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Psychometric Properties of the Persian Version of Children's Active Play Imagery Questionnaire

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ABSTRACT

Objectives. The purpose of this study was to determine the validity and reliability of the Persian version of the children's active play imagery questionnaire. **Methods.** For this purpose, 190 athletic children of the average age of 11.5 years were chosen through random sampling and they completed the Persian version of the children's active play imagery questionnaire (CAPIQ). At first, the data was confirmed with the use of back translation methods and check translation accuracy. Then, a confirmatory factor analysis, based on the structural equations model, was done to determine the constructive validity of the questionnaire. To determine its internal consistency, the Cronbach's alpha coefficient was used. The intra-class correlation coefficient (ICC) in the test-retest method was calculated to assess the temporal reliability of items. **Results.** The confirmatory factor analysis results suggested that the approximation square mean root was 0.07 and the comparative fit index was 0.94. Three factors and 11 items were properly verified in the questionnaire. The results of the Cronbach's alpha coefficient and the ICC showed that the CAPIQ has appropriate internal and temporal consistency in answers. **Conclusion.** Therefore, the Persian version of the CAPIQ can be regarded as a valid and reliable tool to be used by the researchers.

KEY WORDS: ***Imagery, Social Factor, Validity, Reliability, Factor Analysis.***

INTRODUCTION

Psychologists and educators are now willing to use any human ability to improve the performance of their athletes. Many people believe that mental imagery is a kind of magic. But, it is no magic. It is an ability of human beings by using which optimal performance can be achieved in training and competition. With an increase in the scientific evidence that supports the effectiveness of mental imagery in sport and exercise environments, many athletes and exercisers have started using the imagery not only to improve their performance but also to enjoy training and sport environments more (1). Imagery refers to the voluntary experience of one or more senses to create a specific sport skill (2). It is a simulation of a real sensory experience (e.g., seeing, feeling, or hearing), but the experience takes place in one's mind (1). Studies have shown that imagery of psychological skills helps change old behaviours, thoughts, and beliefs (3). This has been observed widely in physical activities, including exercise and sports. The benefits reported by the previous studies indicate that the

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use of imagery in this area includes the improvement of performance (4) and efficacy (5). In addition, imagery affects the positive sense of improvement (6) and the motivation for physical activity. Many studies on sports imagery are rooted in the Paivio conceptual framework (1985), which was established on the assumption that imagery acts in both cognitive and motivational roles and at general and specific levels (7). The specific skills-training includes the respective cognitive imagery. General cognitive imagery includes routines and the strategies of play. The motivational special imagery involves imaging particular goals and directed behaviour, and motivational general imagery contains images related to energy efficiency and increase in the level of arousal. Much of imagery research has been focused on physical activity and sports. Adults and children use this imagery for cognitive and motivational goals (3, 5). To explain the active play imagery, it must be pointed that active play is defined as unstructured physical activity, i.e., playing outdoors in leisure time (8). So, active play may be done indoors or outdoors. If done outdoors, it can create a sense of independence from parents for children (9). The interest in using imagery in the children's society has been rising recently. The imagery assessment of athletes of a lower age range needs the development of new tools. Stadulis *et al.* (2002) suggested the designing of an appropriate questionnaire to measure the imaging ability, given the lack of potential ability of children to understand the structure specific to the research tool (10). Moreover, researchers have noted that children's special measurement instruments should be developed, evaluated, and revised according to the stage of their development. The measuring devices for evaluating the performance of imagery were developed in the last decade in a particular context. A review of the available literature indicates that a very basic questionnaire with 32 questions has been provided in this area. The questions reflect the imagery that shows the most influenced forces and factors relating to the participation of children in frameless physical exercises. Davies, Gregory, and White (1995) identified the factors related to physical activity in unstructured programmes that include the perceived physical competence, goals, obstacles sensed, parental support, the support of other important people, access to facilities or programmes, active opportunity, and the time spent outside home. A further investigation of factors associated with physical activity revealed similarities despite the difference in research methods (11). After identifying the common factors of unstructured physical activity among children and teenagers, Cook *et al.* (2014) identified some important factors. These are, for example, ability (perceived competence, self-sufficiency, deciding to stay active and successful orientation), recreation (pleasure), and social factors (encouraged by important people like parents and peers, the participation of friends and social support) (12). Cook *et al.* (2014) developed a 16-question questionnaire using these factors. It involved conventional imagery used by children in active play settings. Cook *et al.* (2014) used three implementation phases to complete and develop the tools. In the first phase, they studied the questionnaire with the 16 questions about children's imagery in active play. At this stage, the process and data analyses were done according to the instructions given by Crocker and Algina (1986) (assessment of validity) (13). The preliminary version of the children's active play imagery questionnaire (CAPIQ) was distributed among specialists. (They were chosen to review the questionnaire on the basis of their experience in doing research in the field of physical activity and imagery in children). They were asked to adapt the questionnaire with three factors related to the active play imagery (ability, recreational, and social factors). Then, they assessed the validity of the questionnaire using a five-point Likert Scale (1=weak to 5=excellent) following the guidelines of Dunn, Boufard, and Rogers (1999) (14). They made additional comments about the quality of questions and the selection of appropriate vocabularies for children of the 7–14 age range. The results of the first phase showed that four of the 16 questions were not compatible with the stated age range and, thus, should be removed. As a result, the second phase of the project was operated with the CAPIQ including 12 questions. To determine the construct validity of the 12-item questionnaire, Varimax rotation was used in this stage. The results indicated that one of the questions had a lower load factor than

the others (0.57) and, thus, should be removed. So, the third phase was operated with an 11-item questionnaire based on the three factors: recreational, social, and ability. The Amos software (version 22) was used in this stage. The results indicated the utility of all measurement model indices of the 11-item CAPIQ, and so, it fit the measured model. Since no questionnaire has so far been presented to evaluate the use of children's imagery during active play and the CAPIQ is considered an appropriate tool to assess imagery, such a questionnaire is highly appreciated. The researchers believe that there is an unconscious experience of active play, and active play imagery can be useful in different play perspectives. So, the measurement tools for special perspectives growth is mandatory. The CAPIQ has some advantages that the previous questionnaires lacked. First, it has limited but clear questions and, second, the level of understanding is appropriate for young children. Researchers in the field of sport and physical activity have mentioned the necessity for having psychologically valid tools for evaluating the wide range of intellectual and cognitive skills. Anshel (1987) reconsidered 128 questionnaires designed between 1970 and 1987 covering 30 elements relating to mental exercise (15). In addition, the nature of intellectual and cognitive skill evaluation and assessment led researchers to develop several mental tests. Although its designers had assessed the validity and reliability of the original version of the CAPIQ, its validity in Iran was not studied. So, it was important to investigate the validity of the applicability of the test in a new society, and find out whether meanings could have changed in equivalent vocabularies for the translated version of the questionnaire, which may lead to insufficient cultural credibility. Besides, the content, superficial translation, and validity of a questionnaire are not enough. Scientific achievements in all fields, especially sports psychology, put emphasis on the need to construct the validity of the questionnaire according to the target population and the society for which its original version would be translated (16). Thus, it is essential to confirm the construct validity, which has been done using the confirmatory factor analysis based on structural equation modelling to assess the applicability of the questionnaire in the new community (that of Iranian children athletes). On the other hand, determining the reliability is another important need and presupposition for the psychometric studies linked to the repeatability of answers in different times and situations. It is necessary to assess the time reliability and a test's internal consistency. Hence, the purpose of this study was to determine the validity and reliability of the Persian version of children's imagery during active play. It wanted to answer the question of whether the Persian translation of the scale has construct validity and reliability among Iranian children athletes' society (internal and time reliability).

MATERIALS AND METHODS

This study is a survey. A survey refers to observing a phenomenon to determine the various aspects of the data collected. This study consisted of two phases. The first phase included detailed observation of the investigated parameters. The second phase included data collection and analysis of the observations. Survey research objectives include describing, explaining, and exploring.

Participants. The study population consisted of all male and female students from different sports fields (team and individual) in Tehran. To select the sample, the random sampling method was used. The subjects comprised 190 athletic children (85 boys and 85 girls) at two skill levels ('beginner' and 'elite') with a mean age of 11.5 years. The 'elite' players were chosen from the national championships. Those chosen from the provincial championships or those who had between three months and a year of experience in a sport but no championship experience were regarded as 'beginners' (16, 17). Due to a lack of information about the actual population size, the sample size was determined depending on the purpose of this study. Since the sample needed for the factor analysis studies is five to 10 participants per questionnaire item (18) and there were 11 questions in the CAPIQ, 190 subjects were enrolled in the study. Given that the samples (n=17.27 per question) were beyond the needs of the factor analysis research, there was an increased likelihood of supposed model fit and construct validity (19). The purpose of

choosing such a big sample size and wide skill levels of different sports was to increase the generalizability of the findings (20).

Tools. The instrument used in this study was the CAPIQ designed by Cook *et al.* (2014) (12). It includes 11 questions. This tool examines children's active play imagery using three factors: the recreational factor (three items), social factor (four items) and ability (four items). Due to the use of the confirmatory factor analysis method, the construct validity of the CAPIQ was confirmed. In another part of their study, Cook *et al.* (2014) evaluated the internal consistency coefficient of the instrument using Cronbach's alpha. In the questionnaire, the scoring system is based on the Likert Scoring Scale on a range of one to five. Each item is awarded one to five scores. So, the maximum score for each question is five and the total maximum score per questionnaire is 55 (12).

Procedure. Initially, using the translation-back-translation method, the translation validity and accuracy of the CAPIQ was confirmed by several experts and translators. To fix the potential bugs, the questionnaire was distributed in a small sample group (pilot study) to verify its comprehensibility for younger children. Based on their response, the final changes were made. Then, the Persian version of the questionnaire was distributed among teenage athletes in Tehran with the authorities' permission. At first, the data relating to the individual's characteristics, such as age, gender, the history of participation in sports and their championship status, were gathered. The respondents were asked not to mention their names. They were assured that to prevent potential data misuse, their responses would remain confidential and be used only for research purposes. To prevent social desirability among respondents, they were told that the research results would have no influence on their sports selection and there was no wrong or correct answer (20). After collecting the completed questionnaires, the data were classified and analysed by a statistician using the appropriate statistical methods. These included both descriptive and inferential statistical methods. Descriptive statistics were used to calculate the central indices and dispersion and draw the diagrams. Then, the confirmatory factor analysis method based on the structural equation mode was used to examine and prove the factor construction validity of the questionnaire (19, 21). In addition, the internal consistency (stability) of the Persian version of the CAPIQ was determined using the Cronbach's alpha coefficient. To determine the reliability of time (response stability), using the test-retest, the intra-class correlation coefficient (ICC) was used (22). The confirmatory factor analysis and the internal consistency of the questionnaire were applied to the research subjects and the questionnaire test-retest was operated on the 60 subjects on a two-week interval. For the statistical calculations, SPSS version 21 and LISREL 5.8 software were used.

RESULTS

In this section, the demographic characteristics of the subjects, such as the ratio and the number of participants categorised by their gender and skill level, were initially presented in the tables. Then, the mean and standard deviation of the questionnaire items were reported. Then, using the confirmatory factor analysis method, the factor construction validity of the CAPIQ was examined.

Table 1. The frequency of participants by gender and skill level in Children's active play imagery questionnaire

Gender	Index	Skill level		Total
		Novice	Elite	
Boys	Number	70	15	85
	Percent	41.18	8.83	50
Girls	Number	74	11	85
	Percent	43.53	6.47	50
Total	Number	144	26	170
	percent	84.71	15.29	100

Examining the construct validity. Since Cooke *et al.* (2014) demonstrated the multifactor characteristics of the CAPIQ and since no question was changed or deleted in the questionnaire after the preliminary stages of the translation-back-translation and the facial and content validity were verified by experts, doing only the confirmatory factor analysis based on the structural equation model was enough to verify the validity of the questionnaire for the Iranian athletic children. According to the structural equation experts' opinion about when the researchers have a given model, the statistical methods used for the first stage should be the confirmatory factor analysis and not the exploratory factor analysis. The confirmatory factor analysis was used to review and approve the questionnaire items, or, in other words, to confirm the validity of the questionnaire (19, 23). The first-order confirmatory factor analysis of the questionnaire showed that the questionnaire measurement was appropriate and that all the numbers and parameters of the model were significant (Figure 1). The measurement model fit indices are presented in Table 2 and the results show that the model is fit. Given that there was no general consensus among the structural equations modelling experts about which of the fit indicators provides a better estimation of the proposed model, it is suggested that a combination of three or four indices be reported (18, 24). The experts proposed the different cut-off points for the fit indices. So, in the next part, the first-order confirmatory factor analysis of the CAPIQ is presented (figure 1) and the model fit indices are exhibited (see Table 2).

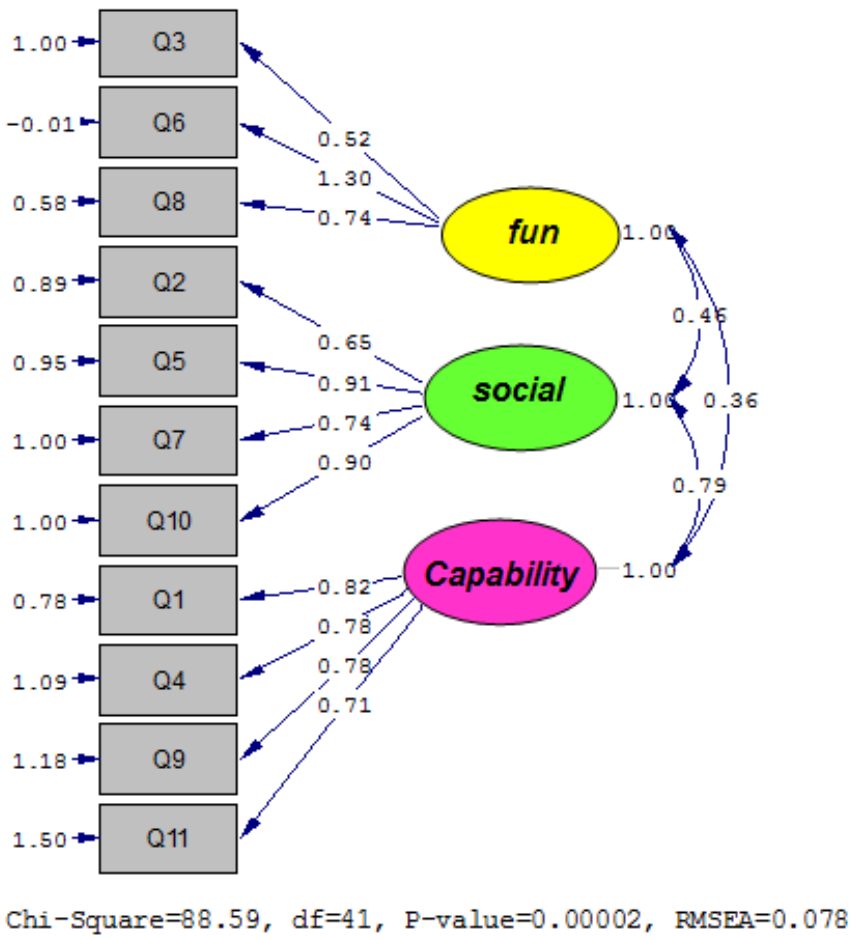

Figure 1. *The first-order model of the children's active play questionnaire standard estimation*

Table 2. The first-order confirmatory factor analysis fit indices in children's active play imagery questionnaire

Fit indexes	abbreviation	Observed values
Chi-square	X^2	88.59
Degree of freedom	DF	41
Significance level	P	0.00002
Chi-square proportion to the degree of freedom	x^2/DF	2.16
Increasing fit index	IFI	0.95
Tucker Lewis Bentley fit index or non-normative fit index	TLI/NNFI	0.93
Comparative fit index	CFI	0.94
Root -mean square error of approximation	RMSEA	0.078
Modified goodness of fit index	AGFI	0.87
Thrifty fit goodness index	PGFI	0.57

As Table 2 shows, the CFI and TLI indices are higher than 0.90 and the JFI and PJFI indices are higher than 0.5 (values between zero and one are acceptable). The coded index is equal to 0.078, which indicates the best fit of the measured model. There is no agreement about an acceptable chi-square-to-DF-indices ratio, but researchers in the field of structural equation have propped the values less than 3. However, Terry and Lane (2003) believe that the chi-square-to-DF-indices ratio indicates a reasonable model when it is in the range of 2 to 5. The chi-square-to-DF-indices ratio in the first-order model is 2.16 (20). In addition, to evaluate the significance of the relationship between the questions, there is no judgement based on a higher or lower figure. To this end, the T-index should be used. To reveal a significant correlation between the observed variables (questions) and latent variables (factors), the T-index was used. It shows that the figure for T in all questions was higher than 2. This indicates a significant relationship between the questions and the factors concerned, which means that the questions can predict the actors.

Table3. T-index and factor loads in the children's active play imagery questionnaire

Statements	T-index	Factor Load
When thinking about active play, I imagine the moves that are needed	8.28	0.68
When thinking about active play, I imagine joining in with others	8.47	0.57
When thinking about active play, I picture myself having fun	9.39	0.79
When thinking about active play, I imagine the positions of my body	7.96	0.60
When thinking about active play, I see myself with my friends	7.36	0.68
When thinking about active play, I imagine the fun I have	5.76	1.00
When thinking about active play, I picture myself doing it in a group	8.68	0.59
When thinking about active play, I imagine enjoying myself	6.93	0.70
When thinking about active play, I imagine the movements that my body makes	8.11	0.58
When thinking about active play, I imagine my friends with me	7.55	0.67
When thinking about active play, I imagine how my body moves	8.68	0.50

A closer examination of each parameter value estimation in the questions related to the factors shows that the fun factor of question 8 (factor load 0.70, and T 7.36), the social factor of question 5 (factor load 0.68, and T 7.36) and the capability factor of question 1 (factor load 0.68, and T 8.28) are the most important predictors of their respective agents. To achieve a more accurate factor construct, the second-order factor analysis was used. The purpose of this method is to achieve a more meaningful method than data. In these models, it is assumed that the latent variables in the shared variance are the result of one or more higher orders. In other words, the second-order factors are the first-order factors' factor. This method

is appropriate for investigating the construct validity of the questionnaire and confirming the presence of the researcher's items or relevant researches. As mentioned earlier, three factors, including fun, social, and capability, assess children's active play together. According to this, to determine the construct validity of the questionnaire and to investigate the relation between these three first-order-approved factors with the general factor of children's active play, the second-order confirmatory factor analysis was operated.

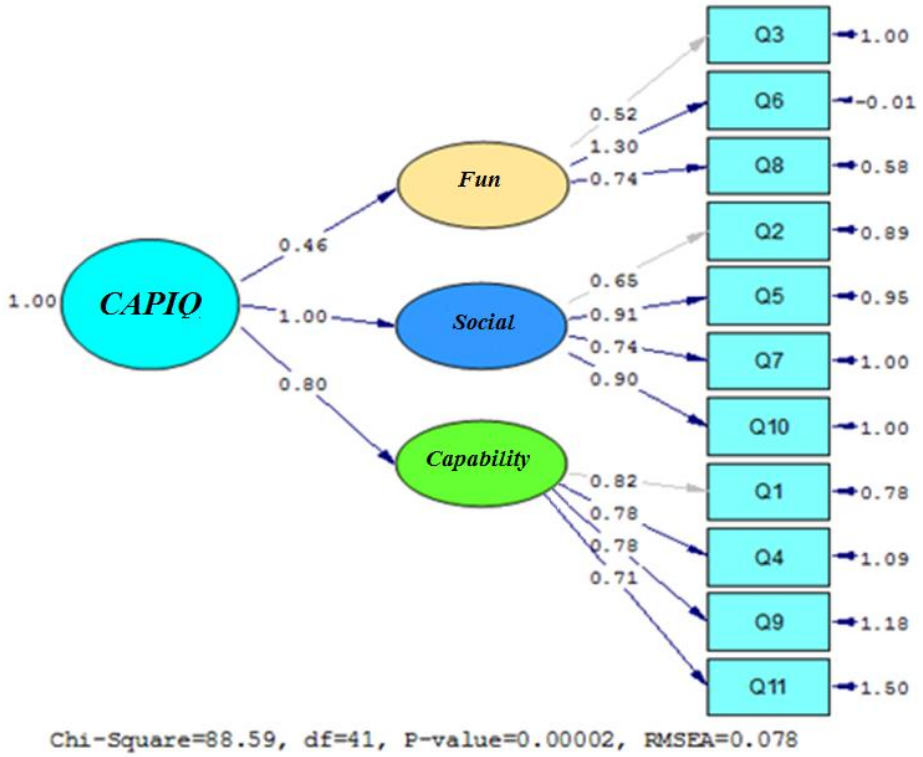

Figure 2. The second-order standard estimation model of the children's active play imagery questionnaire.

The second-order confirmatory factor analysis showed that there is a good measuring tool and a significant relationship between the three factors and the children's active play imagery (Figure 2). Table 4 shows the fit indices of the measurement model.

Table 4. The second-order confirmatory factor analysis fit indices in children's active play imagery questionnaire

Fit indexes	abbreviation	Observed values
Chi-square	X^2	88.59
Degree of freedom	DF	41
Significance level	P	0.00002
Chi-square proportion to the degree of freedom	x^2/DF	2.16
Increasing fit index	IFI	0.95
Tucker Lewis Bentley fit index or non-normative fit index	TLI/NNFI	0.93
Comparative fit index	CFI	0.94
Root -mean square error of approximation	RMSEA	0.078
Modified goodness of fit index	AGFI	0.87
Thrifty fit goodness index	PGFI	0.57

The results of the second-order confirmatory factor analysis showed that the questionnaire's fit indices are acceptable and desirable like the first order. Consequently, the fit of the model was confirmed (Table 4). According to the results, the T-index values in the relationship between the factors with their higher factors (active and exciting games) are all higher than 2. This suggests a significant relationship between them. As Table 4 shows, the relationship between fun, social, and capability factors with the active and exciting play in the second order is desirable and acceptable. Considering that all fit indices are above 0.85 and the approximation root mean square is 0.07, it can be stated that the second-order model fit is appropriate. Thus, the results of the questionnaire's confirmatory factor analysis showed that without having to remove any of the questions, the questionnaire has acceptable and favourable construct validity. The three factors—the T-Index of fun, social, and capability—with the higher factor (active play) are presented in Table 5 below.

Table 5. The value of T –index and the significant relationship between the factors' factor load in the children's active play imagery second-order questionnaire

Higher Order Factor	Factors	Parameter Estimation	t	P
	Fun	0.49	9.60	0.001
Children's Active Play Imagery Factor	Social	0.73	9.72	0.001
	Capability	0.80	11.08	0.001

As Table 5 shows, the T-index values are above 2 for all the factors in their relationship with the higher factor (imagery). This means a significant relationship between them. The social factor (factor load 0.80 and T-Index 11.08) is the most important predictable variable in anticipating the active play factor. The first- and second-order factor analysis results showed that the Persian version of the CAPIQ has acceptable construct validity for 11 questions with three factors.

Internal stability (consistency). Table 6 shows the results of the Cronbach's alpha coefficient for internal consistency of the questionnaire items. The internal consistency (Cronbach's alpha coefficient) of the questionnaire is 0.86 and that of the other factors is acceptable and desirable ($\alpha > 0.60$). It is worth noting that though the common criteria to evaluate the acceptability of the internal consistency by Cronbach's alpha value is 0.70, experts such as Loewenthal (2001) believe that the cut-off value should be 0.60 for the factors, including four items or fewer. So, the questionnaire and its factors have desirable internal stability (consistency) (25).

Temporal stability. The ICCs obtained from the test-retest with a two-week interval for all the questionnaire items were higher than the acceptable value (0.70). This indicates an acceptable time for the reliability or reproducibility of the questionnaire items. The ICC for the entire questionnaire was also 0.88. This indicates its Search Results Temporal stability.

Table 6. Results of the questionnaire Cronbach's alpha and intra-class correlation coefficients

Factors	The number of questions	Alpha Coefficient	Intra-class correlation coefficient
Fun	3	0.85	0.87
Social	4	0.85	0.88
Capability	4	0.84	0.87
Total score	11	0.86	0.88

DISCUSSION AND CONCLUSION

The aim of this study was to evaluate the validity and reliability of the Persian version of the CAPIQ. The factor analysis results showed that the Persian version of the CAPIQ has a proper fit amount. The first-order model results (Figure 3) with respect to CFI index were 0.94. At 0.93, the Tucker Lewis fit index was above the desirable criteria (0.85). The coded index, 0.07, was lower than the criteria cut-off point

(0.08). All the findings were desirable and proved the fit and construct validity of the Persian version of the CAPIQ. This part of the research results is in line with the findings of Cooke *et al.* (2014), who designed and evaluated the psychometric properties of the English version (original) of the CAPIQ. As in the research done by Cooke and colleagues, the CFI index, the Tucker Lewis fit index, and the coded index were calculated as 0.95, 0.93, and 0.07 respectively. Due to the immense proximity of the results with the fit indices criteria, it can be stated that the first-order analysis model of the questionnaire is supported and verified in both the English and Persian athletes' community. So, the approval of the Persian version of the CAPIQ, with no change in the number of questions, appropriate and coordinated equivalents of the English terms in Persian, and the evaluation of children's active play imagery, resulted in the correct interpretation of questions, like in the case of the English version. Also, the verification of the three-factor model by Cooke *et al.* (2014) for the Persian-speaking community reflected the capability of the CAPIQ in evaluating these three structures despite cultural differences. In the next part, to achieve more accurate factor analysis and after the implementation of the first-order confirmatory factor analysis, the second-order factor analysis (Figure 4) was operated in the presence of three factors: fun, social, and capability. Cooke *et al.* (2014) did not refer to these three factors in their scientific reports. This part of the results showed that all factors had significant association with their higher factor. So, all factor loads (path coefficients) had the factors' prediction capability for their latent variables significantly ($P<0.05$). It is worth noting that according to the second-order model, the social factor was the most predictive variable in explaining the children's active play imagery in the Persian-language community. These results are not in line with those obtained by Cooke *et al.* (2014) because they considered 'capability' as the most important factor in their research. The difference in the two versions, Persian and English, can be rooted in the cultural differences in the two languages. According to the results of the t-test and the correlation, the Persian version showed that all the questions can significantly predict their agents in the three factors (fun, social, and capability). Moreover, in this study, the results of internal consistency of the questionnaire, using the Cronbach's alpha coefficient, in the fun, social, capability, and total amount were obtained as 0.85, 0.85, 0.84, and 0.86 respectively (Table 6) and all values were higher than the acceptable value ($\alpha< 0.07$). This part of the research results are in line with those obtained by Cooke et al. They reported Cronbach's alpha for the fun factor as 0.82, the social factor as 0.73, and the capability factor as 0.82. These are similar to the present study results. But, as the results showed, the Cronbach's alpha coefficient for the questionnaire items was higher in the Persian version. This proved higher internal consistency and more desirable link among the items and a common content understanding in the Persian version.

According to the results (Table 6), the ICC of the questionnaire due to the test-retest with a two-week interval was obtained at a higher-than-acceptable value (0.75). The results showed desirable results for the time reliability or reproducibility of the questionnaire's Persian version, but Cooke *et al.* (2014) did not mention this factor in their scientific reports (12).

In general, the research in the field of children's active play imagery insists on three factors: fun (interest and pleasure), social (encouragement by important people, including parents and peers, friend's participation, and social support) and capability (merit understanding, self-sufficiency, deciding to stay active and successful orientation) (12). The same understanding of factors related to the Iranian and foreign children's imagery led to similar results with the research done by Cooke and colleagues. On the other hand, explaining the true concepts related to each question, as well as the simple and accurate translation of the questionnaire, accompanied the researchers of this study to achieve the highest possible outcome. Also, choosing a sufficient sample size and the similar average age range led this study to be in line with Cooke and colleagues' study. Overall, the results of this study showed that the confirmatory factor analysis, Cronbach's alpha coefficient and ICC of the questionnaire's Persian version, supports the three-factor and 11-

question structure. It can be stated that the Persian version of the questionnaire can be used as a valid and reliable tool for the investigation and evaluation of children's active play imagery in Iranian society. So, alongside other tools, it can provide a context for more research activities. Using it, some psychological needs of the athletic students in primary and secondary school can be recognized and considered in terms of future planning. As the research illustrated, imagery prepares the effective tool for changing people's behaviour or beliefs (3). By identifying the relationships between imagery and active play, interventions aimed at improving the level of activity among children and youth can be created in the future, especially for people who are adversely immobile. Future studies can examine the psychometric properties of the Persian version of the CAPIQ in theory with other structures related to children, including the organism integration theory (26). In addition, it is suggested that further research be done on the CAPIQ among various populations to determine the applicability of this tool.

APPLICABLE REMARKS

- It is recommended to use this tool in order to evaluation of children's active play imagery.
- Physical education teachers can use this tool to measure the student's active play imagery.
- To increase the level of knowledge and talent Identification in the many Federations coaches should use this questioner.

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