



Successful Intelligence and Coaching Efficacy among Soccer Coaches

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Authors' contributions

This work was carried out in collaboration between both authors. Author GC collected the data and managed the analyses of the study. In addition to this, author GC wrote the first draft of the manuscript. Author HOB carried out all literature work, wrote the conceptual framework and the conclusion. Moreover, author HOB managed the literature searches and edited the manuscript. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJESBS/2016/26903

Editor(s):

(1) David A. Kinnunen, Department of Kinesiology, California State University Fresno, USA.

Reviewers:

(1) Jaffry Zakaria, Sultan Idris Education University, Malaysia.

(2) Michal Bronikowski, University School of Physical Education, Poznan, Poland.

Complete Peer review History: <http://sciencedomain.org/review-history/15324>

Original Research Article

Received 9th May 2016
Accepted 9th June 2016
Published 9th July 2016

ABSTRACT

The purpose of this study was to investigate relationship between successful intelligence and coaching efficacy among football coaches in Turkey. Participants of the study were 220 males (M age = 35.72±9.49) from various coaching degree, C level (n=109: 49.05%), B level (n=57: 25.65%), A level (n=32: 14.40%) and not given (n=22; 10.90%). Successful Intelligence Questionnaire and Coaching Efficacy Scale were administered to the participants. Canonical correlation analysis was used to investigate the relationships between two sets of variables. Successful intelligence in three dimensions – analytical, creative and practical – was related to coaching efficacy in four domains – motivation, game strategy, technique and character building. Canonical correlation analysis results revealed that the analytical and practical abilities were the most contributed predictor of coaching efficacy in motivation and character building domains. In conclusion, the coaches who have analytical and practical abilities are more pronounced in terms of game strategy and technique efficacy.

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Keywords: Successful intelligence; coaching efficacy; canonical correlation analysis; soccer coach.

1. INTRODUCTION

Based on Denham and Michael's model of teacher efficacy, and [1] self-efficacy theory, coaching efficacy can be defined as a coach's belief in his ability to affect the learning and the performance of his athletes [2]. Coaching efficacy consists of four dimensions. The first one is motivation, the second one is game strategy, the third one is technique, and the last one is character building [3]. More specifically, motivation efficacy refers to the coach's confidence in his ability to affect the mood and psychological states of his athletes. Game strategy efficacy is the coach's belief in his ability to coach and guide his team to a successful performance during competition and lead them to a successful outcome. Technique efficacy represents a coach's confidence in his ability to show skills in an effective way, identify talent, and diagnose skill errors. Finally, character building efficacy concerns a coach's belief in his ability to promote his athletes' personal development [4].

In addition, [3] proposed that certain desirable outcomes for both coaches and athletes should result from high levels of coaching efficacy. Scholars have stated that high self-efficacy in coaches has been found to relate to different external variables: These include coaching behavior [3], team winning percentage [5], coaches' commitment to coaching [6], player improvement [7]; [4], playing experience [8], imagery [9], leadership style [10], coaching experience [7], coach education [11], team efficacy, satisfaction with the coach, and team performance in athletes [12-14].

In addition to different variables, perhaps the most salient information affecting changes in coaches' self-efficacy beliefs are coaches' perceptions of their abilities relevant to their successful performance on specific activities. Here, [15] conceptualization of successful intelligence, which is concerned with an individual's ability to succeed in life, indicates that high self-efficacy is characteristic of successful intelligence of a person. According to this theory, high self-efficacy means believing in one's ability to get a job done. People who don't think they can succeed, often don't [16].

Specifically, [17] defines successful intelligence as, (a) the ability to achieve in life according to one's own definition of success, given one's socio-cultural context, (b) capitalizing on one's strengths and correcting or compensating for one's weaknesses, (c) the ability to adapt to, shape, and select environments, (d) the capacity to succeed through a combination of analytical, creative, and practical abilities [18].

In brief, analytical abilities are involved when one dissects, understands, and solves problems. Creative abilities are involved when one creatively copes with novel problems and problem situations. Practical abilities are involved when one applies analytical and creative abilities to pragmatic problems. There is no single way to succeed in a job that works for everyone.

With the assessment that the triarchic abilities of successful intelligence, separately or interactively, might contribute as efficacy information to perceptions of self-efficacy, the present study aimed to examine the relationship between successful intelligence and coaching efficacy in a sample of Turkish coaches in Turkey. The triarchic abilities of successful intelligence and coaching efficacy were separately assessed. The correspondence of coaching efficacy and personal accomplishment was examined, as was the blending of the triarchic abilities.

2. METHODS

2.1 Participants

In Turkey, 220 different internationally licensed soccer coaches participated in this study. The sample consisted of 32 coaches who were UEFA "A" licensed, a first top coaching degree; 57 coaches who were UEFA "B" licensed, a second top coaching degree; and 109 coaches who were UEFA "C" licensed, a third top coaching degree. Twenty-two participants did not give information about a coaching degree. The participants were between the ages of 21 and 62 ($M_{age} = 35.72$ years, $SD = 9.49$) with coaching experience ranging from 1 to 30 years ($M_{experience} = 7.55$ years, $SD = 5.60$). All of the participants received an information letter and informed consent form prior to participating in this study. The researcher

has applied and obtained from the University Ethics Committee for ethical approval.

2.2 Instruments

2.2.1 Successful intelligence

The Successful Intelligence Questionnaire (SIQ), developed by [18], assesses successful intelligence based on responses to 36 items describing activities that reflect analytical, creative, and practical abilities. The SIQ uses a six-point scale ranging from 0 (*least descriptive*) to 5 (*most descriptive*) to evaluate these items. The relevant items can then be aggregated to yield a score on analytical abilities (12 items, e.g., I compare and contrast different points of view), a score on synthetic abilities (12 items, e.g., I come up with new ideas), and a score on practical abilities (12 items, e.g., I put into practice things that I have learned). A confirmatory factor analysis on these 25 items revealed that a six-factor model adequately represented the data ($\chi^2_{(260)} = 672.95$; $p = .00$; $\chi^2/df = 2.58$; Normed Fit Index = 0.97; Comparative Fit Index = .99; Standardized Root Mean Square Residual = .05). The Cronbach [19] α was .97 for 36 items, with subscale values being .92 for analytical, .93 for creative, .90 for practical intelligence.

2.2.2 Coaching efficacy scale

The Coaching Efficacy Scale CES [3] was used to measure coach efficacy in the present study. The authors represented the four-factor structure of coaching efficacy through 24 Likert-type scale questions. Responses could range from 0 (*not at all confident*) to 9 (*extremely confident*). The Turkish version of the coaching efficacy was examined by [20]. Motivation was represented by seven items (e.g., confidence to motivate athletes), as was game strategy (e.g., confidence to recognize opposing team's weaknesses during competition). Teaching technique was measured by six questions (e.g., confidence to demonstrate the skills of your sport), while character building had four items (e.g., confidence to instill an attitude of fair play among athletes). This measurement has been supported by confirmatory factor analysis with high school coaches, and has been shown to be internally reliable. Alpha values in the present study were .95 for the total scale, with subscale values being .92 for motivation efficacy, .88 for game strategy efficacy, .86 for character building efficacy, and .87 for teaching technique efficacy.

2.3 Procedure

The necessary permission to conduct the study was initially obtained from the Turkish Soccer Federation. The study was explained verbally to the coaches who were attending in a conference which is organized by Turkish Soccer Federation. In addition to this, the coaches were provided with multi-section instruments containing demographic items. Confidentiality was guaranteed for their responses. The questionnaire took 25 to 30 minutes to complete. All participants were assured that the data would be kept confidential and would be used for research purposes only.

2.4 Translation of the Successful Intelligence Scale

The Successful Intelligence Scale, which was originally written in English, was translated into Turkish using the back-translation technique [21]. This method required the contributions of four bilingual translators. Translators A and B, who were bilingual university faculty members with doctorate degrees in Sports Psychology, independently translated the Successful Intelligence Scale from English into Turkish. Following discussions, they reached an agreement regarding a preliminary Turkish version. This was then independently translated from Turkish back into English by translators C and D, who were bilingual faculty members with doctorate degrees in English. A comparison of the version that was retranslated into English by translators C and D with the original English Successful Intelligence Scale revealed that the item meanings were identical. Therefore, the preliminary Turkish version agreed upon by translators A and B was retained.

2.5 Analysis

In order to have successful intelligence, which is the independent variable of the set, there must be ability, analytical, creative, and practical dependent variables. In the set of dependent variables, there must be motivation efficacy, game strategy efficacy, technique efficacy, and character building efficacy. Since there were more than one dependent and independent variables in the study, it was formed in a continuous data. It was designed to examine the relationships between variables in two sets. The correlation technique was used between sets (canonical) in order to solve the data [22]. In order to obtain reliable results from canonical

correlation analysis, some conditions must be established [23]. It is expressed that there are normality, multi-collinearity, linearity, homoscedasticity and outliers. The multi-collinearity test was established by looking at Pearson's correlation coefficients and tolerance values among variables. In addition, in order to test other assumptions, a canonical root scores scatter graph was drawn. Outliers were identified by examining with Z scores for univariate outliers and with maholonobis distance for multivariate outliers in each variable. One case of univariate and 39 cases of multivariate outliers were removed, leaving 220. As a result of these studies, canonical correlation analyzes of the data concluded that they had sufficiently met the assumptions. 0.05 was accepted as a margin of error in research. Cronbach's alpha coefficients were used to assess the internal consistency of the measuring instruments.

3. RESULTS

Canonical correlation was performed between a set of successful intelligence variables and a set of coach efficacy variables using SPSS CANCORR. The successful intelligence set included analytical intelligence (ANA), creative intelligence (CRE), and practical intelligence (PRA). The coach efficacy set contained motivation efficacy (ME), game strategy efficacy (GSE), technique efficacy (TE), and character building efficacy (CBE).

The first findings presented were Pearson's correlation coefficient matrix between variables, followed by the results of canonical correlation analysis. The correlation coefficient in psychology framework uses the terms of strong and weak to compare descriptively. According to the often-cited publication by Cohen [24], Pearson correlation values of $r = \pm .50$ are considered strong, $r = \pm .30$ are considered moderate, and $r = \pm .10$ are considered weak.

The correlation coefficients of dependent and independent variables of the research are given in Table 1.

As seen in Table 1, there was positive relations between successful intelligence and the coach efficacy ($r = .28 - .56$). Pearson correlation coefficients of analytical intelligence indicated that motivation ($r = .39$) and character building ($r = .49$) were moderate, and game strategy ($r = .56$) and technique ($r = .53$) were strong. On the other hand, there were moderate positive

relations with creative intelligence and game strategy ($r = .49$), technique ($r = .47$), and character building ($r = .30$). However, there was a weak relations with motivation ($r = .28$). In addition, practical intelligence correlation coefficient showed that motivation ($r = .42$) and character building ($r = .46$) were moderate, while game strategy and technique were strong relations.

As a result of the canonical correlation analysis, the three canonical correlation coefficients were obtained and one significant canonical root was extracted in the analysis. The first canonical was .61 (38% overlapping variance). The remaining two canonical correlations were effectively zero. With all three canonical correlations included, $\chi^2_{(12)} = 149.436$; $p < .00$. Subsequent, χ^2 tests were not statistically significant. The first pairs of canonical variates, therefore, accounted for the significant relationships between the two sets of variables.

Correlations and standardized canonical coefficients are reported in Table 2. Shown in the table are correlations between the variables and the canonical variates and the standardized canonical variate coefficients. Within-set variance was accounted for by the canonical variates (percent of variance), redundancies, and canonical correlations. The first canonical root accounted for 81% of variance of the successful intelligence set and 76% of the variance of the coach efficacy set. Therefore, the percent of variance and total redundancy indicate that first pairs of canonical roots were strongly related.

In Table 2 for correlation coefficients, the cut-off point was taken as .30. All the variables in the successful intelligence set that correlated with the first canonical root were analytical, creative, and practical. Similarly, all of coach efficacy variables—motivation, game strategy, technique, and character building—correlated with the first canonical root. The first canonical variates indicated that high scores in analytical intelligence (.94), creative intelligence (.86), and practical intelligence (.90) are associated with motivation (.81), game strategy (.97), technique (.90) and character building (.82). Stevens (2002) stated that canonical coefficients should be reported with canonical loadings. These variables, such as multiple regression analysis, reviewed the standardized coefficients, analytical (.64) and practical intelligence (.55) of the most contributed variable, and are observed to be a

Table 1. Averages of variables, standard deviations and internal consistency and Pearson's correlation coefficients

Dependent \ Independent	Pearson's correlation coefficients						
	M	SD	α	ME	GSE	TE	CBE
				M = 52.34 SD = 6.26 $\alpha = .88$	M = 50.58 SD = 6.39 $\alpha = .89$	M = 44.54 SD = 5.10 $\alpha = .84$	M = 30.88 SD = 3.79 $\alpha = .79$
ANA	42.45	8.21	.93	.47**	.56**	.53**	.49**
CRE	38.07	8.56	.90	.28**	.49**	.47**	.30**
PRA	42.78	8.06	.92	.42**	.55**	.51**	.46**
Coaching degree				.31**	.36**	.28**	.33**

$p < .05$ and ** $p < .001$

first canonical variate. When the standardized coefficients related with coaching efficacy is examined, it is observed that variables that contribute the most to the first canonical variate are game strategy (.61) and technique efficacy (.38).

Table 2. Correlations, standardized canonical coefficients for the first canonical variates between successful intelligence and coach efficacy and their responding canonical variables

Variables	First canonical variate	
	Correlation	Coefficient
Successful intelligence set		
ANA	.95	.64
CRE	.82	-.16
PRA	.93	.55
Percent of variance	.81	
Redundancy	.30	
Coach efficacy set		
ME	.79	-.21
GSE	.95	.61
TE	.90	.38
CBE	.84	.28
Percent of variance	.76	
Redundancy	.29	

As a result, according to first canonic root, the coaches whose analytical and practical intelligence was high, had high coach efficacy that was more pronounced in terms of game strategy and technique efficacy. Fig. 1 shows, in general, the relationship among variables and the first root of canonical variate.

4. DISCUSSION

The present study sought to ascertain the extent and nature of relations between the successful intelligence and coach efficacy. Prior results provided some empirical support, but they were

in an educational context, as the sports context relationship between successful intelligence and coach efficacy had not been investigated until this study. However, coaching efficacy has assumed a role in models of coaching effectiveness [12]. Moreover, coaches' effectiveness is based directly on a coach's personal characteristics. Most importantly, the effectiveness of coaching depends on the individual differences of the coaches [25].

Indirectly, the personal characteristics of the athlete influence a coach's behavior by affecting his expectations, beliefs, and goals. Moreover, a coach's belief about his capacity affects the learning and performance of his athletes. With this in mind, a theory of components of intelligence was used to understand the information-processing origins of individual differences in human intelligence. In addition, in his self-efficacy theory, [1] suggested that a major means of influencing efficacy was based on the processing of efficacy information on the successful performance of relevant activities. At this time, [17] successful intelligence theory uses an integrated set of abilities that are needed to attain success on individual patterns. Hence, this study assessed coaches' perception of their self-efficacy within the framework of [26] successful intelligence.

In canonical analyses, the first canonical root identified that perceived analytical and practical abilities emerged as the best significant predictor of coach efficacy in four domains. These findings supported the theoretical suggestions of scholars [17]. In this successful intelligence framework, personal abilities or resources are viewed in the context of person-environment interactions, suggesting that self-efficacy beliefs could be enhanced by a well-managed balance of these three individual abilities. The present findings certainly have implications for developing

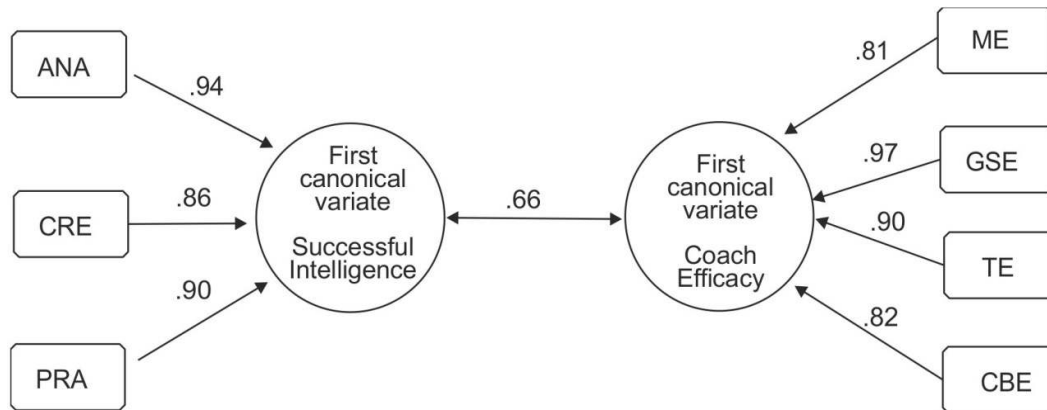


Fig. 1. Loadings and canonical correlations for first canonical variate pair for the data in Table 2

intervention efforts to help coaches enhance their efficacy beliefs in relevant domains, game strategy, and technique efficacy. Specifically, analytical abilities represent a mix of abilities that analyze, evaluate, judge, compare, and contrast in understanding and solving problems [18]. Similarly, game strategy is the coach's belief in his ability to coach and lead his team to a successful performance during the competition. A coach also shows his confidence by identifying an opponent's weakness and making in-game adjustments [3]. Thus, a coach's analytical abilities may provide clues in identifying the strengths/weaknesses of an opponent and ways to successfully adjust tactics during the competition. For example, a coach may assess the strategy used by the favored team in a football match and ascertain what tactics should be used in order to defeat the opponent [27]. Also, analytical abilities could be a significant predictor of technique efficacy. Technique efficacy pertains to the coaches' beliefs regarding their instructional teaching and diagnostic skills, training, and conditioning [3]. Analytical abilities allow coaches to assess activities through instructional and critical thinking and thus, let them dissect, understand, and solve problems through teaching and diagnostic skills [28]. Moreover, Pearson's correlation coefficients revealed the supporting findings, analytical abilities mostly associated with game strategy ($r = .56$), and technique efficacy ($r = .53$) in four coach efficacy domains. [3] stated that coaches can be seen as teachers. And consistent with the theoretical predictions of scholars in career teachers, self-efficacy is a development process of exploring and commitment to successful intelligence. Chan [29] found that a significant

predictor of teaching highly-able learners was analytical abilities among Chinese teachers.

In addition, the first canonical root identified that practical abilities were strong significant predictors of coach efficacy. Practical abilities involve individuals applying their abilities to the kinds of problems one could expect in the transmission of pragmatic and tacit knowledge in job life. Furthermore, since coaching efficacy in game strategy and technique efficacy could be most predictable from practical abilities, one could expect the transmission of pragmatic and tacit knowledge about coaching through coaching-related tasks. In addition, a coach's playing experience may be a source of practical abilities that leads to high game strategy efficacy beliefs. Moreover, technique efficacy pertains to the coaches' beliefs regarding their instructional and diagnostic skills [3]. [30] stated that there is evidence that teaching for successful intelligence could raise student achievement [30]. In this way, successful intelligence helps coaches to develop greater confidence and ultimately increase effectiveness in their teaching and diagnosing skills. For example, coaches can put into practice what they have learned from their coaching education in football into making their athletes' techniques better [26].

Specifically, more efficacious youth sports coaches perceived more support, had more extensive playing and coaching backgrounds, and thought their players improved more throughout the season compared with less efficacious coaches, particularly in terms of technique and game strategy efficacy [4].

Admittedly, the present study had many limitations in canonical correlation analysis results. It was generally assumed that different levels of triarchic abilities (analytical, creative, and practical) contributed to different degrees of efficacy beliefs, and that the one canonical root was from triarchic abilities to coach efficacy. However, the findings were discussed based on a theoretical background to focus only a few studies in education context on relationships between successful intelligence. Thus, the need for studies in sports context should be emphasized.

The present study assessed coach efficacy in the expanding areas of coach functioning in Turkey, which include coaching of triarchic abilities (analytical, creative, and practical) in a football sample. It is possible that these coaches could have been relatively motivated and therefore, it is difficult to generalize the present findings to the larger population. Thus, the need for cross-cultural and different sports replication studies with more representative samples of coaches should be emphasized.

5. IMPLICATIONS AND CONCLUSIONS

Research indicates that a set of methods of teaching for successful intelligence helps not only coaches, but also students to reach their full potential [31]. [32] stated that professional improvement is very important for coaches. And coach educational programs provide a complement to coach professional development. Thus, teams and sports federations should integrate successful intelligence courses in their educational system. By training, we can predict that coaches will improve their analytical, creative, and practical ability to demonstrate belief of their efficacy, and thus become more effective role models.

The results of the research show that the coaches whose analytical and practical intelligence were high, have high coach efficacy that are more pronounced in terms of game strategy and technique efficacy. From these results, having successful intelligence could be accepted as a new component for coaches' effectiveness, and it could be said that coaches who have high successful intelligence differ from coaches who have less successful intelligence because of their using analytical, creative, and practical abilities. Ultimately, they are more effective for the success of the team.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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The peer review history for this paper can be accessed here:
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