

Exploratory Factor Trait Sports Confidence Inventory(TSCI) Scale among Adolescent Taekwondo Players

¹Tahereh Bagherpour, ¹Hairul Anuar Hashim, ²Soumendra Saha and ¹Asok Kumar Ghosh

¹Sports Science Unit, School of Medical Sciences, Universiti Sains Malaysia,
16150, Kubang kerian, Kelantan, Malaysia

²School of Health sciences, Universiti Sains Malaysia, 16150, Kubang kerian, Kelantan, Malaysia

Abstract: The present study investigated the psychometric properties of Malaysian and Iranian trait sports confidence inventory scale. The questionnaire was administered to 267 Malaysian participants with the mean age = 13.33 and 261 Taekwondo athletes participants with the mean age = 12.47 from different level of experience. Exploratory factor analysis (EFA) and Cronbach's alpha were used to determine the factorial validity and internal consistency of the questionnaire respectively. Factor analysis of results on the 13 items suggested that 13 items in one factor were most interpretable in Malay and Persian versions. Alpha coefficient was 0.91 for Malay and 0.94 for Persian. In conclusion, the results of the current study indicated that the one-factor with 13 items model each and are scored on a 9-point scale ranging from low confidence (score of 1) to high confidence (score of 9) of the TSCI possessed a more satisfactory factorial validity in Malaysian and Iranian Taekwondo players and can be used as a scale instrument of trait sport confidence.

Key words: Exploratory factor • Trait sport confidence • Taekwondo athletes

INTRODUCTION

Sport psychology helps the athletes for obtained optimal level of skills that are depends on three factors; physical, skill and mental preparation. It seems that different performance in champions depends on mental preparation, [1]. Sports confidence is an important mental skill and it has important roles in the success of athletes' performance [2]. Self confidence has been discussed from several points of views such as Bandura's self efficacy theory, Harte's competence motivation theory and Vealey's sports confidence [3].

According to Vealey (year), self confidence is a belief that an individual is certain of their ability to be successful in sports. Vealey postulated that athlete's self confidence is both general and specific. Specifically, the general self confidence among athletes is their belief about general sports such football match. However sports confident athletes believe their abilities in a specific situation such as penalty shoot outs. Athletes' specific self- confidence or state sports confidence is largely influenced by their level of general sports confidence and

trait sports confidence. The relationship between these constructors is mediated by a number of factors such as a competitive orientation. The understanding of the interaction between general trait and state self-confidence and understanding further will help coaches to monitor and enhance the athletes' self confidence. Fundamental in understanding athlete's mental state such as self-confidence, is the measurement instrument. To identify this instrument, we need psychometric. In this regard, self confidence questionnaires were developed. Vealey (year) has shown the potential of using it to demonstrate self-confidence. Development of self-confidence has been done in several steps [4].

She revised the questionnaire in 1986 and 1998. Her questionnaire included 20 items but after a review by expert judges of sport psychology, the final version was upgraded to 13 questions. She also modified the original TSCI format from 5 degree Likert scale to 9 degree Likert scale and it catered to a wider response. Vealey (year) replaced the labels liker from "extremely, moderately, not at all to High, Medium and Low" [5].

Cranbach's (1951) alpha coefficient and internal consistency for TSCI was $r = .93$. She also used this question for 109 high school and 110 college students 1 hour before starting the match to take the reliability by test re test. Results showed it was above accepted (.86). Vealey (year) investigated concurrent validity by second phase participants. The participants completed the TSCI and SCAT and physical self-efficacy scale 1 hour before competition. He understood the TSCI was positively related ($r = .18$) to physical activity [5].

To investigate about predictive validity Trait and state Sports Confidence (Vealey) had done it between marathon running performance. Result showed trait sport confidence was a better predictor of performance (Gayton and Nickless, 1987). In this theme Martin and Gill (1991) found the trait had validity in running players and athletes had more confidence to run faster than those with less confidence. In a further Meta analysis study by Woodman and Hardy (2003) 48 subjects were tested on the relationship between state cognitive anxiety and performance and between self- confidence and performance. They found the mean effect size for self-confidence and performance was larger than the cognitive anxiety and performance [6]. Similarly, Feltz's (1982) reported a positive relationship between confidence and performance and it is also confirmed that confidence is a stronger performance predictor than anxiety. Yoo (1994) investigated between 257 college varsity athletes and the results showed athletes had less sport competition anxiety more than sports confidence. In muscular leg-endurance task, they found individuals who have higher self-confidence they have improved in performance [7]. Also the personality characteristics investigated by Gould and colleagues (2002), they found confidence was a shared characteristic of these athletes in Olympic champions. In addition, the results from the qualitative interviews showed that athletes concerned to confidence as an important factor for their successes. [8].

Various studies had found effects of different culture on confidence. Six mental qualities differences (competitive trait anxiety, trait self-confidence, concentration, mental preparation skills, achievement motivation and leadership skill) had been discovered in expert athletes from Singapore, North America, China and Nigeria [9]. Specifically, North American athletes had the highest confidence; the second was Nigeria, then Singapore and Chinese athletes showed the lowest confidence. Similarly, results of Cox and Whaley (2004) showed African-American athletes had higher expectancies for success, which can correspond to

confidence and in another study between Spanish and U.S. demonstrated higher sport-confidence in U.S. athletes compared to Spanish athlete [10]. Differences in skill levels also seem to affect levels of self-confidence. Skilled or elite athletes have shown higher self-confidence than novice or non-elite athletes. For example, Perry and Williams (1998) compared level of confidence in tennis players with different skill levels (novice, intermediate, advanced). Advanced skilled level athletes reported higher self-confidence than intermediate and novice skilled athletes [11]. The types of sport in some previous studies have been shown that, there were not significant differences between athletes but most of them found different psychological characteristics in type of sport [12].

In summary, sport confidence is the main factor to help in obtaining points among athletes, although in previous study, sports confidence questionnaire had the validity and reliability, now two research questions were raised: is the trait sport confidence valid in taekwondo adolescent athletes in Malaysia? And (2) is the trait sport confidence valid in taekwondo adolescent in Iran? To answer these questions, the questionnaire used in two versions for validity and reliability among taekwondo athletes. So we hypothesized the trait sport confidence is valid as well as in the original version as this research investigated about psychometric properties among adolescent Taekwondo players in Malay and Persian version. It will be suggested to compare sport confidence type between kinds of sports in future time.

MATERIALS AND METHODS

The investigation of the psychometric properties includes two phases, first study is in the Malay version and second study is in the Persian version.

Study 1

Participants: Two hundred sixty seven subjects participated (109 girls, (%41.6). Mean = 14.04 years. SD = 2.725 and 158. Boys, (%58.4). Mean = 12.67 years. SD = 2.984) selected among adolescent Taekwondo athletes from different level of experience.

The participants' ages are between 7- 21 years. All participants are participated regular in physical activity as club member in international level. They're from different parts of this country (Malaysia) such as Kedah, Terengganu, Melaka, Johor, UITM Kelantan, Kelantan and Kuala Lumpur. All participants are volunteers. They have fought in the 2nd round of the international championship.

According to Fidel and Tabachnich research; for analysis factor, more than 10 subjects per estimated parameter are acceptable [13].

Instruments: The instrument is used to collected sport confidence participations before the international Taekwondo completion including trait sports-confidence inventory (TSCI); Vealey (1986). The TSCI was then back translated into Malaysian version. Similar to the original version, the TSCI composes of 13 items that only measures sports self-confidence and asks subject to rate how confident they generally feel when competing in sports. A 9 point Likert scale that ranges from 1 (low) to 9 (high) was used for each item and the TSCI scores were computed by summing all responses. Scores ranging from a low of 13 to a high of 117. All items were positively stated.

Procedures: The study protocol was approved by the Research Ethical Committees (Human). Cross-cultural adaptation involved in translating psychological testing due to different cultural background, especially in terms of the meaning of each item in the scale [14]. So according to Brisline's research [15], functionally, an equivalent translation can be demonstrated when responses to the original and target version are studied. Thus the original TSCI questionnaire is translated from English to Malay by 2 MSc students, back up questioners translated have been converted to English and check without the help of the original scale.

Immediately after warming up, the head coaches calls all Taekwondo players and asking them to fill up the questions. Participants are briefly explained about the procedure of the study and received written instructions. They asked to read the items carefully and respond correctly to each item to research assistant. They had a pencil and questions to complete the TSCI during the 20 minutes prior to competition. Three research assistants helped participants to fill out the questionnaires.

Statistical Analysis

Descriptive Analyses: Analyses were performed by using SPSS (Version 18.0). Descriptive analyses of the data were performed with all study variables to describe the study participants.

Factor Analysis: Factor analysis is a statistical technique that decreases a large number of interrelated questions to a smaller number of underlying common factors or domains that are primarily responsible for co variation in

the data (Kim and Mueller 1978). To ensure that the characteristics of the data set were fitting for the factor analysis to be conducted on the sample, The Kaiser-Meyer-Olkin (KMO) measure of sampling sufficiency and Bartlett Test of Sphericity (BTS) were conducted on the data. To determine the best factor structure to represent the TSCI exploratory factor analysis (EFA) was used. Principal component analysis was employed. These methods were chosen because an underlying theoretical structure was hypothesized and because it was assumed that the dimensions or factors describing the structure might be interred correlated. Three major sequential steps were undertaken. Firstly, it involved identifying the number of meaningful factors to retain based on the screen test (Cattell) and the percentage of (common) variance accounted for by a given factor. Using the screen plot, we obtained the eigen value (i.e. the amount of variance that is accounted for by a given factor) associated with each factor and looked for a point before the slope is flattens out. Factors that seem before the break were assumed to be meaningful and were retained for rotation [16]. Factors appearing on the horizontal line after the break were taken to account only for a trivial amount of variance and were therefore not retained. Secondly, it involved an oblique rotation on the retained factors to help with interpretation. An oblique rotation was applied because it was hypothesized (and later confirmed) that the factors would be correlated with one another. Thirdly, it involved interpreting the rotated solution by identifying which items load on each retained factor, the conceptual meaning of items that load on the same factor and conceptual differences in items that load on different factors. The minimum loading of an item was determined at 0.3 [17].

Finally, an examination of items that loaded strongly on each factor was made to see if the items actually fit together. Cronbach a coefficients were calculated to evaluate the internal consistency of the TSCI total and subscale scores.

RESULT

The data were checked for accuracy. No missing value or outliers were present. Descriptive statistics (Means, percentage and standard deviation), exploratory factor and Cronbach s alpha were used.

Age means between gender groups was obtained. The different ages mean were normal between males and females so we have used parametric statistics. Table 1, provided means and standard deviations for each of the items in TSCI.

Exploratory Factor Analysis: EFA is used to find out the underlying structure of a relatively large set of variables. EFA with Principal Component Analysis was employed for sample aiming at empirically revealing and demonstrating the hypothesized, underlying structure of the preliminary model of TSCI. Before conducting an EFA, the results of the KMO measure of sampling adequacy and the Bartlett's test of sphericity were examined to determine the appropriateness of factor analysis. Bartlett's test was significant (BTS value=1513.297, $p<0.001$), showing that the correlation matrix was significantly different from an identity matrix. Similarly, the KMO Measure of Sampling Adequacy of 0.93 was substantial. Both revealed that it was appropriate to perform a factor analysis.

From the screen plot and the Kaiser-Guttman rule, factor analysis of results on the 13 items suggested that those 13 items in 1 factor were most interpretable. We prespecified and required that at least 10% of the variance be explained by a retained factor [18].

Solution was supported by the percentage of variance accounted for by each factor. The first factor accounted for was 50.79% Therefore, a one factor solution was chosen based on the screen test. Their absolute values reflect the unique contribution that each factor makes to the variance of the observed item. We use this varimax to determine which groups of items are measuring a given factor and for interpreting the meaning of each factor.

Table 2 demonstrated the rotated principal factor loading varimax for the TSCI items.

Internal Consistency: Internal consistency of the TSCI was checked by calculating alpha reliability coefficients using SPSS 18. The overall alpha coefficient was 0.91.

Study 2

Participation: From 261 participants 130 were girls (%42.8) (Mean = 13.1 years. SD =2.818) and 168 were boys (%43.1) (Mean =12.47, years. SD =2.962). Their age's ranges vary from 7 to 21 recruited from different sports club. They're active and have attended in some national competitions and listed as national team.

Methods and Procedures: There are two English translators who translated English to Persian and 2 others double check Persian to translated to English with no help. The head coaches informed about the methodology. Head coaches and 3 sport students are informed of the research's goal. They are arranged with separated coach twenty minutes before the game started while they waiting to start their fight. They are given pencils and options to answer the questionnaires. Assistants are available to help them to fill out the form. The participants are also asked to mark their gender, Experimental and age.

RESULT

Descriptive statistics (Means, percentage and standard deviation), exploratory factor and Cronbach s alpha were used. Means between gender groups were obtained. The mean were normal between different age's groups so we have used parametric statistics. Table 3 provided means and standard deviations for each of the items TSCI.

Exploratory Factor Analysis: EFA is used to find out the underlying structure of a relatively large set of variables. EFA with Principal Component Analysis was employed for sample aiming at empirically revealing and demonstrating the hypothesized, underlying structure of

Table 1: Means and SD for items of TSCI

Items	Items 1	Items 2	Items 3	Items 4	Items 5	Items 6	Items 7	Items 8	Items 9	Items 10	Items 11	Items 12	Items 13
Mean Std Deviation	5.85 1.793	5.65 1.746	5.55 1.834	5.52 1.825	5.82 1.973	5.84 1.875	5.62 1.921	5.75 1.871	5.73 1.758	5.74 1-841	5.71 1.732	5.53 1.848	5.86 1.938

Table 2: Final exploratory factor analysis results

Items	Items 8	Items 9	Items 11	Items 10	Items 7	Items 1	Items 5	Items 6	Items 2	Items 12	Items 4	Items 13	Items 3
Component	0.817	0.802	0.782	0.766	0.748	0.735	0.713	0.694	0.690	0.683	0.645	0.574	0.523

Table 3: Means and SD for items of TSCI

Items	Items 1	Items 2	Items 3	Items 4	Items 5	Items 6	Items 7	Items 8	Items 9	Items 10	Items 11	Items 12	Items 13
MeanStd Deviation	6.790 1.500	6.469 1.593	6.391 1.550	6.290 1.675	6.457 1.583	6.364 1.623	6.395 1.532	6.321 1.646	6.279 1.597	6.259 1790	6.647 1.709	6.515 1.646	6.879 1.637

Table 4: Final exploratory factor analysis results

Items	Items 8	Items 9	Items 11	Items 10	Items 7	Items 1	Items 5	Items 6	Items 2	Items 12	Items 4	Items 13	Items 3
Component	0.775	0.707	0.782	0.765	0.764	0.789	0.804	0.793	0.770	0.731	0.735	0.753	0.722

the preliminary model of TSCI. Before conducting an EFA, the results of the KMO measure of sampling adequacy and the Bartlett's test of sphericity were examined to determine the appropriateness of factor analysis. Bartlett's test was significant (BTS value=2090.66, $p<0.001$), showing that the correlation matrix was significantly different from an identity matrix. Similarly, the KMO Measure of Sampling Adequacy of 0.95 was substantial. Both revealed that it was appropriate to perform a factor analysis [18]. If KMO is higher, Bartlett Test gets statistically more significant. If both tests values are high, this indicates that the scale has a strong correlation between items [19].

From the screen plot and the Kaiser-Guttman rule, factor analysis of results on the 13 items suggesting that 13 items in 1 factor were most interpretable. We prespecified and required that at least 10% of the variance be explained by a retained factor [18].

Solution was supported by the percentage of variance accounted for by each factor. The first factor accounted for was 50.79%. Therefore, a one factor solution was chosen based on the screen test. Their absolute values reflect the unique contribution that each factor makes to the variance of the observed item. We use this varimax to determine which groups of items are measuring a given factor and for interpreting the meaning of each factor. Table 4 demonstrated the rotated principal factor loading varimax for the TSCI.

Internal Consistency: Internal consistency of the TSCI was checked by calculating alpha reliability coefficient using SPSS 18. The overall alpha coefficient was 0.94.

DISCUSSION

The purpose of the present study was to investigate the validity and reliability of the Malay and Persian version of trait sports confidence (TSCI) among adolescent Taekwondo athletes. Evidence of factorial validity was established using EFA. Developing validity is essential from the English version to the Malay and Persian version, in utilizing these questionnaires in these countries. The hypothesis predicted that Trait Sport Confidence Inventory was validated in this study. According to the descriptive analysis, there is a different mean between the Malaysian and Persian version. The highest mean was 5.86 for the thirteenth question in Malaysia and also the highest mean was 6.87 for the thirteenth question in Iran. This results is similar to Xinyi, Smith and Adegbola (2004) and Cox and Whaley (2004)

and according to the researcher results we can find different scores between different nationality in this questionnaire.

The exploratory factors analysis in two versions demonstrated that one factor solution best fits the data and the results of the present research support the hypothesis that sports confidence is a valid questionnaire for measurement in this sample. Accounting for the Malaysian version was %50.7 of the variance but for Persian version it was %58.4 of the variance. According to this results both of versions have high loading in the one factor and the 8th question have a higher loading in Malaysian version (compare your confidence in your ability to be successful to the most confident athlete you know) and 11th question have a higher loading in Persian version (Compare your confidence in your ability to meet the challenge of competition to the most confident athlete you know).

According to Veale's results (1986, 1998), Gayton and Nickless (1987) validity for TSCI can be found for all the questions in both versions with 13 items each and are scored on a 9-point scale ranging from low confidence (score of 1) to high confidence (score of 9) [20]. reliability was 0.91 in the Malay version but in the Persian version was 0.94. Vealy obtained 0.93 alpha reliability for colleagues and high school students and again he used test re test that was 0.83 [21]. Many researchers [8,22-25] used the TSCI for their study and they have confirmed that TSCI can strongly predicted sports performance. Between the psychologies factors (sports anxiety) have positive relationship with sports performance.

Self-confidence is suggested to be one of the most powerful qualities that expert athletes possess and sport confidence reduced cognitive anxiety and physiological arousal during the performance [26]. Also Results from some study showed that between emotional intelligence with self-confidence was a significant relationship [27]. The results of the current study provide preliminary support to suggest that increased self-confidence allows athletes to enhance or maintain a facilitating outlook towards out coming competition. Further, athletes are able to enhance and protect their level of self-confidence using cognitive strategies including thought stopping, positive self-talk and mental rehearsal. These strategies function by allowing the performer to control any negative thoughts or images experienced and, assisted by greater effort and motivation, maintain positive perceptions of control and interpret symptoms experienced as facilitating towards performance [28].

The present study has limitations; the last two of which have implications for future research. The subjects filled up these questions at the same time; 20 minutes before Competition, the measures were all based on self-report, in which they had different experience in Taekwondo and psychology field, their age was between 8 to 21 years old and researchers have selected only taekwondo players. In conclusion, the results of the current study indicated that the one-factor with 13 items model each and are scored on a 9-point scale ranging from low confidence (score of 1) to high confidence (score of 9) of the TSCI possessed a more satisfactory factorial validity in Malaysian and Iranian Taekwondo players and can be used as a measure of trait sports confidence.

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