FACTOR VALIDITY OF THE ATHLETIC IDENTITY MEASUREMENT SCALE IN A MAINLAND CHINESE SAMPLE

VALIDADE FATORIAL DA ESCALA DE MEDIÇÃO DE IDENTIDADE ATLÉTICA EM AMOSTRA DA CHINA CONTINENTAL

VALIDEZ FACTORIAL DE LA ESCALA DE MEDICIÓN DE IDENTIDAD ATLÉTICA EN MUESTRA DE CHINA CONTINENTAL

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ABSTRACT

Introduction: The Athletic Identity Measurement Scale (AIMS) is a multi-dimensional instrument for measuring athletic identity and has been validated in different cultural samples around the world, except in mainland China. Objective: This study aimed to test the validity of the mainland Chinese version of AIMS. Methods: The sample consisted of 205 athletes, including 150 student athletes and 55 retired athletes. Validation of the factor structure and internal consistency was tested by performing confirmatory factor analyses and calculating Cronbach's alpha on eight different models proposed in the literature. Results: The results indicated that the 7-item 2-factor model fit best in retired athlete samples, while the 7-item 3-factor model fit best in student athlete samples, according to stringent fitting criteria. Conclusion: Based on the data analysis, it is proven that the 7-item multidimensional structure of AIMS is valid for the mainland Chinese culture. ***Level of evidence II; Comparative study.***

Keywords: Social identification; Validity of results; Mainland China. .

RESUMO

*Introdução: A Athletic Identity Measurement Scale (AIMS) é um instrumento multidimensional para medir a identidade atlética, já validada em diferentes amostras culturais do mundo, exceto na China Continental. Objetivo: O presente estudo tem como objetivo testar a validade da AIMS na versão da China Continental. Métodos: A amostra foi composta por 205 atletas, incluindo 150 atletas estudantes e 55 atletas aposentados. A validação da estrutura fatorial e da coerência interna foi avaliada por análises fatoriais confirmatórias e cálculo do alfa de Cronbach em oito modelos distintos propostos na literatura.. Resultados: Os resultados indicaram que o modelo de 7 itens e 2 fatores se ajusta melhor em amostras de atletas aposentados, enquanto o modelo de 7 itens e 3 fatores se ajusta melhor em amostras de atletas estudantes, de acordo com critérios de ajuste rigoroso. Conclusões: Com base na análise dos dados, comprova-se que a estrutura multidimensional dos 7 itens da AIMS é válida para a cultura da China Continental. **Nível de evidência II; Estudo comparativo.***

Descritores: *Identificação social; Validade dos resultados; China continental.*

RESUMEN

*Introducción: La Athletic Identity Measurement Scale (AIMS) es un instrumento multidimensional para medir la identidad atlética, ya validada en diferentes muestras culturales del mundo, excepto en China continental. Objetivo: El presente estudio tiene por objetivo testear la validez de la AIMS en la versión de China Continental. Métodos: La muestra fue compuesta por 205 atletas, incluyendo a 150 atletas estudiantes y a 55 atletas jubilados. La validación de la estructura factorial y de la coherencia interna fue evaluada por análisis factoriales confirmatorios y cálculo del alfa de Cronbach en ocho modelos distintos propuestos en la literatura. Resultados: Los resultados indicaron que el modelo de 7 ítems y 2 factores se ajusta mejor en muestras de atletas jubilados, mientras que el modelo de 7 ítems y 3 factores se ajusta mejor en muestras de atletas estudiantes, de acuerdo con criterios de ajuste riguroso. Conclusiones: Con base en el análisis de los datos, se comprueba que la estructura multidimensional de los 7 ítems de la AIMS es válida para la cultura de China Continental. **Nivel de Evidencia II; Estudio Comparativo.***

Descriptores: *Identificación social; Validez de los resultados; China continental.*

INTRODUCTION

The identity of the individual is one of the main determinants of internal behavior, which has been recognized by many experts.[1-3] In sport psychology, instead of the term "identity", the term "athletic identity" (AI) is used. The measurement of Athletic identity contributes to explain the athletes' behaviors and design an implementation of programs aimed at the development of their character. It is a rather attractive subject for researchers.

The research on athlete identity emerged in the 1990s. Brewer and his colleagues were the first researchers to conceptualize and systematically

structure sport-related identity, and defined AI as "the degree of an individual's identification with the role of athlete".[4] Their studies indicated that AI should be understood as a cognitive framework that guided and organized the processing of self-related information.[5] With defining the concept and structure of athletic identity, Brewer developed a psychometric instrument for empirical research called the athlete identity measurement scale (AIMS). It was used to measure the degree of recognition of athletic role and their influences on various important events, such as experiencing injuries, entering universities, and team selections. The AIMS initially consisted of 10 items, including social, cognitive, and affective factors of athlete identity. The items tapped into the thoughts and feeling from athletes' daily experience.

AIMS is the primary tool for measuring the athlete identity.[6] Brewer initially used the 10-item AIMS scale as a unidimensional measure in a sample of English-speaking culture, while this unidimensional structure was supported by other studies.[7,8] Since the early development of AIMS, researchers have been trying to validate and improve the measurement and conceptualization of AI. Considering the possible cultural differences in the process of self-identity, it is beneficial to explore the structure of athlete identity in non-English-speaking culture. These studies involved people of different languages and cultures such as Russian,[9] Portuguese,[10] Hong Kong,[11] Greek,[12] Brazilian,[13] Turkish,[14] Japanese,[15] and extended to special groups such as athletes with disabilities.[16]

With the validation of AIMS in different cultures, some researchers have revealed the existence of other dimensions of AIMS. The others pointed out that the unidimensional model was problematic and the statistical analyses are showed poor fitness in 10-item unidimensional structure.[17] Therefore, multi-dimensional models of AIMS were proposed. For example, 10-item of 3-factor,[18] 9-item of 4 -factor,[19] 7-item of 3-factor[20] and so on.

In addition to validating the dimensional structure of AIMS in different cultures, researchers compared differences between athletes and non--athletes about AI to verify the discriminant validity of AIMS. The results indicated the ability of instrument to discriminate between athletes and non-athletes in all items. It was also highlighted in other international studies, which described AI as a predictor of sport participation.[21] For the influence of aging process on personality trait, it is necessary to compare validation of the AIMS between athletes and retired athletes. However, there is a lack of related research.

According to previous studies, the structure of AIMS has not been tested in the Chinese mainland sample. Because of cultural influences, it is difficult to predict which multidimensional model is fit for Chinese mainland sample. The purposes of this study are to: (a) test the reliability and validity of the Chinese mainland version of the AIMS, while also (b) compare the validation of AIMS between student athletes and retired athletes.

METHODS

Participants

The sample was consisted of 55 retired athletes (28 male and 27 female) and 150 student athletes (80 male and 70 female) who were regularly participated in training and competitions in China during the data collection period. The participants were aged from 13 to 38, with the mean age at 18.8. The majorities of retired athletes represented China at international events, including three world and 20 national championships. All the student athletes were studying in high schools or universities. The participants took part in a variety of individual or team sports including basketball (42), football (14), tennis (11), aerobics (24), gymnastics (8), volleyball (20), athletics (28), taekwondo (33), badminton (13), table tennis (12).

Measures

The original *Athletic Identity Measurement Scale* (AIMS)[2] with 10 items was used in the research. It was an instrument to assess the level of the identification with the athlete role. All 10 items were on 7-point Likert-type scales from one (strongly disagree) to seven (strongly agree). Participants' athletic identity was measured by a summation of the scores for the seven items, seven points being the minimum score and 49 the highest. Higher score meant stronger athletic identity (AI). Along with the AIMS, the demographic information (e.g., age, gender, athlete level, types of sports) was included in the questionnaire package.

Procedures

The steps for translating and adapting the Chinese Mainland version of the AIMS were in accordance with ITC Guidelines.[22] After obtaining the necessary permission from the principal author of the AIMS, the 10-item AIMS was first translated into Chinese by two bilingual researchers. To produce a combined version, both translators discussed the two translations and agreed on a single version. The Chinese translated AIMS was then back translated by another two bilingual investigators in sport psychology. Two bilingual investigators verified the translation and examined the content validity of the scale. Thereafter, a pilot was conducted among 30 student athletes to check the content validity of the verified scale. No further changes were made to the translated scale.

Ethical approval and informed consent were obtained from the institution board before data collection. The university PE teaches and the head coaches of student athletes were contacted to inform the purposes of the study. After getting the permission, athletes were invited to participate in this study without external incentives (e.g., payment) via emails. The study was approved by the Ethics Committee of Shanghai university of sport, protocol number 102772020RT045, in accordance with the Declaration of Helsinki.

Data Analysis

Eight models of AIMS were tested in this study, including one unidimensional structure and seven multidimensional structures. he specific characteristics of each model were shown in Table 1. The reason for choosing these versions was because they were often mentioned in literatures and were validated in several countries in both English-speaking and non-English-speaking cultures.

Internal consistency of the scale was assessed using Cronbach's alpha.[23] The suitability of a single-group measurement model was usually assessed using an SEM procedure known as confirmatory factory analysis (CFA).[24] The AMOS version 17.0 was used to perform CFAs and examine the AIMS models that were proposed and investigated in previous studies. In the scope of CFA, χ^2, χ^2/df, RMSEA, IFI, TLI, CFI and GFI were used to evaluate factorial validity of the models. The RMSEA is an index least affected by the sample size. However, the criteria for RMSEA fitting index are inconsistent in different literatures. It is generally considered that a cut off value close to 0.06 or 0.07 seems to be acceptable amongst in this area. Some authors suggest approximate fit with RMSEA≤0.05, acceptable between 0.05 and 0.08, and poor fit with RMSEA≥0.10.[25] The fit indices of the IFI, TLI, CFI, and GFI exceeding 0.90 are considered evidence of adequate model fit.[26] Hu & Bentler[27] suggest the criterion than 0.95 as more stringent criteria. In this study, we have set the stringent criterion with RMSEA≤0.05, and IFI, TLI, CFI, GFI ≥0.95.

RESULTS

To test the reliability and validity of the Chinese Mainland version of AIMS, the most common used instruments were chosen. Then, eight sets (student athletes, retired athletes and total) of models were tested:

Table 1. Dimensional Characteristics of AIMS Models.

Model	Author/year	Country	language	population	SE	SI	EX	NA	Omitted
1	Brewer(1993)	USA	English	Student-athletes					
2	Groff(2009)	USA	English	Elite athletes with cerebral palsy		1,2,3,7	4,5,6,9	8,10	
3	Hale(1999)	Russian	Russian	Elite athletes		1,2,3	4,5,6,9	8,10	7
4	Ryska(2002)	USA	English	High school student-athletes		1,2,3,7	4,5,9	8,10	6
5	Martin(1997)	Australia	English	Swimmers with disabilities	1,2	3,7	4,5,9	8,10	6
	Nagata(2016)	USA	English	Wheelchair rugby players					
6	Brewer(1993)	USA	English	College football players		1,2,3	4,5,6	8,10	7,9
7	Silva(2016)	Brazil	Portuguese	athletes and non-athletes		1,2,3,4,5		8,10	6,7,9
8	Brewer(2001)	USA	English	Athletes and non-athletes		1,2,3	4,5	8,10	6,7,9
	Li(2008)	Hong Kong	Chinese	Elite and sub-elite athletes					
	Proios(2012)	Greek	Greek	Physical education students					
	Tunckol(2015)	Turkey	Turkish	Physical education students					
	Hagiwara(2020)	Japanese	Japanese	Collegiate students					

SE: self-identity, SI: social identity, EX: exclusivity, NA: negative affectivity.

one unidimensional (10-item) and seven multidimensional (10-item of 3 factors, two 9-item of 3 factors, 9-item of 4 factors, 8-item of 3 factors, 7-item of 2 factors, 7-item of 3 factors). The internal consistency of the model scale was evaluated with the Cronbach's alpha, and the fitness of the model was evaluated with χ^2/df, RMSEA, NFI, TLI, CFI and GFI. All the evaluation results were shown in Table 2. Table 2 showed that the internal consistencies of the total scale for all models of the AIMS were acceptable with Cronbach's alpha ranging from 0.73-0.86.

According to the previous proposed fitting criteria, none of the fit indices for Model 1(10-item, 1-foctor), Model 2 (10-item,3-factor) and Model 3(9-item, 3-factor) reached acceptable levels. The fit indices for Model 4 (9-item, 3-factor) and Model 5(9-item, 4-factor) showed the indices of total sample were acceptable. But the indices of SA (model 4: RMSEA=0.095, TLI=0,895; model5: RMSEA=0,091) and RA (model 4: GFA=0.895; model 5: RMSEA=0.000) were not. To further distinguish the Chinese version of the model, this study adopted more stringent criteria, that is, IFI, CFI, TLI were all greater than 0.95 and RMSEA was less than 0.05. Then the fitting indices of model 4 and model 5 were not satisfactory, while the indices of Model 6(8-item, 3-factor), Model 7(7-item, 2-factor) and Model 8(7-item, 2-factor) were acceptable. However, the degrees of fitting were different among SA, RA and Total samples.

For the SA and the total sample, the fitting indices of model 6 was not satisfied (RMSEA =0.079, TLI =0.939), model 7 and model 8 reached a stringent fitting level, and the model 8 was superior to model 7. For the sample of RA, the fitting indices of model 8 showed an overfitting error model (RMSEA =0.000, IFI =1.001, TLI =1.003, CFI =1.003). Both model 6 and model 7 reached a stringent fitting level, and the model 7 was superior to model 6. From the analysis above, the results showed that the 7-item of 2-factor model was fitting best for retired athletes, while the 7-item of 3-factor model was fitting best for student athletes and the total samples.

DISCUSSION

The aim of the study was to explore the internal consistency and factor structure of the Chinese Mainland version of AIMS. Cronbach's alpha indicated that the internal consistency of all models was acceptable. The CFA examining the factor structure of AIMS in the Chinese Mainland sample supported for the 7-item, 3-factor model and the 7-item, 2-factor model. Separately the retired-athletes sample supported the 7-item, 2-factor model, while the student athletes sample supported another.

AIMS has been validated in many countries since its development. Besides testing the validity of AIMS in the sample of professional athletes, AIMS had been gradually extended to the sample of student athletes, disabled athletes and others. Cross-cultural adaptation was a necessary

Table 2. Goodness of Fit Indices for AIMS Models.

Models	Sample	χ^2/df	RMSEA	IFI	TLI	CFI	GFI	α
Model-1 (10-item, 1-factor)	SA	3.32	0.125	0.848	0.801	0.845	0.870	0.840
	RA	1.81	0.123	0.796	0.718	0.780	0.809	0.775
	Total	3.95	0.120	0.874	0.836	0.872	0.881	0.859
Model-2 (10-item, 3-factor)	SA	2.49	0.100	0.911	0.872	0.909	0.909	0.840
	RA	1.56	0.102	0.875	0.806	0.862	0.864	0.775
	Total	3.00	0.099	0.922	0.889	0.921	0.919	0.859
Model-3 (9-item, 3-factor)	SA	2.20	0.090	0.932	0.896	0.930	0.932	0.814
	RA	1.48	0.094	0.904	0.839	0.893	0.892	0.744
	Total	2.91	0.097	0.930	0.894	0.929	0.934	0.835
Model-4 (9-item, 3-factor)	SA	2.33	0.095	0.932	0.895	0.930	0.926	0.830
	RA	1.10	0.043	0.978	0.962	0.975	0.895	0.754
	Total	2.29	0.079	0.957	0.934	0.956	0.945	0.852
Model-5 (9-item, 4-factor)	SA	2.23	0.091	0.946	0.904	0.944	0.936	0.830
	RA	0.96	0.000	1.008	1.016	1.000	0.921	0.754
	Total	2.13	0.074	0.967	0.942	0.966	0.954	0.852
Model-6 (8-item, 3-factor)	SA	1.73	0.070	0.968	0.946	0.967	0.956	0.819
	RA	1.04	0.028	0.992	0.986	0.991	0.932	0.728
	Total	2.27	0.079	0.964	0.939	0.963	0.958	0.840
Model-7 (7-item, 2-factor)	SA	1.26	0.042	0.990	0.983	0.989	0.972	0.813
	RA	1.02	0.020	0.996	0.993	0.995	0.937	0.730
	Total	1.32	0.040	0.992	0.986	0.992	0.978	0.839
Model-8 (7-item, 3-factor)	SA	1.24	0.040	0.992	0.984	0.992	0.976	0.813
	RA	0.99	0.000	1.001	1.003	1.000	0.948	0.730
	Total	1.27	0.037	0.994	0.988	0.994	0.982	0.839

SA: Student athlete; RA: Retired athlete.

process when using instruments that were originally found in other contexts, especially when it came to psychological aspects and the cultural diversity of humans.[13] Therefore, to measure the identity of Chinese athletes, the reliability and validity of AIMS in the context of Chinese Mainland should be tested.

The validation results of the Chinese Mainland version showed that all the fitting indices of model 1(10-item, unidimensional) did not reach the acceptable level, indicating that the 10-item of unidimensional model was not suitable for Chinese Mainland samples. Li and Andersen[11] also argued that the unidimensional AIMS structure was not suitable for non-English-speaking culture, because of the poor fitting indices. The results of the 10-item of 2-factor model also showed a poor fitness, indicating the 10-item was not suitable for Chinese Mainland culture whatever the factor was one or two.

Hale et al.[9] found that 9-item of 3-factor model fit good in English-speaking culture (UK and USA), but not in Russian samples. Further evidence of the factor structure reported by Martin et al.[17] demonstrated the

effectiveness of the 4-factor model in the samples of disabled athletes. In this study, the 9-item, 3-factor (model 3, model4) and the 9-item, 4-factor (model 5) model were also validated in the Chinese Mainland samples. The results showed that if the stringent fitting indices (REMSA<0.05,IFI, TL, CFI>0.95) were adopted, the 9-item models were not satisfactory. Both student athletes and retired athletes showed the same results. However, it was found that the 9-item model solution was specifically validated for disability samples, whereas there was no valid proof in the sample of non-disabled athletes. It implied that the 9-item structure was not suitable for individuals without disability.[20]

To further validate the AIMS model, a lot of studies developed a simplified version of the 7-item model using exploratory factor analysis.[28] In these studies, in addition to validating the most used 7-item of 3-factor model, the 7-item of 2-factor model and the 8-item of 2-factor model were also validated. The results showed that the 7-item of 3-factor model (model 8) was high goodness-of-fit for the student athletes and the total samples in Chinese Mainland culture, which further supported that the 7-item of 3-factor model was the most appropriate instrument in non-English-speaking samples. Additionally, in the sample of retired-athletes, the 7-item of 2-factor model (model 7) showed better suitability with Chinese Mainland culture. The difference between model 7 and model 8 was the classification of 4th item (e.g., Sport is the most important part of my life) and 5th item (e.g., I spend more time thinking about sport than anything else). In model 7, there were only two factors, because the item 4, 5 and item 1, 2, 3 were merged into the factor of self-identity. In Model 8, as mentioned in previous studies, there were three factors in which the item 4, 5 were named as exclusivity. It implied that in the Chinese Mainland version of the AIMS model, the subscales of self-identity (item 1, 2, 3) and negative affectivity (item 8, 10) were stable, but the exclusivity (item 4, 5) was not.

The results showed that in the Chinese Mainland version of AIMS, different samples were suitable for different structures. The samples of retired athletes were suitable for the 7-item of 2-factor model, while other individual samples were more suitable for the 7-item of 3-factor model. In retired-athlete sample, the factor of exclusivity was not confirmed. Probably because these athletes regard sports as a part of their lives but not all. Livelihoods and jobs must be considered after retirement. The above-mentioned results further suggested the AIMS a multidimensional measurement instrument.

CONCLUSIONS

After analyzing the different models of AIMS, as a conclusion, the 7-item multidimensional structure of AIMS is proven reliable and valid for Chinese Mainland population when examined in samples of student athletes and retired athletes. Separately, the 7-item of 2-factor model fit the student athlete sample and the 7-item of 3-factor model fit the retired athlete sample. It is further supported that AIMS is a multidimensional measurement instrument. In the literatures applying the 7-item model, it is found that the samples mainly involved professional athletes and student-athletes, but not retired athletes. In this study, the AIMS validity of retired athletes is tested to further supplement the samples of the AIMS.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: Each author made significant contributions to this manuscript. MZ: design of the article, writing, revision, statistical analysis, data analysis and interpretation; BS: conducted the literature search, reviewed the manuscript, and contributed to the intellectual concept of the study.

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