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Reprinted from

International Journal of
Sports Science
& Coaching

Volume 4 · Number 1 · 2009

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ABSTRACT

The purpose of this study was to examine the relations between perceptions of coaching behaviours, psychological needs, achievement goals and motivational indicators (enjoyment and effort) at an intra-individual level. A total of 264 high-school basketball players aged between 14 to 17 years old from 19 schools in Singapore took part in the study. The participants completed a battery of questionnaires measuring perceived coach's leadership style, achievement goals, behavioural regulations and competence, needs satisfaction, and enjoyment. Cluster analysis found 3 distinct groups differing in perceived coaching behaviours among the basketball players. The three clusters differed significantly on the indices of intrinsic motivation, perceived needs satisfaction, and achievement goals. This study shows that distinct groups of players could be identified in terms of perceived coaching behaviours and these perceptions may impact the amount of enjoyment and effort exerted during training and competition, perceived competence, achievement goals and autonomy.

Key words: Achievement Goals, Autonomy, Enjoyment, Perceived Coaching Behaviour

INTRODUCTION

Understanding and enhancing the motivation of young athletes is an important area of study for researchers and practitioners. Gallon [1] highlighted the multiple roles a coach has to play in coaching, such as a teacher, a mentor, and a leader. In this regard, the leadership exhibited by the coach can significantly impact on youth's motivation and enjoyment in sports [e.g., 2].

Research in coaching leadership has the potential to diagnose coaching problems, evaluate and improve the coaching process and lead to performance enhancement. Therefore, many recent studies have attempted to identify effective coaching behaviours exhibited by coaches [e.g., 3- 6]. The goal of this study is to examine the influence of perceived coaching

behaviour on athletes from a motivational perspective. Specifically, we examine the relations among perceptions of coaching behaviours, psychological needs, motivational regulations, achievement goals and motivational indicators with a group of high-school basketball players.

The Leadership Scale for Sport (LSS) was developed by Chelladurai and Saleh [7, 8] to evaluate different coaching behaviours exhibited by sports coaches. The LSS includes five dimensions of leadership behaviour: a) democratic and b) autocratic behaviours that measure the coach's decision-making style; c) social support; and d) positive feedback which measure the coach's motivational tendencies; and e) training and instruction which measures the coach's instructional behaviour. Many studies have been conducted using LSS to measure: i) athletes' preferences for specific leader behaviours, ii) athletes' perceptions of their coaches' leader behaviours, and/or iii) coaches' perceptions of their own behaviour [e.g., 9- 13]. Previous research [e.g., 4] has shown that athletes' perceptions of their coaches' behaviours are useful in predicting athletes' level of intrinsic motivation.

Recent studies in coaching leadership have included theoretical frameworks such as Achievement Goal Theory [14], Self-Determination Theory [15], and Competence Motivation Theory [16] to understand the motivational impacts of coaches on athletes. For example, Cumming et al. [6] examined the main and interactive effects of winning percentages and motivational climate upon young athletes' evaluations of their coaches from the Achievement Goal Theory perspective. Hollebeak and Amorose [17] used a Self-Determination Theory framework and found that coaching behaviours have an impact on athletes' intrinsic motivation, mediated by three psychological needs.

SELF-DETERMINATION THEORY

Self-Determination Theory (SDT) is a dialectic organismic theory that accounts for psychological needs and motives [15]. There are three basic psychological needs that are critical in the energization of human behaviour: the needs of autonomy, competence and relatedness. The need for autonomy is defined as the need to feel ownership of one's behaviour. The need for competence refers to the need for producing desired outcomes and to experience mastery and effectiveness [18]. The need for relatedness is the need to feel that one can relate to others and with the social world in general [19].

Vallerand and Losier [20] propose a model comprising a motivational sequence: "Social Factors → Psychological Mediators → Types of Motivation → Consequences." In this model, social factors, such as coaches' behaviours, have a profound impact on athletes' thoughts, feelings, and behaviours. The effects of these social factors on motivation are mediated by perceptions of the three psychological needs. If the three needs are satisfied, intrinsic motivation will increase. If the needs are thwarted, intrinsic motivation will decrease.

In SDT, motivation is seen as a multi-dimensional construct varying in the degree of autonomy. There are at least four main types of motivation or behavioural regulations central to SDT, each one reflecting a qualitatively different 'reason' for acting out the behaviour in question [21]: external regulation, introjected regulation, identified regulation and intrinsic motivation. *External regulation* refers to behaviour that is motivated by external means such as rewards or external authority. *Introjected regulation* refers to behaviour that is internally controlling or self-imposed, such as acting out feelings of guilt avoidance, and is characterized by feeling of 'ought to' or 'have to'. *Identified regulation* refers to the behaviour is self-determined according to one's choice or values. It is characterized by feelings of 'want' rather than 'ought'. Finally, *intrinsic motivation* refers to behaviour that is

solely for its own sake or enjoyment. In addition, SDT also includes integrated regulation in the self-determination continuum. Integration represents the most self-determined form of extrinsic motivation in which the behaviours performed are in harmony with other aspects of one's self, or when identified regulations are fully assimilated to the self [15]. However, this regulation is mainly found in the adult population and therefore not included in this study. The other four behavioural regulations can be assessed by using the Perceived Locus of Causality scale (PLOC) [21]. The four regulations form a continuum which characterizes the degree of internalization of the behaviour [18]. Introjected and external regulations are considered as more controlled regulation whereas intrinsic and identified regulations are considered as more autonomous regulation [22].

Research has shown that more self-determined behavioural regulations in classroom [e.g., 21, 23- 25], as well as in physical activity contexts with young people [26, 27] lead to more motivational adaptive cognition, emotion and behaviour. For example, in Ryan and Connell's [21] study, external and introjected regulations in school children were related to anxiety and maladaptive behaviour when students were faced with failures. On the other hand, identified regulation and intrinsic motivation were positively related to enjoyment and effort. Chatzisarantis et al. [26] examined intentions to participate during leisure-time exercise with regard to both autonomous and controlling intentions in a group of school children. Results showed that it was the autonomous intentions (i.e., 'want to') that predicted physical activity participation rather than the controlling intentions (i.e., 'have to'). Specific to coaching behaviours, Amorose and Horn [4] found that high levels of intrinsic motivation were generally associated with athletes who perceived their coaches to exhibit a leadership style that emphasized training and instruction, and was high in democratic behaviour and low in autocratic behaviour. However, research in coaching literature has been limited to intrinsic regulation only rather than examining various types of behavioural regulations in combination.

ACHIEVEMENT GOAL THEORY

In Vallerand and Losier's [20] proposal, achievement goals are considered as a social factor. For example, focusing on competition (performance goals) tends to shift the focus away from the activity itself towards proving superiority, thus negatively affecting perceptions of autonomy, whereas focusing on cooperation (mastery goals) is likely to enhance intrinsic motivation. Therefore, achievement goals have the function of fulfilling needs in any achievement setting [14, 28]. For example, Nicholls [14] argues that intrinsic motivation is evident when people do something for its own sake. Mastery goals are therefore predicted to promote intrinsic motivation, because involvement in the activities is experienced as an end in itself. With its emphasis on developing competence, these goals are likely to lead to processes such as working hard, challenge seeking, persistence and task involvement [14, 29, 30] thereby increasing the intrinsic motivation of the task itself. Performance goals, on the other hand, are predicted to have a lower or no relationship with intrinsic motivation because the experience of engagement in the tasks is taken as a means to an end. In this case, the focus is to demonstrate competence rather than to enjoy the task as an end in itself [14].

With the recent inclusion of the avoidance dimension in the Achievement Goal Theory, Elliot et al. [31-33] suggest that a mastery-avoidance goal (where individuals focus on avoiding task-based or intrapersonal incompetence) and a performance-avoidance goal (where an individual focuses on avoiding normative incompetence) should be added to the traditional mastery-approach and performance-approach goals in order to fully understand motivated behaviours (for a review, see [34]). In this model, competence is viewed as the antecedent of achievement goal constructs. Elliot et al. proposed that competence can be

differentiated in two ways. Firstly, by the standard used to evaluate success (either self-referenced or other-referenced) and secondly, by the relative potency of the valences of approach and avoidance (either positive or negative probability).

A few studies conducted in the educational domain support the validity and utility of the 2 x 2 achievement goal framework [35, 36]. Each goal is purported to predict a distinct pattern of achievement-relevant processes and outcomes. In general, mastery-approach and performance-approach goals contribute to positive effects and consequences [34]. Mastery-avoidance and performance-avoidance goals produce less adaptive motivational patterns, such as disorganization, worry, and emotionality [32, 35]. However, very few studies in the physical activity and sport domains have focused on the approach-avoidance dimension (see [37-39]). One piece of empirical work that used the 2 x 2 achievement goal framework is the study conducted by Wang et al. [33] in the PE domain and one other study examined the psychometric properties of a 2 x 2 Achievement Goals Questionnaire for Sport [35].

Coaching behaviour, psychological needs, behavioural regulations, and Achievement Goal Theory can be linked conceptually based on the motivational sequence proposed by Vallerand and Losier [20]. In this sequence, social factors such as perceived coaching behaviour and achievement goals have profound impact on individuals' perceptions of psychological needs. The extent to which an individual perceives that the three psychological needs have been fulfilled will result in different behavioural regulations, and subsequently lead to different cognitive, affective and behavioural consequences. Typically, these relationships are tested using structural equation modeling [e.g., 17, 40]. Testing structural models is appropriate for examining the independent effects of the exogenous and endogenous variables. However, very few studies have examined the intra-individual differences in patterns of key motivational indicators when looking across a comprehensive profile of scores; i.e., are there subgroups of athletes with distinct profiles based in their perceptions of coaching behaviours that may differentiate their levels of needs satisfaction, motivation regulations, achievement goals, and effort and enjoyment? We used cluster analysis to identify the subgroups of athletes with homogenous perceptions of coaching behaviours and examined the variations in psychological needs, achievement goal, motivational regulation, and outcome variables. Using this approach, individuals with similar profiles can be grouped and segmentation strategies developed to increase the effectiveness of interventions [41, 42].

METHOD

PARTICIPANTS AND PROCEDURE

The participants were 264 elite high school basketball players aged between 14 to 17 years old from 19 schools in Singapore (male = 162, female = 102). The players ranged in age from 14 to 17 years ($M = 15.68$, $SD = 0.82$), and had represented their school in the Inter Schools 'B' Division Basketball Competition organized by the Singapore Schools Sports Council. There were 23 teams and 23 coaches involved in the study.

Ethical clearance was obtained from the university's ethical review board. Following that, the Ministry of Education and schools' permission to gather research data were sought. Consent from school principals and participants was obtained prior to data collection. Arrangements were made with the contact persons from the schools for administration of the questionnaire. The Heads of Department for Physical Education and Co-curricular Activities or Teachers-in-charge of the basketball teams were briefed on the purpose of the study. They were assured by the researcher that their participation in the study was completely voluntary and that they may withdraw at any time they wish to.

MEASURES

Leadership Scale for Sports. The Leadership Scale for Sports (LSS) developed by Chelladurai and Saleh [8] was used to measure the coaching behaviour and leadership exhibited by the coaches. The LSS consists of five subscales. Democratic and autocratic subscales assess the coach's decision making; social support and positive subscales assess the coach's motivational tendencies. The last subscale, which is training and instruction, measures the coach's instruction tendencies. There are 40 items in LSS. Participants were instructed to read each of the 40 items clearly and to indicate how frequently they perceived that their coach exhibits each type of behaviour. The response options were scored on a five-point scale: 1 (never), 2 (seldom; about 25% of the time), 3 (occasionally; about 50% of the time), 4 (often; about 75% of the time), and 5 (always). The researcher was on site during data collection in order to answer questions that the participants may have. Most of the participants completed the questionnaire within half an hour.

Basic Psychological Needs. To measure the three psychological needs, we adopted the 21-item Basic Need Satisfaction at Work questionnaire [43]. There were seven items to measure autonomy, six items for competence and eight items for relatedness. Each response was scored on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Behavioural Regulation. The 14-item Perceived Locus of Causality (PLOC) scale [27], based on a scale originally developed by Ryan and Connell [21], was employed to assess four types of behavioural regulation in the basketball context. The stem for all the items was 'I take part in basketball ...'. Answers for all the 14 items were given on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Autonomous regulation (identified and intrinsic regulations) is measured through six items, controlled regulation (external and introjected regulations) is measured through eight items.

The Achievement Goal Questionnaire (AGQ). The Achievement Goal in Physical Education Questionnaire [33] was adapted to measure four achievement goals in the basketball context. The four achievement goals are: mastery-approach (focused on task-based or intrapersonal competence; e.g., "I want to learn as much as possible from playing basketball"), mastery-avoidance (focused on task-based or intrapersonal incompetence; e.g., "I am often concerned that I may not learn all that there is to learn in basketball"), performance-approach (focused on normative competence; e.g., "It is important for me to do better than other players in basketball"), and performance-avoidance (focused on normative incompetence; e.g., "My goal in playing basketball is to avoid performing poorly"). The modified version changed 'PE class' to 'basketball'. There were 3 items in each subscale. Players responded on 5-point Likert-type scales ranging from 'strongly disagree' (1) to 'strongly agree' (5).

Enjoyment and Effort. The enjoyment and effort subscales of the Intrinsic Motivation Inventory (IMI) [44] were adapted to assess enjoyment (5 items; e.g., "I usually enjoy playing basketball") and effort (5 items; e.g., "I tried put in a lot of effort into basketball"). The items were measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

DATA ANALYSES

A series of preliminary analyses were conducted to examine the psychometric properties of the measures. Data were checked for outliers, normality and reliability. Descriptive statistics and correlations among all the main variables used in the study were computed.

In the main analysis, we used cluster analysis to identify homogenous groups or clusters based on the perceived coaching behaviours. Thereafter, we examined the related psychological and behavioural outcomes. In order to identify groups of players that possess similar perceptions of their coaches, the sub-scales in the LSS were used as the clustering

variables. Before the cluster analysis was performed, all the variables were standardized using z scores (mean of 0 and a standard deviation of 1).

We used the hierarchical method to determine the number of clusters [45, 46]. Dendrogram and agglomeration schedules were generated to provide a basis for determining the number of clusters. Ward's method with squared Euclidean distance was used to determine the number of cluster groups.

To validate the clusters solution, we used the composite measures of enjoyment and effort to test the validity of the clusters, since previous studies [3, 17, 47] have established the links between coaching behaviours and intrinsic motivation. A one-way multivariate analysis of variance (MANOVA) was conducted to determine whether differences across clusters in terms of enjoyment and effort could be found.

Subsequently, we conducted three one-way MANOVAs to determine if the clusters differ in the 2 x 2 achievement goals, psychological needs, and behavioural regulations. If the MANOVA showed any significant results, follow-up tests would be conducted using ANOVA and post-hoc Tukey tests.

RESULTS

The internal consistency estimates of reliability were computed using the alpha coefficient [48]. Most internal consistency coefficients indicated satisfactory reliabilities of at least .70, except for autocratic behaviour ($\alpha = .20$) and performance-avoidance goal ($\alpha = .53$). Both scales have been shown to be weak in reliability in previous studies using Singaporean samples [e.g., 33, 49]. These two subscales were deleted from further analysis. Table 1 shows the descriptive statistics and internal consistency coefficients for the entire sample. In general, the players reported moderately high in coaching behaviours in terms of training and instruction, democratic behaviour, and positive feedback. They also reported high enjoyment and effort exertion. They tended to endorse mastery goals and had high scores in relatedness, competence and autonomy and reported high autonomous regulation in basketball. The distribution for autonomous regulation was negatively skewed and most of them had scores ranging from 4 to 5 on a 5-point scale. No outliers were detected.

Table 1. Descriptive Statistics and Internal Consistency Coefficients of the Variables

	α	Mean	SD	Skewness	Kurtosis
1. Training and Instruction	.88	3.99	.58	-.45	-.00
2. Democratic Behaviour	.85	3.48	.69	-.49	.62
3. Social Support	.71	3.34	.71	-.03	-.51
4. Positive Feedback	.77	3.80	.67	-.39	.15
5. Enjoyment	.83	4.30	.64	-1.00	1.07
6. Effort	.71	4.06	.63	-.34	-.42
7. Performance-Approach	.75	3.28	.96	-.17	-.25
8. Mastery-Approach	.73	3.97	.73	-.42	-.23
9. Mastery-Avoidance	.70	3.54	.77	-.24	-.17
10. Autonomy	.75	3.46	.57	.36	-.16
11. Relatedness	.83	4.08	.63	-.49	-.49
12. Competence	.70	3.70	.64	.00	-.39
13. Autonomous Regulation	.74	4.24	.63	-1.20	2.36
14. Controlled Regulation	.70	1.91	.65	.40	-.68

Using the Pearson product-moment correlation, bivariate correlations are calculated to examine the relationships between all the variables. Table 2 shows the correlation matrix. In the current study, the four coaching behaviours were positively correlated. All four coaching behaviours were positively related to enjoyment, effort, mastery-approach and mastery-avoidance goals, autonomy, competence, relatedness, and autonomous regulation. Enjoyment and effort were positively associated with performance-approach, mastery-approach, and mastery-avoidance goals, as well as with the three psychological needs and autonomous regulation. Performance-approach was positively related to both autonomous and controlled regulations. Mastery-approach and mastery-avoidance goals had positive relationship with autonomous regulation, but not controlled regulation.

CLUSTER ANALYSIS

From the agglomeration schedule, it was found that the merging of a four-cluster solution to a three-cluster solution created a bigger change in the coefficients (27.1%) than previous mergers (less than 18% change). According to Hair et al. [45], a larger increase means that dissimilar solutions are merged. Hence, it was decided that the three-cluster solution will be more appropriate for the present study. This is supported by the dendrogram and icicle plots.

Table 3 contains the means, standard deviations and z scores of the clustering and criterion variables of the three clusters. Based on the z scores of ± 0.5 as criteria for classifying high or low scores [41], it was observed that cluster 1 had an “average” perception of coaching behaviours because all four clustering variables (training and instruction, democratic behaviour, social support, and positive feedback) were closed to the means. This first cluster consists of 79 players (29.9%). The second cluster had a “positive” perception of coaching behaviours ($n = 128$), and consists of 48.5% of the sample. The players in this cluster had z scores higher than 0.60 in all the four coaching behaviours. The third cluster consisted of 57 (21.6%) participants with a “negative” perception of coaching behaviours profile; all the four coaching behaviours had z scores of lower than -1.00. (see Figure 1).

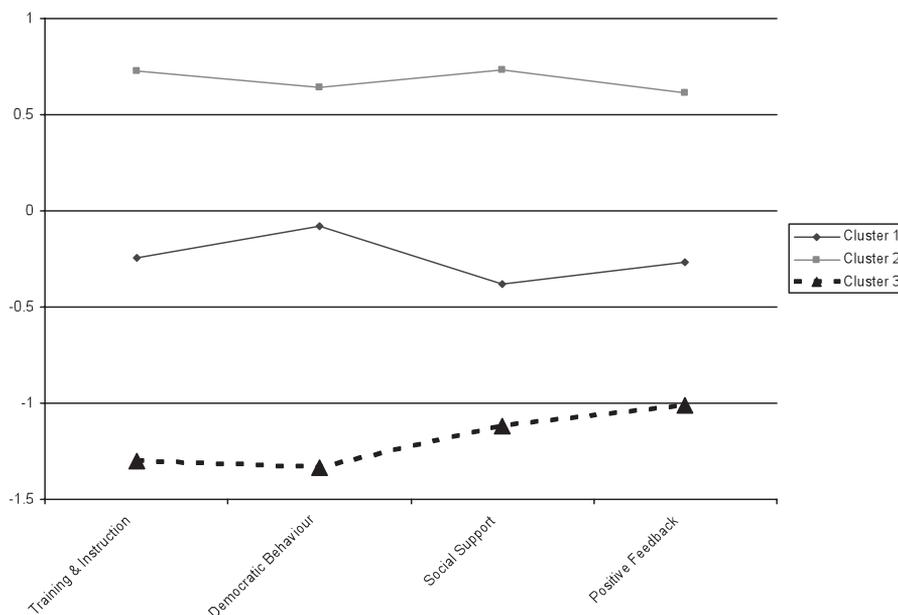


Figure 1. Cluster Profiles Based on Perceived Coaching Behaviour

Table 2. Zero-Order Correlations of the Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Training and Instruction	1.00													
2. Democratic Behaviour	.75**	1.00												
3. Social Support	.62**	.65**	1.00											
4. Positive Feedback	.69**	.67**	.51**	1.00										
5. Enjoyment	.36**	.28**	.23**	.20**	1.00									
6. Effort	.36**	.25**	.17**	.26**	.62**	1.00								
7. Performance-Approach	.11	.09	.07	.05	.33**	.38**	1.00							
8. Mastery-Approach	.35**	.21**	.18**	.16**	.63**	.54**	.43**	1.00						
9. Mastery-Avoidance	.25**	.23**	.18**	.22**	.41**	.29**	.34**	.53**	1.00					
10. Autonomy	.24**	.14*	.26**	.15**	.34**	.33**	.08	.21**	.04	1.00				
11. Relatedness	.25**	.17**	.29**	.18**	.35**	.30**	.03	.21**	.07	.63**	1.00			
12. Competence	.26**	.13*	.19**	.13*	.37**	.38**	.10	.30**	.11	.70**	.65**	1.00		
13. Autonomous Regulation	.23**	.16**	.13*	.14*	.50**	.46**	.29**	.49**	.32**	.22**	.30**	.27**	1.00	
14. Controlled Regulation	-.16**	-.07	-.02	-.14*	-.04	-.04	.31**	.05	.03	-.13*	-.10	-.15*	.16**	1.00

Note. * $p < .05$; ** $p < .01$

Table 3. Cluster Means, Standard Deviations, and z Scores for the Three Clusters by Coaching Behaviour

	Cluster 1 (N = 79)			Cluster 2 (N = 128)			Cluster 3 (N = 57)		
	M	SD	z	M	SD	z	M	SD	z
Training and Instruction	3.85	.33	-.24	4.41	.32	.73	3.23	.43	-1.30
Democratic Behaviour	3.42	.38	-.08	3.92	.46	.64	2.55	.49	-1.33
Social Support	3.07	.46	-.38	3.86	.47	.74	2.54	.43	-1.12
Positive Feedback	3.62	.54	-.27	4.21	.48	.62	3.11	.53	-1.01

VALIDATION OF CLUSTER SOLUTION

Enjoyment and effort scores were used as criterion variables to validate the cluster solution (see Table 3). Results from one-way MANOVA indicated that there were significant effects among the three clusters and the two criterion variables, Wilks's $\Lambda = .88$, $F(4, 520) = 8.51$, $p < .01$, $\eta^2 = .06$. Follow-up tests showed that both criterion variables were significantly different across the three clusters: $F(2, 261) = 15.50$, $p < .01$, $\eta^2 = .11$ for enjoyment; $F(2, 261) = 12.07$, $p < .01$, $\eta^2 = .09$ for effort. Tukey's HSD revealed that the "positive" group (Cluster 2) had significant higher enjoyment and effort compared to the "average" and "negative" clusters (all p-values $< .01$; see Figure 2).

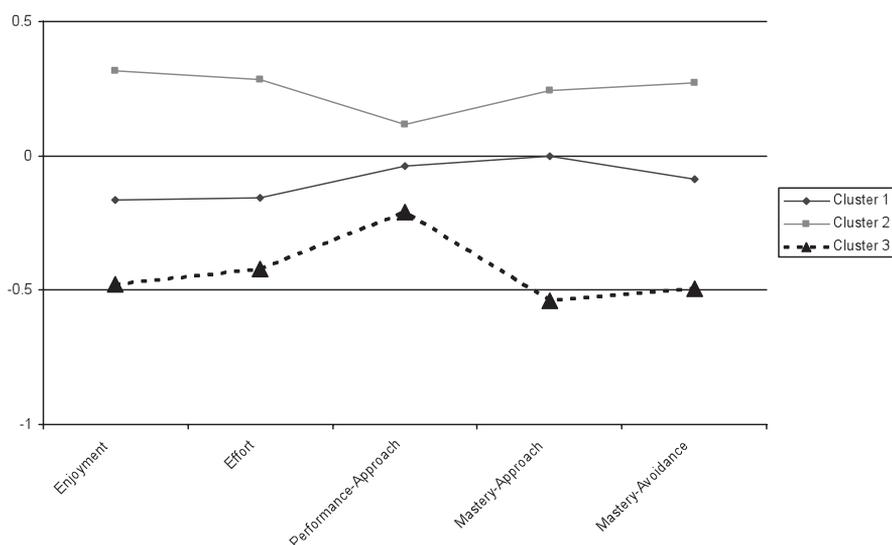


Figure 2. Cluster Differences Based on Enjoyment, Effort, and Achievement Goals

DIFFERENCES IN ACHIEVEMENT GOALS, PSYCHOLOGICAL NEEDS, AND BEHAVIOURAL REGULATION ACROSS CLUSTERS GROUPS

Table 4 displays the means, standard deviations and z scores of the dependent variables for the three clusters. Figures 2 and 3 present the cluster profiles in achievement goals, and psychological needs and behavioural regulation, respectively. The results of the MANOVA using achievement goals as dependent variables showed significant differences between the three clusters, Wilks's $\Lambda = .88$, $F(6, 518) = 5.80$, $p < .01$, $\eta^2 = .06$. Follow-up ANOVAs revealed that, except for performance-approach, significant differences between the three clusters were found in the two mastery goals: $F(2, 261) = 13.17$, $p < .01$, $\eta^2 = .09$ for mastery-approach; and $F(2, 261) = 13.03$, $p < .01$, $\eta^2 = .09$ for mastery-avoidance. Tukey's HSD revealed that the "negative" group scored significantly lower than the other two clusters for mastery-approach (both p-values $< .01$). The "positive" cluster scored significantly higher in mastery-avoidance goals than the other two clusters, the "average" cluster also had higher mastery-avoidance goal than the "negative" cluster (all p-values $< .05$).

The results of the second MANOVA using the three psychological needs as dependent variables also showed significant differences between the three clusters, Wilks's $\Lambda = .92$, F

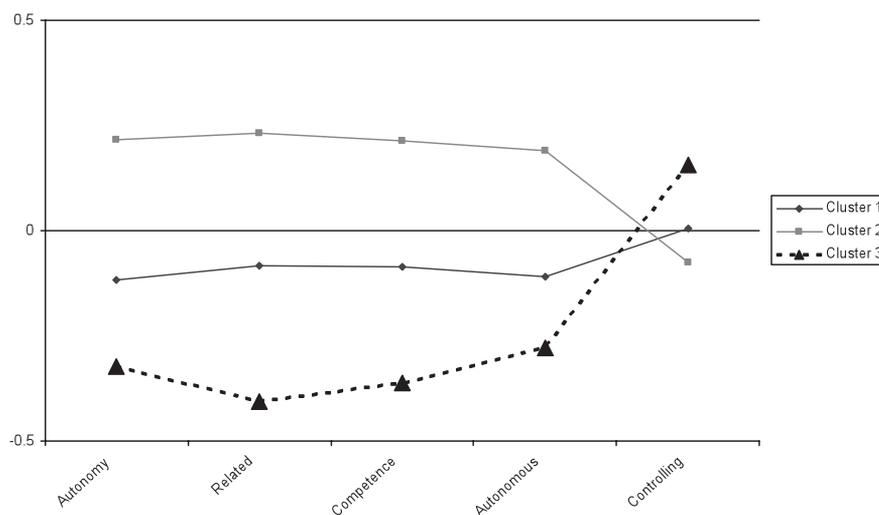


Figure 3. Cluster Differences Based on Psychological Needs and Behavioural Regulation

(6, 518) = 3.42, $p < .01$, $\eta^2 = .04$. The results of the follow-up ANOVAs showed that significant differences were found between the three clusters on all the three dependent variables (all p values $< .01$).

Specifically, the players from the “positive” cluster had significantly higher autonomy, relatedness, and competence compared to the players from the “negative” cluster. The final MANOVA revealed that there were significant differences between the three clusters in their behavioural regulation, Wilks’s $\Lambda = .95$, $F(4, 516) = 3.32$, $p < .01$, $\eta^2 = .03$. Follow-up ANOVAs revealed that significant differences between the three clusters were found in autonomous regulation only, $F(2, 259) = 4.71$, $p < .01$, $\eta^2 = .04$. Post-hoc tests showed that those in the “positive” cluster had significantly higher autonomous regulation compared to those in the “negative” cluster.

DISCUSSION

Of the many factors in sport that may impact athletes’ intrinsic motivation, the athletes’ perceptions of their coaches’ behaviours have been identified as one of the most important [20, 50]. The purpose of the study was to examine the multivariate relations between perceived coaching behaviours, 2 x 2 achievement goals, psychological needs, behavioural regulations, and outcomes variables (such as effort and enjoyment) among a group of elite high-school basketball players. The analysis was done at the intra-individual level using cluster analysis to identify subgroups of athletes with unique characteristics in their perceptions of coaching behaviours.

In the preliminary analysis, the autocratic behaviour subscale of the LSS was found to have unacceptable internal consistency coefficient ($\alpha = .20$). Thus, it was deleted from further analysis. Previous studies have also found the same subscale to have low reliability, with alpha coefficients lower than .50 [e.g., 8, 51, 52]. One of the reasons could be that coaches are respected by the athletes and thus responding to the items in autocratic subscale (such as “my coach refuses to compromise on a point”) could be problematic. In addition, the performance-avoidance goal subscale was also found to have low alpha coefficient. More

Table 4. Cluster Means, Standard Deviations, and z Scores for the Three Clusters by Achievement Goals, Psychological Needs, and Behavioural Regulation, and Outcome Variables

	Cluster 1 (N = 79)			Cluster 2 (N = 128)			Cluster 3 (N = 57)		
	M	SD	z	M	SD	z	M	SD	z
Performance-Approach	3.25	.89	-.04	3.40	1.00	.12	3.08	.90	-.21
Mastery-Approach	3.97	.68	.00	4.15	.67	.24	3.58	.75	-.54
Mastery-Avoidance	3.47	.67	-.09	3.75	.78	.27	3.16	.75	-.49
Autonomy	3.40	.57	-.12	3.59	.54	.21	3.28	.57	-.32
Relatedness	4.03	.61	-.08	4.23	.58	.23	3.83	.68	-.41
Competence	3.64	.55	-.09	3.83	.64	.21	3.47	.69	-.36
Autonomous Regulation	4.17	.61	-.11	4.36	.63	.19	4.06	.63	-.28
Controlled Regulation	1.91	.62	.01	1.86	.65	-.07	2.01	.68	.16
Enjoyment	4.19	.66	-.16	4.50	.52	.31	3.99	.71	-.48
Effort	3.96	.61	-.16	4.24	.55	.28	3.79	.72	-.42

work needs to be done in examining the psychometric properties of the LSS as well as the 2 x 2 achievement goal measures.

Using the four perceived coaching behaviours as clustering variables in the cluster analysis, three distinct clusters were found with “negative”, “average” and “positive” perceptions of coaching behaviours. Enjoyment and effort were used as the criterion variables and the three clusters had corresponding low to high enjoyment and effort exertion. The findings are similar to previous studies in that athletes’ perceptions of various behaviours exhibited by their coaches are related to their intrinsic motivation. For example, Amorose and Horn [4] found positive relationships between frequent positive feedback and democratic behaviours and intrinsic motivation.

Amorose et al. [17, 40] showed that the three psychological needs of competence, autonomy and relatedness are closely related to autonomy-supportive coaching and motivational orientation. It has also been established that the three needs mediate the relationships between perceived coaching behaviour and intrinsic motivation [17, 50]. The results of the present study provide some support in that when athletes’ perceptions of their coaches are “positive”, as in Cluster 2, the resulting needs satisfaction was much higher than the “average” and the “negative” clusters. Although this study did not use structural equation modeling, the pattern of the relationships was consistent with the theory. In fact, the use of cluster analysis may be more powerful than structural equation modeling in that it can identify all the athletes in a specific cluster. Researchers can follow up with the athletes about the reasons for perceiving their coaches in that way and address the issues specifically.

Very few studies have examined the 2 x 2 achievement goal framework in the sport domain, alongside SDT. Many researchers have demonstrated that the two theories could complement each other [53, 54]. In the 2 x 2 achievement goal framework, studies in the academic domain [e.g., 32] have shown that mastery-approach and performance-approach goals are positively related to positive effects and consequences. On the other hand, mastery-avoidance and performance-avoidance goals are associated with less adaptive motivational cognition and emotion (see [34]).

In the physical education domain, Wang et al. [33] combined the SDT and the 2 x 2 achievement goal framework in examining the three psychological needs, behavioural regulations and intrinsic motivation. They found four distinct clusters: i) a ‘moderate achievement goals’ profile with all four achievement goals close to standard scores of zero; ii) a ‘low achievement goals’ profile, in which all achievement goal scores were very low; iii) a ‘high achievement goals’ profile with very high scores for all the four goals; and iv) a ‘mastery achievement goals’ profile with high mastery-approach and mastery-avoidance goal scores, and moderate performance-approach and performance-avoidance goal scores. Similar to the ‘mastery achievement goals’ group, the ‘high achievement goals’ group had the most positive pattern of characteristics and outcomes, such as low amotivation, high relatedness and high perceived competence. They also reported high enjoyment of PE activities. In contrast, the ‘low achievement goals’ group had the least adaptive profile. They scored low on autonomy, relatedness, and perceived competence, and high in amotivation. They also reported least enjoyment of PE activities.

The findings of the present study are consistent with the previous study. The athletes in the “positive” cluster had a similar profile of “high achievement goals” found in Wang et al. [33]. This shows that coaching behaviours of training and instruction, positive feedback, democratic behaviour and social support all related to mastery-approach, performance-approach, and mastery-avoidance goals. The results add to the literature in that coaching behaviours are closely related to athletes’ achievement goals.

Taken together, the findings of this study and previous studies converge to a motivational sequence proposed by Mageau and Vallerand [50]. Perceived coaching behaviours and the goals structure set up by the coach influence athletes' behavioural regulations through the fulfillment of the three psychological needs. The more the athlete perceives the three needs are being satisfied, the more self-determined one's behaviour will be. The resulting consequences will be more motivational adaptive behaviours, such as seeking challenge, persistence during failure and feeling of pride and accomplishment [20].

CONCLUSION

It seems that social events such as the coaches' behaviour or goal structure are related to athletes' behavioural regulation and motivational outcomes. For example, a controlling style corresponds mainly with a low fulfillment of the need for autonomy. A performance goal corresponds with more controlling motivation or regulation. Consequently, they are unlikely to persist at the task or participate in the activity for a long time because of the unpleasant experiences, and this may result in low perceptions of their physical self-worth. Thus, it may be critical that coaches examine these social factors (their own behaviour and coaching methods) in terms of promoting autonomy, perceived competence and relatedness, in order to enhance athletes' motivation and positive motivational outcomes. This study has demonstrated the use of cluster analysis in identifying distinct groups of athletes based on their perceptions toward their coaches and its impact on their motivation. A logical follow-up intervention could be opening up the communication channels between the coaches and the athletes to clarify the expectations and commitment of both parties.

A few limitations of the present study need to be mentioned. First, the model proposed by Vallerand and Losier [20] does not consider personal factors, such as conceptions of sport ability. Future research should examine how personal factors interact with social factors [55] in affecting the motivational sequence of the model. Secondly, this study is cross-sectional and thus causality cannot be inferred. Thirdly, further psychometric work is required concerning the assessment of LSS and AGQ; in particular, the subscale of autocratic behaviour. Finally, LSS only measures limited coaching behaviours and focuses exclusively on the frequency of behaviours. Future studies should look at the quality of the coaching behaviour to gain a full understanding of why coaches do what they do in a specific context. This would extend our understanding of the complex coaching process.

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