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Measure Athletes' Volition—Short: Evidences for Construct Validity and Reliability

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Abstract

The Measure Athletes' Volition consists of 23 items that measure six elements of volitional competences. The purpose of the present study was to examine whether a subset of these items could form a short version of the scale; to provide evidence for the structural validity and internal consistency of the short version; and to test validity issues of the new scale. A total of 831 individuals from three different samples completed the long version of the scale. Results indicated that the short version consisted of 15 items that measured volitional competences of persistence, expediency, and purposefulness. This scale had acceptable internal consistency and construct validity (differences between groups and convergent and concurrent validity). In conclusion, the short version of the scale is a reliable and valid measure for volitional competences.

Keywords: Measure, volition, short version, physical activities

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Sport/exercise is linked to improvement of the participants' performance. Although emotions and motivation have been supported to be the two factors that positively contribute to sport/exercise participation (e.g., Gillet, Berjot, & Gobancé, 2009; Woodman et al., 2009), it is noted that these may not be enough to achieve maximum performance. Cognitive investigators propose that higher-order cognitive preferences (e.g., goals or intentions) may temporarily override lower-order, automatic behavioral impulses (Bargh, 1984; Posner & Snyder, 1975). Kuhl (1987) argues that motivation leads only to the decision to act. Acts in sports are considered as urged (e.g., achievement goals), nevertheless the act urged by motive is not necessary to be fulfilled (Kuhl, 1985, 1987).

Volition has been characterized as a psychological factor that can cover the gap of emotions and motivation to improve performance (Kehr, 2004). Researchers argued that volitional regulation is needed to support cognitive preferences insufficiently motivated by or discrepant from actual implicit behavioral tendencies (Emmons, 1999; Epstein, 1998). Beckmann (1987) claimed that volition may consist of increasing vigor, suggesting that an athlete with high volition would not stop an action when things get tough. Weinberg and Williams (2001) stated that "without an individual's desire to achieve success there is little hope that any psychological skills program would be successful because it takes commitment to practice the skills and carry out the program" (p. 363).

Volition can be considered as the "competence" of an individual to be committed to a goal—chosen by him/her—and to coordinate all his/ her forces in order to achieve this goal (Proios, Mavrovouniotis, & Proios, 2012). For example, in sports each athlete is characterized by achievement goal-setting. The ability to achieve the goals set, regardless of any obstacles present, characterizes the extent of the athlete's volition. Elbe, Szymanski, and Beckmann (2005) report that "volition is a construct from motivation psychology that describes the processes and mechanisms of self-regulation and is commonly referred to as the 'will'" (p. 560).

Psychologists support that optimum volitional functioning is an emergent property of synergies between the individual and the situation (e.g., Bandura, 1986). This means that training habits and styles that mark volition can be seen in strategy efforts by athletes to accomplish self-reliantly the various tasks that training presents. According to Kuhl and Fuhrmann (1998) the development of volition takes place throughout life, however with its most striking features being evident during childhood and adolescence (Elbe et al., 2005).

Numerous studies have examined the connections between volitional skills and athletic achievement (e.g., Beckmann, 1999; Beckmann & Kazen, 1994; Beckmann, Szymanski, & Elbe, 2004). Volition is especially important for realizing long and intense training loads during the course of an athletic career or for keeping up regular exercising. In addition to achievement motivation, concentration, and persistence (Schneider, Bös, & Rieder, 1993), volition is seen as an essential component for athletic excellence. A positive development of these aspects of personality is important for all young

competitive athletes. In addition, the role of context has become increasingly important to motivation theorists (Urda, 1997).

The connection of volitional competences with athletic performance reveals the importance of the estimation of the power of volitional abilities of athletes. The application of volitional control helps to estimate volitional abilities and to control cognitive, motivational, and affective processes around achievement goals (Corno & Kanfer, 1993). The literature contains several instruments used in sport, a) containing a set of elements of volition (e.g., Volitional Components Questionnaire [VCQ II; Kuhl & Fuhrmann, 1998]) and b) containing only one element: persistence (e.g., Persistence Scale for Children [PSC; Lufi & Cohen, 1987; Short-term Persistence (LeFoll, Rasclé, & Higgins, 2006)). Recently, Proios and Proios (2014) developed the instrument Measure Athletes' Volition (MAV) for measuring the power of athletes' volition. The development of MAV was based on the viewpoint that volition is a psychic phenomenon that directs goal-oriented behavior, particularly in adverse conditions. The items of MAV contained constructs relevant to the elements of volition such as continuous effort, effort with difficulties, decision making, persistence in the effort, intention, and goal that explain the three volitional qualities (persistence, expediency, and purposefulness). Persistence is a personal skill describing the efforts undertaken by the individual to achieve a goal, for example in sports. Expediency is a construct suggesting that an individual's action serves a purpose or is intentional, while purposefulness represents another personal skill and characterizes individuals who do not hesitate to make decisions and implement them. Finally, this scale included 23 items with six factors.

The existing structure of the six factors makes the measure impractical for use, since the above mentioned elements of will do not appear in the same way in all sports. Also the use of instruments with multiple subscales such as the MAV presents credibility problems, and for these reasons shorter scales are more popular with respondents and more reliable (DeVellis, 2003). In this sense and through the examination in total of the structure of MAV, a smaller scale could be supported regarding factors and items. The shorter scale of MAV would be more useful and would make an important contribution to the literature.

The goal of the present study is to develop a shorter MAV. This will be done within the framework of three studies, which have as their objects the identification of items that would form a short version of the MAV, the possible enhancement and control of structural validity and internal consistency, and the examination of validity issues of the new scale.

Study 1

The purpose of Study 1 was to select items from the initial 23-item MAV scale for the short scale. Specifically,

we aim to measure volition through the qualities (competences) of persistence, purposefulness, and expediency as independent constructs.

Method

Participants

The sample used for this study was the one from a study used to develop the MAV (Proios & Proios, 2014; available online for free at <http://www.jhse.ua.es/jhse/article/view/445/1015>). Participants were 371 athletes (male $n = 209$, and female $n = 158$; four participants did not state their gender). Their age ranged from 18 to 24 years ($M = 20.12$, $SD = 2.27$). At the time of the study, the athletes in the sample had been participating in 25 different sports. Their athletic experience ranged from 1 to 16 years ($M = 9.16$, $SD = 3.65$).

Procedures

The procedure for the completion of the questionnaires began when researchers contacted athletes and coaches in their training sports. Before contact, the appropriate permission for the cooperation of the athletes and trainers was requested and granted by the leagues. No participant was compensated for taking part in the study.

Instrument

Measure Athletes' Volition (MAV). Athletes' volition in sport and physical activities settings was measured using the MAV (Proios & Proios, 2014). This 23-item measure assesses six components of volition: effort continuous, effort with difficulties, decision making, persistence in the effort, intention, and goal. Mainly these components consist of the elements of volitional qualities: persistence, expediency, and purposefulness. Participants were asked to answer on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Results

Preliminary Analyses

Initially, inter-item correlations were examined; items that were highly correlated ($r = .40, .50$; see Clark & Watson, 1995) with other items were removed as such relationships may lead to the formation of lower-order factors. Four items were removed as a result of these analyses: one from effort with difficulties, one from decision making, one from persistence in the effort, and one from goal labeling. Then, separations of principal component analyses on each of the three proposed dimensions (item loadings $.50$ or above retained, and items with cross-loading $> .30$ removed; Gerbing & Hamilton, 1996) were conducted

to reduce the initial item pool of Sample 1. Within the frame of this analysis five items were removed: two from persistence in the effort and one from each of effort continuous, decision making, and goal.

Exploratory Factor Analysis

Exploratory factor analysis was conducted on 19 retained items to provide a preliminary evaluation of the hypothesized three-factor structure. The KMO and Bartlett's tests were significant, $\chi^2(91) = 853.21, p < .001$, and Kaiser's measure of sampling adequacy was .792, which was above the recommended threshold of .6 (Tabachnick & Fidell, 2007). The 14-item 3-factor model consisted of: in persistence (5 items), expediency (4 items), and purposefulness (5 items). The three-factor solution accounted for 50.85% of the total variance. The scale demonstrated acceptable to good internal consistency with alpha coefficients ranging from .67 to .75.

Study 2

The main purpose of Study 2 was to enhance items and improve alpha coefficients of the short scale. Specifically, our goal was to check the structural validity and internal consistency of the new scale.

Method

Participants

Participants were male ($n = 108$) and female ($n = 109$) students at a department of physical education and sport science. Of those, 142 were involved in competitive and 75 in recreational activities.

Procedures

Prior to the beginning of the research, ethical approval and relevant permissions were asked from the participants.

Instrument

Measure Athletes' Volition—Short (MAV-S). In this study, the 14-item scale of Study 1 was used. However, in this scale two items were added in the subscale expediency for the enhancement of its internal consistency.

Results

Factor Structure of the Scale

Exploratory factor analysis. To examine the hypothesis regarding the factor structure of MAV-S, we initially conducted a principal component analysis of the 16 items

with Varimax rotation with the presumption that items would be uncorrelated. The analysis extracted three factors accounting for a total of 48.50% of the variance. The factor structure showed one item exhibiting a loading of less than .40 and was therefore omitted. Factor analyses were then recomputed on the 15 items. Results revealed that KMO and Bartlett's tests were significant, $\chi^2(105) = 865.32, p < 0.001$, and Kaiser's measure of sampling adequacy was .812, which was above the recommended threshold of .6 (Tabachnick & Fidell, 2007). Using parallel analysis as an extraction method, we identified three significant factors, which, taken together, accounted for 50.41% of the total variance (see Table 1). The three factors were: persistence (5 items), expediency (6 items), and purposefulness (4 items).

Confirmatory factor analysis. Based on the results of the exploratory factor analysis, 15 items were used for the subsequent analysis. Overall, three models were postulated and examined. The first model postulated a three uncorrelated latent factor structure. The next model was a variation of the previous one, allowing the three latent factors to correlate with each other. The final model was of higher order, so as to explain data more parsimoniously from the first-order model, which when it includes goodness of fit is not expected to be better than the first-order model (Flora, Finkel, & Foshee, 2003). Models with one or more higher-order factors should fit almost as well as a model with correlated first-order factors (Barchard & Christensen, 2007).

Using Amos 7.0 (SPSS, Chicago, IL), confirmatory factor analyses were conducted to assess the fit of the hypothesized models. The maximum likelihood method was used to estimate these parameters (Byrne, 1994). Missing data were rare (all items <1%) and assumed to be missing at random. A set of goodness-of-fit indices were calculated, including the traditional chi-square fit index, comparative fit index (CFI), goodness of fit index (GFI) and root mean square error of approximation (RMSEA). A value of .90 or higher for CFI, GFI, and IFI, and an RMSEA of .06 or lower served as the indicators for an adequate fit (Hu & Bentler, 1999; MacCallum, Brown, & Sugawara, 1996).

According to the results of the traditional chi-square fit index, $\chi^2(74) = 126.89, p < .001$, the observed model was significantly different from the expected model. However, this may be related to the large sample size. All other indices, including CFI (.924), GFI (.926), IFI (.926), and RMSEA (.058), suggested an adequate fit only for the correlated factor structure (Table 2). Final, the results for a higher-order factor structure had no satisfactory fit.

Reliability

For the assessment of reliability, internal consistency methods and Cronbach's alpha were used (Anastasi & Urbina, 1997; Cortina, 1993). The internal consistency

Table 1

Factor loadings (FL), reliability characteristics (Cronbach alpha, α), and item-total correlations (ITC) of the MAV-S.

Variable	FL	ITC
Factor 1: persistence ($\alpha = .74$)		
1. I insist on completing a set number of exercises even though I feel tired	.67	.46
2. I insist on executing exercises even if there is a danger for injury	.58	.43
3. I insist on executing exercises even without the presence of the coach	.77	.53
4. I insist on exercising even though the conditions are not good	.68	.59
5. I insist on an exercise regardless if I make mistakes, in order to master it	.64	.49
Factor 2: expediency ($\alpha = .70$)		
1. I feel capable of doing whatever I am asked to do	.66	.45
2. I execute exercises without any hesitation	.59	.49
3. When I start an exercise I complete it	.45	.37
4. I feel that I exercise because I want to	.49	.40
5. I feel capable of overcoming difficult situations	.66	.45
6. I insist on an exercise even though I receive negative comments from others	.59	.42
Factor 3: purposefulness ($\alpha = .78$)		
1. I exercise intensively because I wish to improve my skills	.79	.61
2. I exercise intensively because I feel fulfillment	.73	.61
3. When I exercise I try not to lose any unjustified exercise time	.67	.50
4. I exercise intensively because I wish to achieve the goals I have set	.76	.62

method that was used here was correlations with item-to-scale (average item-total correlation) (DeVellis, 2003).

The results of the inter-total correlation indicated low to medium relation among items (see Table 1). An average inter-item correlation of .30 or higher indicates acceptable reliability (Robinson, Shaver, & Wrightsman, 1991). Tabachnick and Fidell (2007) suggest that correlations exceeding .30 provide enough evidence to indicate that there is sufficient commonality to justify comprising factors. The alpha coefficients for each factor ranged from .70 to .78, and were above the criteria for an acceptable level of reliability (Table 1).

Study 3

The main purpose of Study 3 was to ensure the support for construct validity of the MAV-S scale by examining validity issues, namely the differences between groups and convergent and concurrent validity.

Differences Between the Groups

Sports activities (competitive and recreational) are distinguished by different intensity in effort and achievement goals (Maron & Mitchell, 1994). Maron and Zipes (2005) suggest that a competitive athlete is one who participates in

an organized team or individual sport that requires regular competition against others as a central component, places a high premium on excellence and achievement, and requires some form of systematic (and usually intense) training. In this sense we expect that the volitional qualities persistence, expediency, and purposefulness would differ among the type of sports (competitive and recreational). This kind of examination is supported to check the validity of a new measure (Cronbach & Meehl, 1955).

Convergent Validity

To establish convergent validity, one needs to show that measures that should be related are actually related. This is the reason why we examined the relationship between volitional qualities of persistence, expediency, and purposefulness and the achievement goal orientation in sport settings. Achievement goals are defined by the purposes of competence-relevant activities that individuals strive for, in achievement contexts (Ames, 1992). According to achievement goal theory of motivation (Nicholls, 1984) there are two dispositional perspectives: task and ego orientation. Task orientation refers to self-referenced perception of ability. In a state of task involvement, the athlete believes that subjective success is evidenced through developing

Table 2

Fit indices for the three models of the MAV-S.

Model	χ^2	df	CFI	GFI	IFI	RMSEA
Model 1: uncorrelated	291.52*	90	.743	.856	.748	.102
Model 2: correlated	126.89*	74	.924	.926	.926	.058
Model 3: higher order	322.62*	77	.646	.782	.653	.122

* $p < .001$

skills, exerting effort, and improving personal performance. Conversely, when ego is involved, the athlete's focal concern is towards demonstrating superior competence based upon normative comparisons relative to others. Thus, we hypothesized that the three volitional qualities would be positively associated with task and ego orientation and such relationships would provide support for the convergent validity of these subscales. However, we expected that the volitional qualities would be more strongly associated with task orientation.

Concurrent Validity

Concurrent validity refers to the correlation between the test scores and the scores of the performance of a criterion when both tests are taken at the same time (Kline, 2005). The MAV-S concurrent validity examination was performed by correlating its three subscales with the self-efficacy scale. Self-efficacy is an individual's belief in his or her capacity to master the cognitive, motivational, and behavioral resources required to perform in a given situation (Bandura, 1997). That is, self-efficacy is a situation-specific competence belief. According to Bandura (1995, 1997) the perceived efficacy plays a key role in human functioning because it affects behavior not only directly, but also by its impact on other determinants such as goals and aspirations, outcome expectations, affective proclivities, and perception of impediments and opportunities in the social environment. Efficacy beliefs influence whether people think erratically or strategically, optimistically or pessimistically. They also influence the courses of action people choose to pursue, the challenges and goals they set for themselves and their commitment to them, how much effort they devote to given endeavors, and the outcomes they expect their efforts to produce (Bandura, 2006, p. 309). Additionally, we can report that self-efficacy beliefs are considered to be one of the most influential psychological constructs mediating achievement in sport (Feltz, Short, & Sullivan, 2008; Moritz, Feltz, Fahrback, & Mack, 2000). We expected positive links between general self-efficacy and the volitional qualities persistence, purposefulness, and expediency, a result that could support concurrent validity of volition subscales.

Method

Participants

Participants were 243 athletes (male $n = 131$, and female $n = 112$). Their age ranged from 19 to 27 years ($M = 20.94$, $SD = 2.94$). At the time of the study, athletes in the sample had been participating in 16 different sports. Their athletic experience ranged from 1 to 20 years ($M = 10.56$, $SD = 4.40$).

Procedures

The present study followed a similar procedure for the completion of the questionnaires as was done in Study 1.

Instrument

Measure Athletes' Volition—Short (MAV-S). In this study, the scale produced from Study 2 was used. In this scale, participants through 15 items describe the range of intensity they put into some operations in order to achieve their goals in sport and physical activities settings on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The MAV-S consists of three subscales that measure competences: persistence (5 items; e.g., I insist in exercising even though conditions are not good), expediency (6 items; e.g., I feel capable of executing anything I am asked to do), and purposefulness (4 items; e.g., I exercise intensively because I feel satisfaction). The scale demonstrated acceptable internal consistency (see Table 1).

General self-efficacy. General self-efficacy was measured using an 8-item scale (Chen, Gully, & Eden, 2001). Responses were obtained on a 7-point response format ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). General self-efficacy was computed as the average of the scores of the eight items. Chen et al. (2001) reported Cronbach's alphas from .85 to .90.

To provide further validity for the scale developed by Chen et al. (2001), a confirmatory factor analysis was conducted with the sample of this study. The initial model (eight items, one factor) demonstrated acceptable fit to the data: $\chi^2(20) = 55.53$, $p < .001$, CFI = .91, GFI = .95, IFI = .91, and RMSEA = .08. The general self-efficacy scale demonstrated adequate internal consistency with satisfactory alpha coefficient ($\alpha = .78$).

Task and Ego Orientation in Sports Questionnaire. A validated Greek version (Papaioannou & McDonald, 1993) of the Task and Ego Orientation in Sports Questionnaire (TEOSQ; Duda & Nicholls, 1992) was used in order to assess dispositional goal orientations. The TEOSQ is a questionnaire comprising 13 items. It includes two independent subscales which measure task (seven items) and ego (six items) orientations regarding participation in sports. The TEOSQ has demonstrated adequate internal consistency with satisfactory alpha coefficients for both the task ($\alpha = .79$) and ego ($\alpha = .81$) subscales (Duda & Whitehead, 1998). In the present study, the alpha coefficients were .72 and .80 for task and ego respectively.

Results

A multivariate analysis of variance was conducted in order to examine the effect of type of sport on the volition of the athletes. In the present analysis, the three subscales of the MAV-S were used as dependent variables, while type of sport was used as an independent one. The results showed a significant main effect in the case of type of sport, Wilks's $\lambda = .956$, $F(3, 239) = 3.64$, $p < .01$, $\eta^2 = .044$, which leads to the rejection of the null hypothesis. The univariate F test showed that type of sport had a significant

relationship to the subscales of persistence, $F(1, 242) = 4.91$, $p < .05$, $n^2 = .028$ (competitive $M = 4.55$, $SD = 1.06$ vs recreational $M = 4.24$, $SD = 1.01$); and expediency, $F(1, 242) = 5.34$, $p < .05$, $n^2 = .022$ (competitive $M = 5.58$, $SD = .74$ vs recreational $M = 5.33$, $SD = .92$).

Convergent validity of the MAV-S was examined by computing the correlations of the three volitional competencies with two perspectives of goal orientation. As can be seen in Table 3, the three competencies were positively associated with task orientation. Ego orientation was positively associated only with the expediency competence.

Concurrent validity of the MAV-S was examined by computing the correlations of the three volitional competencies with self-efficacy scale. Here, as can be seen in Table 3, two of the three competencies, expediency and purposefulness, were positively associated with self-efficacy.

General Discussion

The examination of volitional qualities has been reported to offer a clear picture of volitional operation in sport and physical activities. Thus, the availability of a valid and reliable yet concise scale as a measure of athletes' volition would increase the options available to researchers interested in measuring this construct in sport. An example for this could be the choices related to the support of cognitive preferences (e.g., goal orientations) that are not obvious and contribute to the improvement of learning and performance. Through three different studies the present study examined three issues: the identification of a set of items from the MAV that would form a short version of the scale, the establishment of evidence for the construct validity of the short scale, and the investigation of validity issues such as differences between groups and convergent and concurrent validity.

Initially in Study 1, most items of MAV were grouped into three factors through inter-item correlations and exploratory factor analysis. This scale was actually the initial form of the short version of the MAV, which included 14 items and three qualities/competences (persistence, purposefulness, and expediency) that are considered as primary and are met in most sports (Proios et al., 2012).

The factorial structure of the new short version of MAV was further examined in the new study following the

strengthening of the number of items. The results supported a 15-item 3-factor solution for the MAV-S. This finding, similarly to the finding that a higher-order factor structure had no satisfactory fit, supports the multidimensionality of the volition. Several scholars of volition have supported the multidimensionality of this construct (e.g., Forstmeier & Ruddle, 2007; Kuhl & Fuhrmann, 1998). Ryba, Stambulova, and Wrisberg (2009) claim that the structure of volition is complex and its elements (cognitive, affective, and operational) interact, while it is characterized by a variety of functions manifested through a total of volitional qualities such as purposefulness, persistence and perseverance, decisiveness and courage, initiative and independence. The efficiency of the factorial structure of the MAV-S was enhanced by the findings of a satisfactory internal consistency and reliability.

The structure of volitional qualities is different for different people (Ryba et al., 2009). The present study examined the existence of differences in the structure of volitional qualities in athletes in relation to the type of sport. Results supported the existence of differences in the structure of volitional qualities and especially in persistence and expediency. This finding of the existence of differences between groups enhances the construct validity of the MAV-S.

The construct validity of the MAV-S in the present study was additionally examined through the external validity of the instrument. The results showed that the MAV-S predicted enactment of difficult behaviors associated with goal orientation and self-efficacy, which are studies in sport and physical activities (e.g., Bandura, 2006; Nicholls, 1989).

The relation of achievement goal orientation with volitional competences reveals that volition could include an indicator of motivation for the achievement goal in competitive sport and physical activities. The contribution of volition as discovered by the results of the present study seems to be more intense in individuals who make an effort to achieve goals within the context of task orientation. The present finding confirms the results of other studies that revealed that task orientation was a significantly positive predictor of volitional competences (e.g., Guan, Xiang, McBride, & Keating, 2013).

The result of the connection of self-efficacy and volitional competences (expediency and purposefulness) confirms the claim that self-efficacy influences self-regulatory processes

Table 3
Correlations between the scores of the three subscales of the MAV-S and goal orientation, self-efficacy.

Variable	Expediency	Purposefulness	Task	Ego	Self-efficacy
Persistence	.249**	.162*	.221**	.11	.107
Expediency		.496**	.260**	.156*	.520**
Purposefulness			.393**	.09	.318**
Task				.261**	.223**
Ego					.267**

* $p < .05$. ** $p < .01$

(Pajares, 1997). Bandura (1977) stressed the importance of purposefulness for explaining self-efficacy expectations. Bandura (1977, 1986) suggested that self-efficacy influences choice of activities, effort, and persistence. Nevertheless, he also supported that self-efficacy is a poor predictor of persistence (Bandura, 1986). This claim strengthens the results of the present study, which did not reveal a relation among these constructs.

A number of limitations of the present study should be acknowledged. First of all, the sample in Study 2 included university students while the samples of the other two studies involved athletes from different sports, not keeping in this way the homogeneity among participants. Secondly, the small sample size of athletes coming from various sports limits the ability to generalize results. Finally is the absence of test–retest for the support of the reliability of the instrument.

Taken together, the findings of the present study support the conclusion that MAV-S is a reliable and valid instrument for assessing volitional competences and that volition is a multidimensional construct. This instrument can be used for the assessment of volition in physical activities such as competitive and recreational sport and physical education. We also consider that MAV-S is an instrument that may be used as a diagnostic mean for a person's volitional strengths and weaknesses at a goal-oriented behavior. This confirms the theoretical views on the operation of will. However, further studies are needed in order to obtain additional support for its psychometric properties and applicability in sport settings.

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