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Chapter 15

Measuring Leadership in Sport Coaching

Chapter Objectives:

After completing this chapter you should be able to:

- Provide a brief overview of two of the more popular models of leadership.
- Describe two methods of how we measure leadership in sport coaching.
- Detail some of the main operationalisation's or instruments of leadership.
- Be familiar with recent advances in sport leadership measurement.

Key Terms:

Factor analysis is a statistical method used to describe variability among observed, correlated variables e.g. items in a questionnaire, in terms of a potentially lower number of unobserved variables called factors.

Internal consistency measures whether several items (e.g. on a questionnaire) that propose to measure the same general construct produce similar scores. This is calculated by estimating the correlation coefficients between items.

Operationalisation refers to the process through which abstract concepts (or constructs) are translated into measureable variables

Reliability is defined as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials.

Test–retest reliability is the variation in measurement taken by a single person or instrument on the same item and under the same conditions across time.

Validity is defined as the extent to which the instrument measures what it purports to measure.

Introduction

The sport domain involves many important interactions and processes between athletes and coaches. Of specific concern of this chapter is the assessment of attributes, antecedents, and consequences of sport leadership measurement. Much of the leadership research has concentrated on the Multidimensional Model (Chelladurai, 1990) or the Mediational Model of Leadership (Smith, Smoll, Curtis & Hunt, 1978) in order to conceptualise leadership. Each model has been operationalised differently by the measures proposed to measure them and will be discussed with reference to conceptual issues surrounding measurement e.g. validity and reliability. As noted in earlier chapters leadership can be generally defined as the behavioural process of influencing individuals and groups toward set goals (Barrow, 1977). Additionally, newer theories of leadership highlight the importance of success in leadership and include the positive impact that individuals can have on group dynamics relative to a

team objective (Loehr, 2005, p. 155). These points raise one of the most critical issues in research measurement; how are the variables of a particular model operationalised? The measurement of these variables will directly influence the applicability of theory and practice (Chelladurai & Reimer, 1998). Furthermore, a requisite of theory development is the testability of the proposed model, and should therefore include an appropriate method of measurement and evaluation. Accordingly a key feature of this chapter will be to comprehensively describe the measures of leadership theories and to evaluate the psychometrics of those measures. Note, it would not be possible to evaluate all measures of leadership. Therefore, a systematic approach to discussing the most extensively researched instruments will be proposed with directions to alternatives offered.

Measurement Issues:

The main aim of this chapter is to review measurement of leadership. The term measurement in science refers to the process of assigning numbers to objects according to predetermined rules (Meier, 1994). This task becomes difficult when the objects are abstract representations of variables. This next section will discuss some general measurement issues which will help clarify key terms found later in the chapter (for a full overview of psychometrics see Furr & Bacharach, 2014). Researchers study leadership using different methods but with same goal of *operationalising* the construct. This refers to the process through which abstract concepts are translated into measureable variables (Sarantakos, 1993). Before specific aspects of reliability and validity i.e. psychometrics, are discussed in relation to each leadership measure, a brief overview of what each refers to is appropriate. The term *reliability* is defined as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials (Nunnally & Bernstein, 1994). In a word, it is the

consistency of scores over time (*test retest reliability*) or across raters/individuals (*internal consistency*). An example of reliability is the extent to which judges at the 2012 London Olympics ice skating event agree on the scores for each skater. Similarly, the degree to which participant's scores/responses on a leadership questionnaire remain constant over time and across individual is also a sign of reliability. It is important to understand that a measure can be reliable but not be valid. For example, consider a scale that always weighs you as being 5 kilograms heavier than your actual weight. This scale (though invalid as it incorrectly assesses weight) is perfectly reliable as it consistently weighs you as being 5 kilograms heavier than you actually are. Researchers are typically concerned with the internal consistency and retest reliability of a measure which indicates its stability across individuals and time respectively, as poor reliability limits comparability.

Researchers are also concerned with *validity*, which is defined as the extent to which the instrument measures what it purports to measure (Nunnally and Bernstein, 1994). With regards to research measurement an example of poor validity would be a leadership questionnaire which asked questions gauging diet, exercise intensities and facility satisfaction i.e. items which do not directly measure leadership. There are many different types of validity, including: content validity, face validity, criterion-related validity (or predictive validity), construct validity, factorial validity, concurrent validity, convergent validity and divergent (or discriminant validity). However, many of these are beyond scope of this chapter (for a full review of reliability and validity see Coaley, 2009). Nonetheless, this text will be concerned with the factorial validity of leadership measures which refers to a specific statistical technique which can be used to estimate the dimensionality of a questionnaire, and most importantly, does it replicate the original dimensions hypothesised.

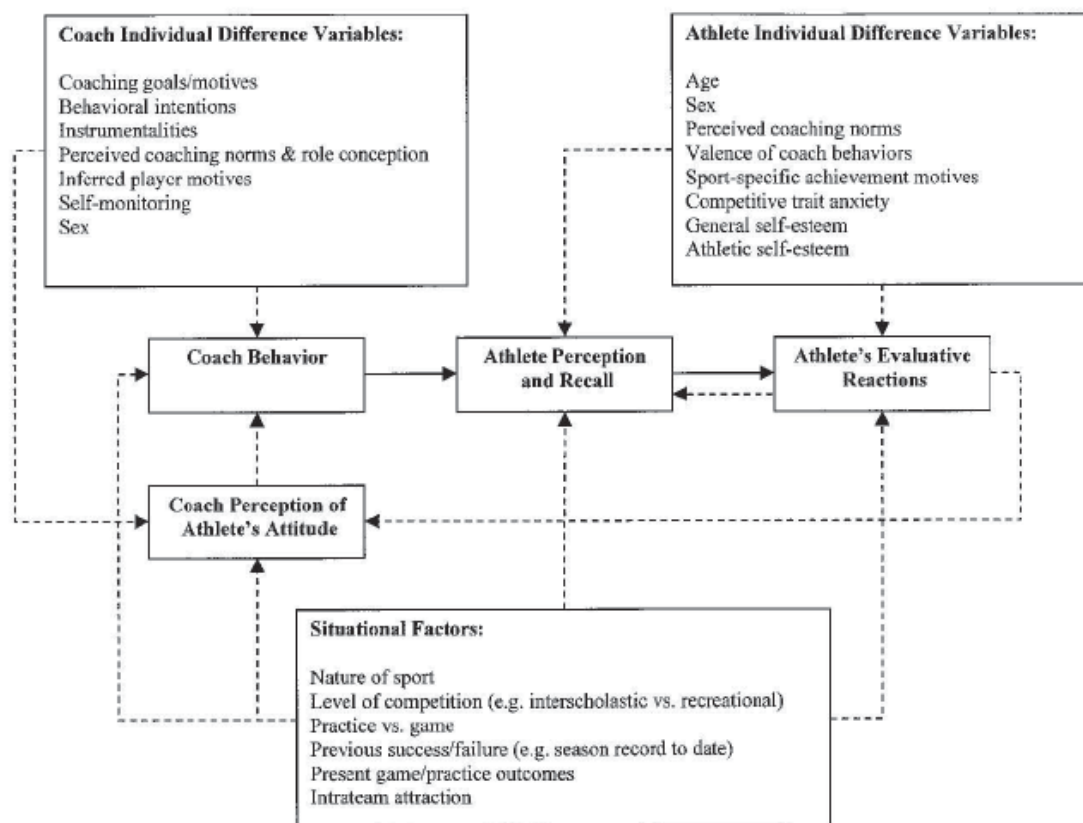
It should be remembered that psychometric support is a never ending process with no conclusive answer. This is the case for most construct variables due to the variability of human behaviour. As an alternative researchers propose increasing bodies of literature which either support or reject the construct, to which then informative decisions can be made. It is for this reason that no recommendations will be made with regards to leadership measure, as it will become evident later on, evidence for several competing measures exist. Also, it is important to remember that the ability to answer a research question is only as good as the instruments utilised. A well-developed instrument will better provide better data which will increase confidence in your findings. Therefore, researchers will have to decide what theory/type of leadership they want to measure and tailor their study to the merits of that operationalisation and acknowledge its limitations accordingly.

Mediational Model of Leadership

The mediational model of leadership (Smoll & Smith, 1989) focuses on the cognitive and affective mechanisms and the individual difference variables of athletes, and how these mediate the relationship between leadership behaviours, its antecedents and consequences. The model emphasises these factors along with situational variables in a three component structure consisting of coach behaviours, player perception and recall, and players evaluative reactions. It was hypothesised that evaluations of coach's behaviour would be mediated by the meaning an athlete attributes to that behaviour. The model postulates that cognitive and affective processes serve as filters between coaching behaviours and athletes attitude towards the coach and sport experience. Moreover, coaches' perception of a player's attitude mediates the relationship between a coach's behaviour and a player's evaluative reaction to those behaviours. Furthermore, the model allows for reciprocal interactions between variables in

conjunction with the normal mediator relationships (Smoll & Smith, 1989). A display of the model is presented in figure 1 below.

Figure 1 — Mediation model of leadership behaviours in sport and hypothesized relationships among situational, cognitive, behavioural, and individual difference variables (adapted from Smoll & Smith, 1989).



Coaching Behaviour Assessment System

Smith and Smoll developed an observational method to measure leadership behaviour according to their mediational model. The athlete's perceptions and recall of leader behaviour, and affective reactions to the sport experience are usually measured using structured interviews. Whereas coach's perceptions of their own behaviour are typically

assessed by questionnaire. The questionnaire operationalises the behaviour through single item sub-scales. Smith and Smoll coined their observational instrument the Coaching Behaviour Assessment System (CBAS). The instrument was developed over several years observing youth coaches and driven by social learning theories. Transcripts were analysed using content analysis from which 12 categories emerged to form the scoring system. These 12 categories were reinforcement, non-reinforcement, mistake-contingent encouragement, mistake-contingent technical instruction, punishment, punitive technical instruction, ignoring mistakes, keeping control, general technical instruction, general encouragement, organisation, and general communication (Smith, Smoll, & Hunt, 1977). Findings indicated that the system encompassed the majority of coaching behaviours, that it could distinguish individual differences in behaviours, and that the measure could be easily utilised in field research (Chelladurai & Reimer, 1998). The 12 coaching behaviour categories can be grouped as either reactive i.e. an immediate response to player/team behaviour, or spontaneous i.e. initiated by the coach independently of previous action. The reactive sub-factor contains responses to desirable performances, mistakes, and misbehaviours. Whereas the spontaneous sub-factor includes game related or irrelevant behaviours. The CBAS is an observational measure of coach's actual behaviour gauging the frequency a coach displays one of the 12 behaviours. Normally, the observation is conducted by one or more individuals during competitive e.g. games, or non-competitive e.g. training, scenarios.

Coaching Behaviour Assessment System Reliability

The naturalistic basis of the scoring system of the CBAS create unique difficulties in assessing the psychometrics of the instrument. However, efforts have been made to improve its reliability. For example, the authors created a training program for individuals utilising the

measure which included a comprehensive overview of the manual, instruction for using the scoring system with video footage, tests on knowledge of the categories, practice scoring of video footage, and consistency checks of field use (Smith, Zane, Smoll, & Coppel, 1983). Furthermore, empirical investigation has assessed the relevant reliability of the coding system. Specifically, the extent of agreement between raters i.e. the correlation between the observers coding the coach's behaviour or correlation between the same observer over time. Smith et al., (1977) reported an agreement of 97.8% between 31 trainee raters on 48 coaching behaviours observed on video recordings. Furthermore, Smith et al., (1983) reported a 90% agreement between trainees and expert observers. Other researchers (Chaumeton & Duda, 1998; Horn, 1984) have reported median inter-rater reliability adopting Cohen's (1960) methods ranging from .68 - .96. Unfortunately, investigations adopting these methods have not always reported reliability estimates (Wandzilak, Ansorage, & Potter, 1988). Furthermore, the guidelines proposed by the authors have not always been adhered too. For example, pass rates on the coder tests have varied, as has time spent training to use the instrument (Sherman & Hassan, 1986). Furthermore, some research has failed to report any information regarding coder training (Krane, Ecklund, & McDermott, 1991). Finally, Smoll and Smith (1989) have stressed the importance that coaches are not aware of being observed. Naturally, this has issues regarding the legitimacy of observations e.g. through social desirability, with coaches modifying behaviour to be viewed more positively. These issues make it difficult to agree consensus on the instruments reliability.

Coaching Behaviour Assessment System Validity

As mentioned the CBAS relies largely on qualitative procedures in its creation and assessment. Some of these procedures lack clarity and detail in the literature e.g. the methods

used to create the 12 categories (Chelladurai & Reimer, 1998). For example, the number of coaches utilised in the original observation in the conception of the 12 categories is not provided in the original text. These deficits create difficulties in evaluating the validity of the instrument. This is contrary to Patton's (1990) call for stringency in reporting details of qualitative investigation for the purposes of evaluation. Nonetheless, examples of content validity exist in the literature. Smoll and Smith (1989) noted that the 12 categories of the CBAS can be observed in nonathletic samples. Furthermore, the 12 categories can be classified as positive and negative which are the 2 broad types of communication which exist in small groups (Bales & Slater, 1955). Furthermore, the CBAS includes all the categories included in the Leadership Scale for Sport (Chelladurai & Saleh, 1980). Chelladurai (1993) suggests that the CBAS is a comprehensive operationalisation of leadership behaviour therefore suggesting that it possess content validity. Similar to the assessment of reliability, the authors suggest that validity can be accurately appraised by adopting a triangulation of observers. One of the most common methods of assessing a measures validity is through conducting a *factor analysis* on a given set of data. Factor analysis is a statistical method used to describe variability among observed, and correlated variables e.g. items in a questionnaire, in terms of a potentially lower number of unobserved variables called factors (Nunnally & Bernstein, 1994). The construct validity of a measure is supported if the factor structure is replicated from the data (confirmatory techniques) or if the theory the measure is based on emerges (techniques exploratory). A consistent replication of an instruments factor structure is a meaningful estimate of both construct validity and reliability. Research investigating the factor structure of the CBAS has provided mixed support with Smith and Smoll (1990) replicating the structure and Smith et al., (1983) reporting an alternative 10 category structure. Comparison of these studies should yield similar results as the same theory is being tested. However, the discrepancies between the numbers of categories can be partially

explained by the differences in techniques used to replicate the structures. For example, the use of orthogonal rotation techniques which force categories to be uncorrelated may not be representative of coaching behaviours (Chelladurai & Reimer, 1998). Furthermore, remember that the goal of factor analysis is to reduce the amount of observed data to fewer factors. Therefore, the differences between the numbers of reported factors (or categories in the example of the CBAS) could be data driven depending on the characteristics of the sample data.

Coaching Behaviour Assessment System Review

The mediation model and related instrument provides a comprehensive description of actual leadership behaviour. The 12 category model theoretically encompasses the full range of coach's behaviour which have also been reported in other theories and measures. However, the subjectivity involved with single item observational measures is problematic. For example, issues surrounding subjectivity and differences in observer training make comparison across studies difficult. Thus, inferences on its reliability and validity are inconclusive. A list of some of the most commonly used observational measures is presented below in table 1.

Table 1: Observational Instruments utilised to Measure Coaching Behaviour.

Instrument	What it measures	Coding categories	Authors
Coaching Behaviour Assessment System (CBAS)	Coaches' overt leadership behaviours during both practices and	12 coding categories divided into reactive and spontaneous coaching behaviours	Smith, Smoll, & Hunt (1977)

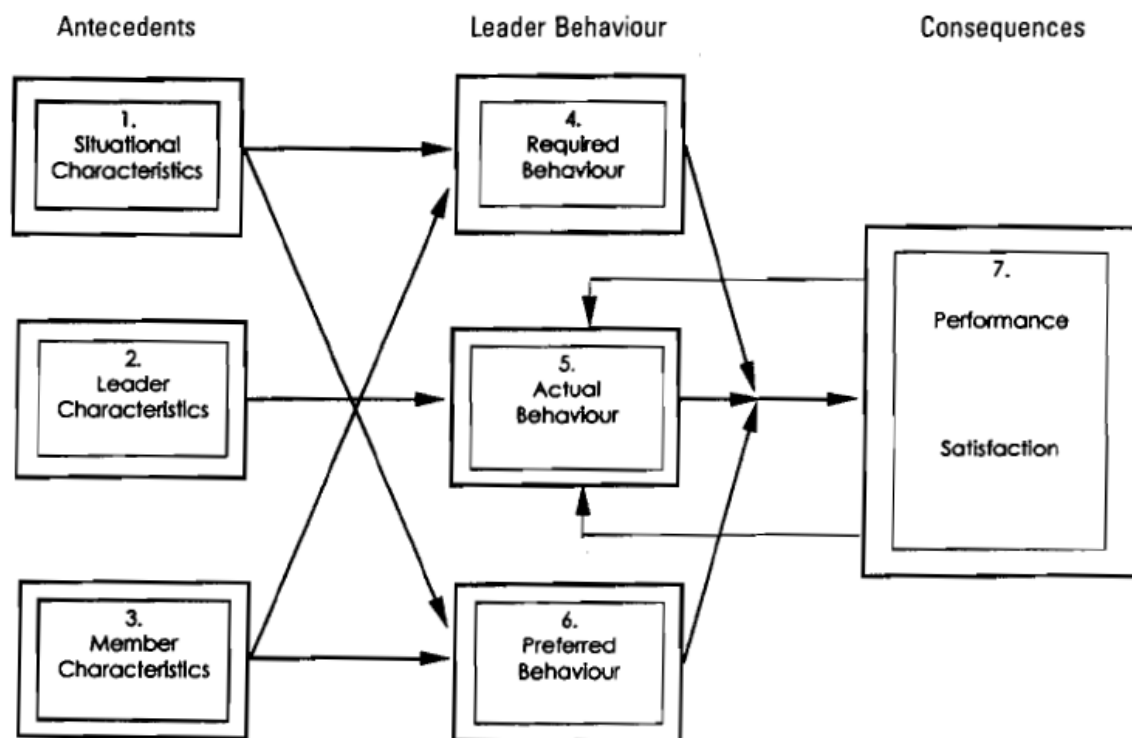
	competitive events (can be used to assess coach behaviour towards teams or individual athletes)		
Arizona State University Observation Instrument (ASUOI)	Coaches' instructional and other behaviours in practice settings	14 categories of coaching behaviour, 7 of which are directly related to instruction	Lacy & Darst (1989)
Coaching Behaviour Recording Form	Coaches' behaviour in practices and competitive events	10-12 categories of coaching behaviour including performance feedback, instruction, encouragement, and modeling	Tharp & Gallimore (1976)
Coach Analysis Instrument (CAI)	Coaches' verbal behaviour	Computer-based system that uses hierarchical form of event recording so that coaches' comments can be analysed at up to 5 levels: direction,	Franks, Johnson, & Sinclair (1988)

		focus, timing, delivery, and emphasis	
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The Multidimensional Model of Leadership

The multidimensional model of leadership combined several existing theories of leadership in order to conceptualise leadership behaviours and processes (Chelladurai, 1993). The model postulates that group performance and member satisfaction as outcomes/consequences are dependent on two clusters of related factors. The first cluster consists of three antecedent factors which influence leadership states such as; situational characteristics, e.g. whether the opposition is weak or strong. Leader characteristics, such as experience, personality, and etc. Group member characteristics, including age, gender and experience of the members. As mentioned, there are three types of leader states in the second cluster; required behaviour i.e. what the situation requires the leader to do. Actual behaviour which details what the leader actually does, which depends on the situation, leader and member characteristics. And preferred behaviour which refers to what the team members want the leader to do. Each of the antecedent factors can influence leadership states in different ways. For example, the demands created by situational characteristics require the leader to behave in certain ways to ensure that group goals are successfully achieved. However, this is not a unilateral process model with multiple antecedents effecting leadership states. For example, the situation and member characteristics will directly influence the required behaviour. Furthermore, the model predicts that performance and satisfaction will also influence actual behaviour (Chelladurai, 1993). A display of the model is presented in figure 2 below.

Figure 2 – Multidimensional model of leadership in sport displaying relationship between antecedents, behaviour and consequences (adapted from Chelladurai, 1993).



Leadership Scale for Sports

Chelladurai and Saleh (1980) constructed the Leadership Scale for Sports (LSS) in order to operationalise their multidimensional model. The instrument consists of 40 items scored on a 5-point likert scale, according to their level of agreement with that phrase; always, often (about 75% of the time), occasionally (about 50% of the time), seldom (about 25% of the time), and never. The scale attempts to operationalise five dimensions of leadership behaviour; one factor that is directly related to group tasks (training and instruction), two decision-making style factors (democratic and autocratic behaviour), and two motivational factors (rewarding behaviour and social support). The training and instruction dimension refers to coaching behaviour intended to improve athlete's performance by stressing and

assisting intense training; specific skill, technique and tactical guidance; detailing relationships between members; managing the group's activities and is comprised of 13 items. The democratic behaviour dimension details coaching behaviours which enable and encourage autonomy in decision making to members, and consists of 9 items. The autocratic behaviour dimension states the independence displayed by group leaders in decision making, and contains of 5 items. The social support dimension describes coaching behaviours that are characterised by emphasising relationships between members, a positive atmosphere and member wellbeing, and is comprised of 8 items. Finally, the rewarding behaviour dimension refers to the coaching behaviours which reinforce good performances through recognition/rewards and consists of 5 items. The main tenet of the model is the congruency between the three states and the consequences i.e. satisfaction and performance. This theorises that leaders will need to successfully manage and negotiate the demands posed by situations and members preferences. The model provides two different feedback loops from satisfaction and performance to actual behaviour. The leader is likely to modify behaviour based on the relative attainment of the consequence variables.

The instrument was developed in two stages, with the first stage involving selecting items from other leadership questionnaires. This resulted in a 99 item questionnaire which was distributed to 160 physical education students and then factor analysed. The analysis revealed a 5 factor solution (as mentioned earlier) and was considered expressive and representative of coaching behaviours. The 5 factor solution consisted of 37 items which met the predetermined cut-offs for retention i.e. high loading on one of the factors and low on the other four. In the second stage items were added to reflect behaviours such as teaching skills and tactics, and social support to conceptualise leader's group facilitation. This new version was distributed to 102 physical education student and 223 college athletes. The data was

again subjected to factor analysis however the 5 factors were specified a priori. The findings, subjected to the same cut-offs as the developmental study, suggested that a 40 item instrument was most suitable for the 5 factors and currently represents the most current version of the scale. Also, the LSS is available in three formats; athletes' preference for coaching behaviour, athletes' perception of their coach's behaviour, and coaches' perception of their own behaviour. All three versions of the LSS are identical in terms of structure and wording of items. However, the scenario for participant's response is gauged from a different context. For example, in the "athletes' preference" version, an athlete is asked to express how they would like a coach to behave towards them. In the "athletes' perception" version, the athlete rates how their coach actually behaves. Finally, in the third version, "coaches' perception", coaches provide a self-report evaluation of how often they behave in certain ways towards their players. The scale has also been modified for use with non-English speaking participants with the most recent translation being revised for polish samples (Walach-Biśta, 2013).

Leadership Scale for Sports Reliability

Chelladurai (1993) assessed the test-retest reliability of the 5 dimensions over a 4 week period during the initial validation of the LSS. The correlations reported were satisfactory for the developmental stage (Nunnally & Bernstein, 1994). The values reported were .72 for training and instruction, .82 for democratic behaviour, .76 for autocratic behaviour, .71 for social support, and .79 for rewarding behaviour dimensions. A range of adequate internal consistency values have been reported in the literature ranging from .61 - .97 utilising different samples of athletes (Chelladurai & Reimer, 1998; Reimer & Chelladurai, 1995). As mentioned there are three version of the scale gauging leadership behaviour from a coach's

perspective, an athlete's perception, and athlete's preference. Typically, scales adopting the perceptions format report higher internal consistency scores. Both versions rely on athlete's subjectivity to recall, however perceptions are generally thought of as more stable and will therefore remain more consistent compared to preferences (White, Crino, & Hatfield, 1985). Nunnally and Bernstein have recommended a cut-off of .70 for satisfactory internal consistency/reliability. However, some of the internal consistency scores for the LSS sub-scale fall below this cut-off, particularly the autocratic behaviour dimension. This may be due to mechanical reasons such as the differing number of items in each of the sub-scales which will have a direct effect on the average-item correlations. Furthermore, the autocratic behaviour dimension attempts to tap into two different leadership facets e.g. 2 items are concerned with handling issues and 2 are concerned with how the coach addresses players. Whereas the democratic behaviour dimension centres on items concerned with decision making. Thus the difference in facets tapped may explain why the autocratic behaviour dimension is typically lower. Chelladurai and Reimer (1998) recommend revising the autocratic behaviour dimension to include more items in order to more comprehensively represent autocratic leadership behaviours and to increase its average inter-item correlations.

Leadership Scale for Sports Validity

Chelladurai and Saleh (1980) claimed that the LSS possessed several examples of validity. The authors noted that content and criterion related validity was represented in the meaningful relationships observed between the dimensions and related areas and theories of leadership. For example, the training and instruction, rewarding behaviour and social support dimensions were evident in Porter and Lawler's (1968) model of leadership motivation, with each playing a significant role in motivation behaviours (Chelladurai, 1981). Empirical

research has reported significant relationships between the consequence factors from the multidimensional model of leadership of which the LSS operationalises i.e. satisfaction and performance, and the five dimensions of the LSS (Reimer & Chelladurai, 1995; Garland & Barry, 1988; Weiss & Friedrichs, 1986; Horne & Carron, 1985). The authors also claim evidence for factorial validity is presented from the developmental samples which produced the same 5 factor solutions. Furthermore, several investigations have supported the five factor solution (Iordanoglou, 1990; Isberg & Chelladurai, 1990). However, there are a few methodological issues with Chelladurai and Saleh's factor analytic work. A relatively low amount of variance was explained in the validation studies e.g. 39.3 – 55.8%. What this means is that a significant portion of the data was unaccounted for in the five factor solution and therefore some coaching behaviours may not be represented in the model. Furthermore, the independence of each factor can be questioned as there is evidence of correlations of approximately .35 between items from different dimensions of the LSS (Reimer & Chelladurai, 1995). Also, there are examples of the five factor solution not being replicated from different data (Summers, 1983; Gordon, 1986). These discrepancies arise from the low amount of variance accounted for in the original data. As exploratory factor analytic techniques try to reduce the amount of variables, the low percentages accounted for may not be replicable in other samples. Furthermore, the original aim of trying to establish meaningful factors from data means that exploratory techniques or item-to-total correlations, as the technique of choice utilised by the authors, may have not been entirely appropriate. The items selected should have been subjected to confirmatory techniques in order to establish the suitability of the items dimensionality. Chelladurai and Reimer (1998) revisited the original data employing confirmatory techniques and reported that the model could be considered valid. However, there was scope for improvement and akin to reliability evaluations, the higher scores were found on the perception versions. It should be noted that stringent

psychometric evaluation is important for a scales validation and later utility. However, precedence must always be given to the meaningfulness of the values i.e. the model makes sense (Browne & DuToit, 1991). Although this requirement is purely subjective, it does provide support for the five factor solution. The LSS is also critiqued at the conceptual level e.g. the original items were derived from leadership measures belonging to the business domains and may not be representative of the unique coaching behaviours observed in sport. Much of the LSS theory is based on transactional theories of leadership, whereas modern approaches to leadership are characterised by transformational leadership theories. The transformational theories are not readily represented in the LSS dimensions and may require reconfiguration in order to conceptualise dimensions such as reactive and adaptive behaviours (Chelladurai & Reimer 1998). Transformational leadership theories stress coaches need to motivate, empower and express in confidence in members. Nonetheless, the interaction effects of the antecedents in the multidimensional model can be considered facilitative and partially transformational.

Leadership Scale for Sports Review

The multidimensional model of leadership and related instrument provide a systematic account of leadership based on several existing theories of leadership in non-sporting contexts. The 5 dimension model explains behaviour by highlighting possible antecedents which explain different types of coaching behaviour and thus group consequences. The authors of the leadership scale for sport have made efforts to psychometrically evaluate their operationalisation. However, methodological weaknesses surrounding their factor analytic work have questioned the psychometrics of the scale. Furthermore, issues surrounding the appropriateness and dimensionality of the five factor solution exist. Nonetheless, more

contemporary approaches to evaluating the five factor solution is warranted as evidence has suggested the scale possess adequate levels of reliability and validity. A list of some of the most commonly used questionnaire measures of coaching behaviour are presented below in table 2.

Table 2: Questionnaire Instruments utilised to Measure Coaching Behaviour.

Instrument	What it measures	Subscales	Authors
Leadership Scale for Sports (LSS)	Dimensions of leader behaviour: 3 versions have been developed to measure a) athletes' preferences for different types of coaching behaviour, b) athletes' perceptions of their coaches' behaviour, and c) coaches' self-evaluation of their own behaviour	1. Autocratic behaviour 2. Democratic behaviour 3. Training and instruction behaviour 4. Positive feedback behaviour 5. Social support behaviour	Chelladurai & Saleh (1980)
Decision-style questionnaires	How coaches make decisions in sport contexts: different versions have been developed to assess	Range of decision-making styles (e.g., autocratic, consultative, participative,	Chelladurai & Arnott (1985)

	athletes' perceptions of their coaches' style and coaches' perceptions of their own style	delegative) that reflect degree to which the coach allows athletes to participate in the decision-making process	
Perceived Motivational Climate in Sport Questionnaire – 2 (PMCSQ-2)	Athletes' perceptions of the motivational climate that their coaches initiate or create in practice and game contexts	Each of 2 higher order factors – task-involving climate and ego-involving climate – has 3 subscales	Seifriz, Duda, & Chi (1992)
Coaches' Interpersonal Behavioural Style	Athletes' perceptions of their coaches' interpersonal behaviours toward and with them	1. Autonomy-supportive interpersonal style 2. Controlling interpersonal style	Bartholomew, Ntoumanis & Thøgersen-Ntoumani (2010)
Coach Behaviour Questionnaire (CBQ)	Athletes' perceptions and evaluative reactions to both positive and negative coaching behaviours	1. Negative activation 2. Supportiveness and emotional composure	Kenow & Williams (1993)
Greek Coach-Athlete Relationship	Coaches' and Athletes' direct	1. Closeness 2. Commitment	Jowett & Ntoumanis (2003)

Questionnaire (GrCART-Q)	perspective of their interpersonal relationship: a modified GrCART-Q2 has been developed to assess athletes' and coaches' meta-perspective of the coach-athlete relationship	3. Complementarity	
Coaching Behaviour scale for Sport (CBS-S)	Coaching behaviours exhibited in training, competitive, and organisational settings	7 dimensions of coaching behaviour (e.g., physical training and planning, goal setting, personal rapport)	Cote, Yardley, Hay, Sedgwick, & Baker (1999);
Multifactor Leadership Questionnaire (MLQ-5X)	Individuals' perceptions of their leaders' attributes, behaviours, and leadership styles	9 leadership factors composed of 5 transformational factors, 3 transactional factors, and 1 non-leadership (laissez-faire) factor	Bass & Avolio (1997)

Future Directions and Contemporary Approaches:

Amorose and Horn (2000) reconceptualised the CBAS measures to construct the Coaching Feedback Questionnaire (CFQ). The CFQ attempts to quantify the mediational model from a quantitative perspective operationalising their 16 item questionnaire. The 16 items tapped eight factors which included; three categories of responses to player's performances and five categories reflecting errors reflected. Amorose and Horn claimed that these eight factors correspond to those of CBAS particularly the reactive behaviours. Factor analysis and internal consistency assessment provided mixed support for the instruments reliability and validity. Factor analysis suggested that three factors characterised the data with dimensions in positive and informative feedback, punishment orientated feedback and non-reinforcement/ignoring mistakes reported. However, the amount of explained variance was quite low. This may be due to the under representation of eight factors in a 16 item instrument, Nunnally and Bernstein recommend that at least five items operationalise a dimension. Similarly, the same values are required for participants to items ratio. However, the internal consistency scores were satisfactory ranging from .72 - .83 for the three factor solution. The CFQ may be preferred due to its brevity and psychometric evidence. However, it is not as representative of coaching behaviours as the original CBAS. Therefore, researchers will have to decide between an instrument with a much narrower range of application but promising psychometric evidence or a more comprehensive definition of coaching behaviours with little psychometric evidence.

Zhang, Jensen and Mann (1997) modified the LSS to include more items and dimensions but retained the other features of original instrument e.g. three response formats and instructions.

Zhang et al., retained the original five dimensions but added two further dimensions, group maintenance behaviour, and situational consideration behaviour. Group maintenance behaviours categorise cohesion and coach-athlete improving behaviours. Situational consideration behaviours describe behaviours aimed at considering situational factors and setting goals for members and to determine how they can achieve them. Zhang et al., developed the Revised Leadership Scale for Sport (RLSS) by employing experts to evaluate 240 items generated from interviews with college coaches. Three samples of athletes and coaches i.e. 696 athletes on the preferred version, 661 on the perception version, and 206 coaches, were factor analysed. The results revealed that 60 items conceptualised 6 of the proposed dimensions with the group maintenance behaviour dimensions not emerging as a distinct factor as its items loaded on other factors. The internal consistency was also evaluated which reported values above .80 for all factors except for the autocratic behaviour dimension. One major flaw of this line of research is that a comparison between the LSS and RLSS was not made. This would have enabled researchers to make a judgement on what was the most parsimonious operationalisation of coaching behaviour. Therefore, despite Zhang and colleagues effort to combat the weaknesses of the LSS, these issues remain in their instrument albeit to a lesser degree.

Summary:

One approach in measuring coaching behaviour is through behaviour assessment of practice and game contexts either directly or using videotaped sequences. This approach utilises trained observers to assess coach behaviours using a systematic observation and recording device. The most commonly used system is the Coaching Behaviour Assessment System devised by Smith, Smoll, and Hunt (1977) which provides a direct, observationally based

assessment of 12 categories of coaching behaviour. The CBAS is aimed at operationalising the mediational model of leadership. The 12 categories can be broadly classified into two sets of behaviours: reactive (behaviours exhibited by a coach in response to a variety of player behaviours) and spontaneous (behaviours exhibited by a coach outside of responding to player behaviours). Mixed support has been provided for the instruments reliability and validity partially due to its naturalistic origins. However, due to the practical development of the instrument it theoretically provides one of the most comprehensive measure of actual coaching behaviour.

The multidimensional model of leadership has been conceptualised by the Leadership Scale for Sports. The LSS consists of five subscales, two of which measure the coach's motivational tendencies (social support and positive feedback), two of which measure the coach's decision-making style (autocratic and democratic), and one that measures the coach's instructional behaviour (training and instruction). The LSS has been through stringent assessments of its psychometric properties and these procedures have generally supported the reliability and validity of the LSS, although not conclusively. Furthermore, the authors note concern with regard to the autocratic subscale and have suggested further psychometric testing and instrument revision (Horn, 2008).

In conclusion, two of the most prominent leadership behaviour models and their respective instruments have been reviewed in terms of their theory and measurement i.e. the Coaching Behaviour Assessment System of the Mediational Model of Leadership (Smoll & Smith, 1989) and the Leadership Scale for Sport of the Multidimensional Model of Leadership (Chelladurai, 1993). Throughout this chapter specific attention was paid to the development, reliability, validity and measurement issues surrounding each scale. The psychometric

evidence of both instruments warrant further research, as both, are consistently and theoretically measuring coaches leadership behaviours. The most recent attempts at conceptualising the models have also experienced difficulties. This suggests that regressing back to theoretical underpinnings for further evaluation may be required. It may be possible that the advances in methodologies over the past few decades e.g. advances in factor analytic techniques and availability of software packages to measure them, will enable leadership researchers to reach new conclusions regarding the models proposed. Once this has been undertaken, researchers could utilise the mixed methods framework deployed by Zhang et al., to operationalise a contemporary instrument of coaching behaviour. This would require harvesting expert opinion of leadership behaviour to generate items, and then subjecting this data to both exploratory and confirmatory factor analytic techniques. This could result in a more psychometrically sound measure of leadership being developed.

Review Questions:

1. Note the components of the mediational model and how the Coaching Behaviour Assessment System operationalises this?
2. What are some of the issues surrounding the psychometrics of the Coaching Behaviour Assessment System?
3. The multidimensional model is operationalised by the Leadership Scale for Sport. What are the five sub-scales and how are these sub-scales categorised?

4. Explain the utility of factor analysis in the development and validation of the Leadership Scale for Sport?

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