective' coach would lead to a decreased number of athletes meeting the criteria for the negative sociometric groups (e.g., rejected and neglected) and a corresponding increase in athletes classified as average or popular. These changes could be analyzed at a group level (i.e., number of athletes in each group) or individually (i.e., individual group migration).

A nomination-based sociometric approach was selected to measure peer connection over more traditional self-rated questionnaires because it is simple and easy to administer to a group of young athletes. Further, previous research on peers in sport has focused on qualitative methods and youth's perceptions of their peers, which has failed to entirely capture the complex and dynamic nature of peer interactions and relationships [41]. The Peer Connection Inventory utilizes a sociometric approach to build upon the existing body of literature on peers in sport by collecting data from each member of the group or team, rather than relying on a single perspective alone.

CHARACTER

As previously mentioned, the caring and compassion constructs were found to be integrated within the conceptualization of character development in the sport coaching and athlete development literature [7]. Character can be defined in terms of moral development and sportspersonship [42]. Specifically, character in sport is generally typified by the engagement in prosocial behaviors and avoidance of antisocial behaviors. Prosocial behaviors are voluntary actions intending to help or benefit others [43], for example helping an injured opponent. Antisocial behaviors, on the other hand, are voluntary actions intending to harm or disadvantage others [44], such as deliberately injuring an opponent.

PROSOCIAL AND ANTISOCIAL BEHAVIOR IN SPORT SCALE

The Prosocial and Antisocial Behavior in Sport Scale (PABSS) [45] is a 20-item questionnaire that will be used as a measure of character. This instrument is broken down into four subscales which target prosocial and antisocial behavior toward both teammates and opponents. For each item, athletes rate how often they engage in a specific behavior based on a 5-point Likert scale ranging from *'never'* to *'very often'*. Example items include 'Gave positive feedback to a team-mate' and 'Physically intimidated an opponent'.

The PABSS was chosen as the instrument to measure the character construct because it is relatively brief and targets discrete, easy to understand examples of behaviors that are relevant across an assortment of team sport contexts. Initial testing determined that the instrument is valid and reliable for use with adolescent team sport athletes with α coefficients ranging from .74 to .86 [45].

DISCUSSION

This framework for the measurement of the 4Cs of PYD represents an integrative and holistic approach to our understanding of athlete development. The proposed toolkit should not be considered a replacement for all of the existing tests and instruments used to assess athlete outcomes (e.g., [46-48]); instead, it is a simplified, practical measurement toolkit that can be used by researchers, and hopefully coaches and practitioners as well, to supplement the tests already used with their athletes. This type of simple toolkit is grounded in the PYD literature and can provide a common measurement platform to allow for comparisons across coaches and sport experiences—something that is currently lacking in both research and practice. One of the primary strengths of this measurement strategy is that it is made up of existing instruments and techniques that have previously been used and validated with similar samples. The collection of these individual instruments into a cohesive framework allows for the accurate measurement of developmental outcomes of youth team-sport participants. Rather than just a list of questionnaires, this framework has been designed such that the whole is greater than the sum of the parts. The group of questionnaires combines to measure the 4Cs of PYD in their totality, which has been recognized as the desirable outcome of youth sport participation [9]. Initial pilot testing with this toolkit has been conducted in youth sport settings in Canada (male soccer players aged 10-11; male and female volleyball players aged 14-18) and the United States (male and female water polo players aged 14-18). All participants completed the battery of questionnaires in less than 20 minutes (typically ranging between 10 and 15 minutes) with minimal difficulty or direction from the researchers. In-depth psychometric work is required to assess the reliability and validity of the group of instruments in the toolkit.

In terms of coaching research, this methodological framework addresses the need for a method of measuring coaching effectiveness [9]. While the importance of measuring athletes' performance or competence in sport has long been understood, it is also necessary to measure desirable psychosocial outcomes in athletes (i.e., confidence, connection, and character) when assessing coaching effectiveness and expertise [9]. These elusive psychosocial outcomes are often difficult to grasp and measure; the present framework attempts to provide a simple and concise method of measuring not only competence, but also confidence, connection, and character. This framework may prove useful in the identification of expert coaches based on Côté and Gilbert's [9] integrative definition. This framework could also be used in interventions designed to improve coaching effectiveness. For example, the ability of a coaching intervention designed to promote PYD in athletes could be assessed by administering this group of questionnaires prior to and following an intervention.

The primary focus of this article was to propose a simple method of measuring the 4Cs in a youth team sport setting. One of many possible uses for this measurement framework is the identification of sport environments effective at promoting PYD. Sport teams that successfully promote the 4Cs can be identified through the longitudinal completion of the proposed procedures. Also, the proposed toolkit provides direct evidence of a particular coach's influence on athlete development. If multiple teams within a single sport program or organization are measured using this approach, it could provide indirect evidence on the program's overall effectiveness to promote PYD among their athletes. This program approach is currently being pilot tested in a large (2,575 students) urban high school in the United States. The athletics director and the principal at the school were debriefed on the toolkit and have endorsed its use with all student-athletes across the athletics program. This early, ongoing, field experience illustrates the promise of this toolkit as a practical and valid measurement battery for youth sport settings. Once these effective teams and programs have been determined, future research can more closely examine the specific contextual processes that enable these programs to foster positive developmental outcomes.

One of the most attractive aspects of this measurement framework is its ability to track change in the 4Cs over time. This framework could be utilized in any sort of longitudinal research, such as program evaluation. By using a pre/post-test design at the beginning and end of a season or time span of similar length, it is possible to measure the amount of developmental change that occurs over that time span. This would be especially useful to evaluate the effectiveness of coaches and organized sport experiences that have been specifically developed to promote PYD. The use of the proposed framework would allow researchers to pinpoint areas of PYD that are being ignored or underdeveloped by certain sport programs.

A unique quality of the proposed framework and toolkit is that it is integrative in nature and the areas of literature that support each construct are vast and varied. This integrative approach should be embraced and can help to guide future research. It may be useful to combine this toolkit of questionnaires with other research methodologies to provide a more holistic and thorough understanding of athletes' developmental experiences than could be provided by pencil and paper questionnaires alone. Multiple methods of measuring each construct would also help to test the validity of each instrument and help to guide the future refinement of the questionnaire package. Certainly, each construct could be measured more comprehensively through the use of additional instruments; however, we also need to be aware of time and resource constraints. The relatively short attention spans of younger sport participants, as well as the limited time available for such non-directly sport related activities (i.e., filling out questionnaires) need to be accommodated in order to construct a practically useful measurement tool. In light of this, this framework has been designed to be a concise method of measuring the 4Cs; the following suggestions are simply ideas for future research that could complement and help to refine the proposed framework and toolkit.

For example, competence, connection, and character could all be suitably paired with systematic observation since these constructs are characterized by more easily observable behaviors. The PABSS [45] in particular is made up of 20 discrete behaviors that could easily be coded using behavioral observation. Observation not only allows for the measurement of the frequency of certain behaviors but also the contextual conditions in which they occur. Competence-related behaviors could be behaviors related to the items of the Sport Competence Inventory as well as more general statistics (e.g., shots, blocks, goals, etc.). The use of systematic observation in concert with sociometric connection data could help to link more traditional measures of peer acceptance and social status [38] with the type of

interactive behaviours athletes are actually displaying [41].

It might also be interesting to compare the sociometric connection data with social network analysis [49]. Using social network analysis, the amount of interaction between teammates could be analyzed using video and plotted to display the interconnectedness among teammates or group members. It would be beneficial to compare the patterns of interaction among teammates as shown by the sociometric questionnaires and social network analysis. For example, one could investigate whether higher rated athletes interact with a greater number of peers, or if lower rated athletes interacted with other similarly-rated athletes. These findings could then be linked and compared to previous sociometric research in school-based settings [32].

Given that sport confidence is a subjective internal construct, it is difficult to measure it by only using external methods such as observation. However, qualitative interviews with athletes could be conducted to help construct a more deep and rich account of how and why athletes display certain levels of confidence in various sport situations. This step could be directly relevant to the refinement and development of the confidence instrument. Furthermore, video observation might also be employed in conjunction with interviews to uncover salient behaviours with respect to sport confidence through video elicitation techniques [50].

CONCLUSION

This revised conceptualization of the 4Cs is much narrower than traditional definitions within the general psychology literature [51], as the present definitions are specific to the sport context. As such, any developmental change or outcome measured by these instruments cannot be generalized beyond the sport context. The present method of measurement is designed to be the first step in empirically measuring the 4Cs and resultant PYD in sport. Since there were no existing measures for competence and connection appropriately meeting the inclusion criteria, novel measures were developed from relevant existing areas of research. However, the reliability and validity of these measures have yet to be tested in detail, and subsequent research should critically examine these tools and refine them as needed. In particular, given that the present focus of the toolkit is on team sport, these future refinements should aim to adapt the toolkit for application to a broader range of settings such as individual sports. Finally, after positive sport experiences and effective coaches have been identified using these tools, further research should then be performed to investigate whether these positive outcomes extend beyond sport to more general life domains.

AUTHORS NOTE

Measures described in this article are available upon request from the first author.

ACKNOWLEDGMENT

Support for the writing of this manuscript was given by a standard research grant from the Social Sciences and Humanities Research Council of Canada (SSHRC Grant # 410-2011-0472).

REFERENCES

1. Lerner, R. M., Lerner, J. V., Almerigi, J. Theokas, C., Naudeau, S., Gestsdottir, S., Naudeau, S., Jelicic, H., Alberts, A., Ma, L., Smith, L., Bobek, D., Richman-Raphael, D., Simpson, I., Christiansen, E. D. and von Eye, A., Positive Youth Development, Participation in Community Youth Development Programs, and Community Contributions of Fifth Grade Adolescents: Findings from the First Wave of the 4-H Study of Positive Youth Development, *Journal of Early Adolescence*, 2005, 25(1), 17-71.

2. Hall, G. S., *Adolescence: Its Psychology and its Relation to Physiology, Anthropology, Sociology, Sex, Crime, Religion, and Education (Vol. 1 & 2)*, Prentice-Hall, Englewood Cliffs, NJ, 1904.

3. Little, R. R., *What's Working for Today's Youth: The Issues, the Programs, and the Learnings*, Paper presented at the Institute for Children, Youth, and Families Fellows' Colloquium, Michigan State University, 1993.

4. Fraser-Thomas, J. L., Côté, J. and Deakin, J., Youth Sport Programs: An Avenue to Foster Positive Youth Development, *Physical Education and Sport Pedagogy*, 2005, 10(1), 19-40.

5. Phelps, E., Zimmerman, S., Warren, A. E. A., Jelicic, H., von Eye, A. and Lerner, R.M., The Structure and Developmental Course of Positive Youth Development (PYD) in Early Adolescence: Implications for Theory and Practice, *Journal of Applied Developmental Psychology*, 2009, 30, 571-584.

6. Jones, M.I., Dunn, J. G. H., Holt, N. L., Sullivan, P. J. and Bloom, G. A., Exploring the '5Cs' of Positive Youth Development in Sport, *Journal of Sport Behavior*, 2011, 34, 250-267.

7. Côté, J., Bruner, M. W., Erickson, K., Strachan, L. and Fraser-Thomas, J., Athlete Development and Coaching, in: Lyle, J. and Cushion, C., eds., *Sport Coaching: Professionalism and Practice*, Elsevier, Oxford, 2010, 63-79.

8. Eccles, J. S. and Barber, B. L., Student Council, Volunteering, Basketball, or Marching Band: What Kind of Extracurricular Involvement Matters?, *Journal of Adolescent Research,* 1999, 14(1), 10-43.

9. Côté, J. and Gilbert, W. An Integrative Definition of Coaching Effectiveness and Expertise, *International Journal of Sports Science and Coaching*, 2009, 4(3), 307-323.

10. Camiré, M., Forneris, T., Trudel, P. and Bernard, D., Strategies for Helping Coaches Facilitate Positive Youth Development Through Sport, *Journal of Sport Psychology in Action*, 2011, 2, 92-99.

11. Watson II, J. C., Connole, I. and Kadushin, P., Developing Youth Athletes: A Sport Psychology Based Approach to Coaching Youth Sports, *Journal of Sport Psychology, in Action*, 2011, 2, 113-122.

12. Jones, R. L. and Wallace, M., Another Bad Day at the Training Ground: Coping with Ambiguity in the Coaching Context, *Sport, Education, and Society*, 2005, 10(1), 119-134.

13. Horn, T., Coaching Effectiveness in the Sport Domain, in: Horn, T., ed., *Advances in Sport Psychology*, 3rd edn., Human Kinetics, Champaign, IL, 2008, 239-267.

14. Côté, J., Young, B. W., Duffy, P. and North, J., Towards a Definition of Excellence in Sport Coaching, *International Journal of Coaching Science*, 2007, 1, 3-17.

15. Vella, S., Oades, L. and Crowe, T., The Role of the Coach in Facilitating Positive Youth Development: Moving from Theory to Practice, *Journal of Applied Sport Psychology*, 2011, 23, 33-48.

16. Mesquita, I., Isidro, S. and Rosado, A., Portuguese Coaches' Perception of and Preferences for Knowledge Related to their Professional Background, *Journal of Sports Science and Medicine*, 2010, 9, 480-489.

17. Bennie, A. and O'Connor, D., Coaching Philosophies: Perceptions from Professional Cricket, Rugby League, and Rugby Union Players and Coaches in Australia, *International Journal of Sports Science and Coaching*, 2010, 5, 309-320.

18. Gilbert, W. and Côté, J., Defining Coaching Effectiveness: A Focus on Coaches' Knowledge, in: Potrac, P., Gilbert, W. and Denison, J., eds., *Handbook of Sports Coaching*, Routledge, London, In Press.

19. Martens, R., *Successful Coaching*, Human Kinetics, Champaign, IL, 2004.

20. Lacy, A. C., *Measurement & Evaluation in Physical Education and Exercise Science*, 6th edn., Benjamin Cummings, Boston, MA, 2011.

21. Harter, S., The Perceived Competence Scale for Children, *Child Development*, 1982, 53(1), 87-97.

22. Horn, T., Coaches' Feedback and Changes in Children's Perceptions of their Physical Competence, *Journal of Educational Psychology*, 1985, 77, 174-186.

23. Weiss, M. R., McAuley, E., Ebbeck, V. and Wiese, D. M., Self-Esteem and Causal Attributions for Children's Physical and Social Competence in Sport, *Journal of Sport and Exercise Psychology*, 1990, 12, 21-36.

24. Rodriguez, D., Wigfield, A. and Eccles, J. S., Changing Competence Perceptions, Changing Values: Implications for Youth Sport, *Journal of Applied Sport Psychology*, 2003, 15(1), 56-81.

25. Feltz, D. L. and Brown, E. W., Perceived Competence in Soccer Skills Among Young Soccer Players, *Journal of Sport Psychology*, 1984, 6, 385-394.

26. Frick, P. J. and Kamphaus, R. W., Behavior Rating Scales in the Assessment of Children's Behavioral and Emotional Problems, in: Walker, C. E., and Roberts, M. C., eds., *Handbook of Clinical Child Psychology*, 2001, Wiley, New York.

27. Dirks, M.A., Treat, T.A. and Weersing, V.R., Integrating Theoretical, Measurement, and Intervention Models of Youth Social Competence, *Clinical Psychology Review*, 2007, 27, 327-347.

28. Causgrove Dunn, J., Dunn, J. G. H. and Bayduza, A., Perceived Athletic Competence, Sociometric Status, and Loneliness in Elementary School Children, *Journal of Sport Behavior*, 2007, 30(3), 249-269.

29. Vealey, R. S., Conceptualization of Sport-Confidence and Competitive Orientation: Preliminary Investigation and Instrument Development, *Journal of Sport Psychology*, 1986, 8, 221-246.

30. Cox, R. H., Martens, M. P. and Russell, W. D., Measuring Anxiety in Athletics: The Revised Competitive State Anxiety Inventory-2, *Journal of Sport and Exercise Psychology*, 2003, 25, 519-533.

31. Jowett, S., and Ntoumanis, N., The Coach-Athlete Relationship Questionnaire (CART-Q): Development and Initial Validation, *Scandinavian Journal of Medicine and Science in Sports*, 2004, 14, 245-257.

32. Newcomb, A.F., Bukowski, W. M. and Pattee, L., Children's Peer Relations: A Meta-Analytic Review of Popular, Rejected, Neglected, Controversial, and Average Sociometric Status, *Psychological Bulletin*, 1993, 113, 99-128.

33. Smith, A. L., Peer Relationships in Physical Activity Contexts: A Road Less Traveled in Youth Sport and Exercise Psychology Research, *Psychology of Sport and Exercise*, 2003, 4, 25-39.

34. Bukowski, W. M., Sippola, L., Hoza, B. and Newcomb, A. F., Pages from a Sociometric Notebook: An Analysis of Nomination and Rating Scale Measures of Acceptance, Rejection, and Social Preference, in: Cillessen, A. H. N., and Bukowski, W. M., eds., *Recent Advances in the Measurement of Acceptance and Rejection in the Peer System*, Jossey-Bass, San Francisco, CA, 2000, 11-26.

35. Coie, J. D. and Dodge, K. A., Continuities and Changes in Children's Social Status: A Five-Year Longitudinal Study, *Merrill-Palmer Quarterly*, 1983, 29, 261-282.

36. Coie, J. D., Dodge, K. A. and Coppotelli, H., Dimensions and Types of Social Status: A Cross-Age Perspective, *Developmental Psychology*, 1982, 18, 557-570.

37. Newcomb, A. F. and Bukowski, W. M, Social Impact and Social Preference as Determinants of Children's Peer Group Status, *Developmental Psychology*, 1983, 19, 856-867.

38. Rubin, K. H., Bukowski, W. and Parker, J. G., Peer Interactions, Relationships, and Groups, in: Eisenberg, N., ed., *Handbook of Child Psychology*, 5th edn., John Wiley & Sons, New York, 1998, 619-700.

39. Terry, R., Recent Advances in Measurement Theory and the Use of Sociometric Techniques, in: Cillessen, A. H. N. and Bukowski, W. M., eds., *Recent Advances in the Measurement of Acceptance and Rejection in the Peer System*, Jossey-Bass, San Francisco, CA, 2000, 27-54.

40. Asher, S. R. and Parker, J. G. (1989). Significance of Peer Relationship Problems in Childhood, in: Schneider, B., Attili, G., Nadel, J. and Wassenberg, R., eds., *Social Competence in Developmental Perspective*, Kluwer, Dordrecht, Netherlands, 1989, 5-23.

41. Murphy-Mills, J., Bruner, M. W., Erickson, K., and Côté, J., The Utility of the State Space Grid Method for Studying Peer Interactions in Youth Sport, *Journal of Applied Sport Psychology*, 2011, 23, 159-174.

42. Bredemeier, B. J., and Shields, D. L. (1996) Moral Development and Children's Sport., in: Smoll, F. L., and Smith, R. E., eds., *Children and Youth Sport: A Biopsychosocial Perspective*, Brown & Benchmark, Chicago, IL, 1996, 381-404.

43. Eisenberg, N., and Fabes, R. A., Prosocial Development, in: Eisenberg, N., ed., *Handbook of Child Psychology (Vol. 3): Social, Emotional, and Personality Development,* Wiley, New York, 1998, 701-778.

44. Kavussanu, M., Seal, A. R. and Phillips, D. R., Observed Prosocial and Antisocial Behaviors in Male Soccer Teams: Age Differences across Adolescence and the Role of Motivational Variables, *Journal of Applied Sport Psychology*, 2006, 18, 326-344.

45. Kavussanu, M. and Boardley, I. D., The Prosocial and Antisocial Behavior in Sport Scale, *Journal of Sport and Exercise Psychology*, 2009, 31, 97-117.

46. Bishop, P. A., *Measurement and Evaluation in Physical Activity Applications*, Holcomb Hathaway, Scottsdale, AZ, 2008.

47. Bulger, S. M., Mohr, D. J., Rairigh, R. M. and Townsend, J. S., *Sport Education Seasons*, Human Kinetics, Champaign, IL, 2007.

48. Morrow, J. R., Jackson, A. W., Disch, J. G. and Mood, D. P., *Measurement and Evaluation in Human Performance*, 4th edn., Human Kinetics, Champaign, IL, 2011.

49. Wasserman, S. and Faust, K., *Social Network Analysis: Methods and Applications*, Cambridge University Press, Cambridge, England, 1994.

50. Wilcox, S. and Trudel, P., Constructing the Coaching Principles and Beliefs of a Youth Ice Hockey Coach, *Avante*, 1998, 4, 39-67

51. Roth, J. L. and Brooks-Gunn, J., What Exactly is a Youth Development Program? Answers from Research and Practice, *Applied Developmental Science*, 2003, 7, 94-111.