Cross-Cultural Adaptation of Persian Version of the Motivation to Exercise and Diet in Children Questionnaire: Psychometric Study

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Original Article

Abstract

Introduction: Childhood obesity is one of the major public health problems of the last century. This study aimed to investigate the validity and reliability of the Persian version of the Motivation to Exercise and Diet in Children (MED-C) questionnaire.

Materials and Methods: After receiving formal permission from the developer, the MED-C questionnaire was translated into Persian and back-translated into English. Following approval of back-translated version, this questionnaire along with the Physical Activity Questionnaire for Children (PAQ-C) was filled by 353 Persian-speaking students aged 7-11 years. The construct validity of the scale was measured using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The convergent validity was determined by the average variance extracted (AVE). The internal consistency and reliability of the scale was then examined using Cronbach's alpha coefficient, and split-half reliability coefficient and composite reliability coefficient, respectively.

Results: With EFA, four main factors with an eigenvalue greater than one were extracted, which explained 76.51% of the total variance of the scale. CFA showed that all four factors of the questionnaire, including motivation and need for exercise, motivation and need for diet and nutrition, had a high correlation with the whole questionnaire, and these factor loadings were significant at the level of 0.001. The reliabilities obtained in the questionnaire were higher than 0.7 and acceptable. A significant correlation was found between physical activity and dimensions of MED-C (P = 0.01).

Conclusion: The Persian version of the MED-C questionnaire seems to be a valid and reliable tool for measuring the motivation for physical activity and diet in Iranian children.

Keywords: Motivation; Physical activity; Diet

Introduction

Obesity, particularly among children, has become a major public health concern in the 21st century (1). The link between childhood obesity and current and future health problems is well-established (2). Additionally, it increases the likelihood of obesity in adulthood (3), a significant risk factor for chronic diseases such as diabetes, cardiovascular diseases (CVDs), kidney diseases, and cancer (4-6). Obesity is also directly linked to mortality (7). As per a report by the World Health Organization (WHO) in 2016, more than 340 million children and adolescents aged 5 to 19 were overweight and obese worldwide (8), and this proportion has increased in recent years to over 40% (9).

Motivation is the primary driving force behind any activity, and it is influenced by personal beliefs, thoughts, and values (10). Due to this fact, motivation plays a crucial role in predicting an individual's participation in physical activities (11), which can lead to improved mental well-being (12).

Self-determination theory (SDT) is a motivational theory that considers motivation to be a determining factor in human behavior (10). It introduces a range of self-determination, from the lowest level of lack of motivation to the highest level of intrinsic motivation.

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According to this theory, three psychological needs - autonomy, competence, and relatedness, drive a person to initiate a specific behavior (13) and directly predict a person's motivation level (10). Autonomy refers to the need to understand oneself as the source of one's actions, competence refers to the need to feel capable of performing well in an activity, and relatedness refers to the need to feel close to and understood by people who are essential to the individual (13).

The highest level of motivation is intrinsic, meaning that it originates from within the individual and arises after intrinsic satisfaction from performance. Demotivation occurs when people do not see a relationship between their actions and their consequences, which is equivalent to a complete lack of self-determination (10). External motivation is located in the distance between internal motivation and lack of motivation in the spectrum of self-determination. Behaviors that are dependent on external motivation are instrumental and not done for the enjoyment of the activity, but for other consequences (14).

Despite the importance of establishing a balanced diet and regular physical exercise from an early age to prevent weight-related disorders, little research has been done on the relationship between the satisfaction of children's psychological needs and their motivation (15). Researchers often measure motivation by adapting different scales developed for other populations or using objective measures to overcome the limitations of self-report techniques when studying the effective processes in changing children's eating and physical exercise behavior (16). These methods generally explore the value of self-determination in understanding behavior related to exercise and physical activity (17), but they do not determine the quantity and quality of motivation. Additionally, no valid instrument assesses children's psychological need satisfaction (16). To address this gap, Pietrabissa et al. (18) developed a questionnaire to evaluate the satisfaction of the psychological need for physical exercise and diet in children. This questionnaire aims to investigate the relationship between different types of motivation (intrinsic, identified, external, internal, and lack of motivation) and needs (autonomy, competence, dependence), as well as specific personality traits and the presence of eating disorder symptoms. The questionnaire can provide helpful information to planners, specialists, health officials, and health professionals. However, since the questionnaire is not currently available in Persian, evaluating its validity and reliability in different climates, cultures, and living conditions is necessary. Therefore, this study aims to determine the psychometric characteristics of the Persian version of the Motivation to Exercise and Diet in Children (MED-C) questionnaire.

Materials and Methods

The current study was conducted with description and correlation analysis using a survey method for data collection. The participants selected were 353 students, aged between 7 and 11, studying in first and second-term elementary schools of Isfahan Province, Iran, in 2022. The sample was selected based on availability and consisted of 227 female and 126 male students. To choose the sample, 30 questionnaires were distributed initially, and the variance of the questionnaire was calculated to be 72.25. Further, equation (1) was used to obtain the value of φ, which represents the error value or the difference between the community average and the sample average, and the value obtained was 7.53.

$$\text{Equation 1: } \varphi = |\mu - \ddot{x}| \cong 7.53$$

In the next step, we obtained a sample size of 353 people by putting the numbers in equation (2). Table 1 presents information on the parameters for determining the sample size.

Equation 2: Sample size calculation method:
$$N = \left(\frac{Z(\alpha/2) * \sigma}{\varphi}\right)^{.2} ==> N = \left(\frac{1.96 * 72.25}{7.53}\right)^{.2} \cong 353$$

An orientation session was held for the parents of the students, where they were briefed about the study objectives and the significance of each questionnaire item. They were requested to sit with their child while filling out the questionnaire and explain any unclear items to their child, using the training they had received. The consent form and questionnaires were created using Google Forms and sent to each participant.

Table 1. Information related to the calculation of the sample size

Value in the formula		
N	Sample size	353
α	Error level	0.05
Zα/2	The standard value is 0.05 in the normal curve	1.96
σ	The amount of variance	72.25
φ	The error value or the difference between the population mean and the sample mean	7.53

Table 2. Motivation to Exercise and Diet in Children (MED-C) questionnaire

Motivation	Exercise statement	Diet statement
Inherent	I like to exercise.	I like to eat healthy food.
Well-known	Exercising is important to me.	It is important for me to eat healthy food.
Introduction	Exercising makes me feel good.	Eating healthy food makes me feel good.
External	Others tell me that I should exercise.	Others tell me that I should eat healthy food.
Motivation	Exercising is not important to me	I don't care about eating healthy food.
Self-determination needs		
Autonomy	I can decide which sport to do.	I can decide what to eat.
Qualification	I think I am good at sports.	I think I am good at following a healthy diet.
Dependency	Sports make me experience the good feeling of being a member of a team	Eating with others makes me experience the good feeling of having a family.

Prior to commencing the study, the researcher sought permission from the questionnaire designer and obtained approval from the Ethics Committee of Islamic Azad University, Isfahan Branch (Khorasgan), for all stages of the research.

Research tool: Two questionnaires were used in the present study:

MED-C: In 2020, Pietrabissa et al. (18) created a questionnaire to assess children's motivation for exercise and healthy eating habits (Table 2). The questionnaire consists of two subscales, exercise and diet, which include 16 statements (eight statements for each subscale). Five of these 16 statements measure motivation, while the remaining three measure self-determination needs. Participants are required to rate their answers on a 5-point Likert scale ranging from 'never' (0) to 'always' (4). It is important to note that the reverse score only applies to item 5 of each scale, which reads "I don't care about physical exercise/healthy eating" (18).

Physical Activity Questionnaire for Children (PAQ-C): This questionnaire consists of ten statements. The first statement represents the average of all physical activities, while the second to eighth statements represent the amount of physical activity done in the physical education class, recreation time, and other activities. The ninth statement refers to the physical activity done on all days of the previous week, and the tenth statement identifies students who were inactive in the last week due to illness or other reasons (19). The Cronbach's alpha coefficient of this tool's English and Turkish versions has been reported to be 0.72 to 0.77 (20, 21). Moreover, the Persian version of the questionnaire has been found to have good face and content validity, with a score of 0.89 (22).

The first step in the research was to translate the MED-C from English to Persian with permission from the questionnaire designers. The translated version was then retranslated back to English to ensure accuracy. Several respondents reviewed the Persian version to confirm its acceptability and clarity (face validity), and the research team incorporated their feedback into the questionnaire. The MED-C questionnaire, PAQ-C, and the consent form were provided to the participants online, and data were collected.

The present study used exploratory factor analysis (EFA) to measure construct validity. The factor structure was investigated using confirmatory factor analysis (CFA). Internal consistency was calculated using Cronbach's alpha coefficient, and reliability was estimated by calculating the split-half reliability coefficient.

Content validity ratio (CVR) was used to measure the validity of the questionnaire. Eight experts were asked about the questionnaire's content to calculate this ratio. First, the purpose of the questionnaire and the operational definitions of the items were explained to the experts. Then, they were asked to classify each item based on the three-part Likert scale (the item is necessary, the item is helpful but not necessary, and the item is not required). CVR was calculated using equation 3:

Equation 3: $\qquad CVR = \frac{ne - \frac{n}{2}}{\frac{n}{2}}$

It is important to note that 'n' represents the total number of experts while 'ne' is the number of experts who selected the necessary option. Each item has a minimum acceptable CVR of 0.75 (23). Concurrent validity was evaluated using Pearson's correlation test. The calculations were carried out using SPSS statistics software (version 23, IBM Corporation, Armonk, NY, USA) and AMOS (version 22, IBM Corporation, North Castle, NY, USA).

Results

The demographic information of the study sample is given in table 3.

Most fathers and mothers in the sample had a bachelor's degree, with 128 people (36.3%) and 153 people (43.3%), respectively. All items on the scale had an acceptable minimum CVR value of 0.75.

Table 3. Demographic information of the study sample

Variable	Group	n (%)
Gender	Girls	227 (64.30)
	Boys	126 (35.70)
	Total	353 (100)
Grade	First primary	63 (17.85)
	Second primary	72 (20.40)
	Third primary	63 (17.85)
	Forth primary	80 (22.65)
	Fifth primary	75 (21.25)
	Total	353 (100)

An EFA was conducted using the principal components method with orthogonal rotation, which resulted in the extraction of four main factors with an eigenvalue more significant than one. These four factors explained 76.51% of the total variance of the scale. Table 4 provides the results of the EFA and the children's motivation questionnaire for exercise and diet.

CFA was used to check the construct validity of the MED-C. The model is mentioned in figure 1 and the CFA results are presented in tables 5 to 7.

The results of table 5 indicate that the measurement model for the MED-C is acceptable. The relative chi-square index of the model was 2.53, which is within the acceptable range. Additionally, the comparative indices of Tucker-Lewis index (TLI) and comparative fit index (CFI) were higher than 0.9, indicating a good fit. The goodness of fit index (GFI), parsimony CFI (PCFI), was also favorable, with a value greater than 0.5. Finally, the model's overall fit was good, with a root mean square error of approximation (RMSEA) value of 0.066.
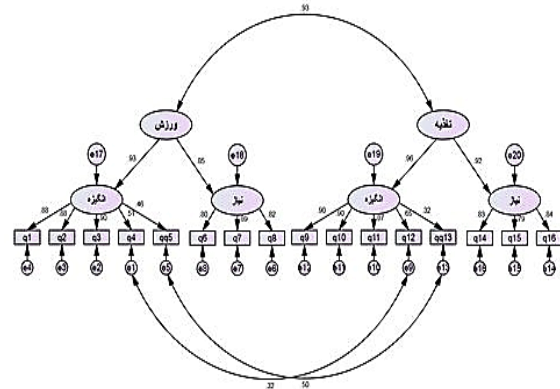
Figure 1. Measurement model of motivation questionnaire for children's exercise and diet

Based on table 6, the second-order CFA measurement model revealed that all four factors of the questionnaire, namely motivation and exercise demand, motivation and diet demand, had high correlation factor loadings with the entire questionnaire. These significant factor loadings were found to be at the 0.001 level.

Its correlation with the PAQ-C was used to check the convergent validity of the motivation to exercise subscale. The correlation between the motivation for exercise subscale of the MED-C questionnaire and the PAQ-C was significant at 0.001 (Table 8). The average variance extracted (AVE) index in the questionnaire subscale was higher than 0.5 (Table 8). These results show that the subscale of the motivation questionnaire for exercise has good convergent validity.

Table 4. Expressions and factor weights of expressions and eigenvalues of motivation questionnaire for children's physical activity and diet

Question	Factor load	Amount of shares	Question	Factor load	Amount of shares
Exercise motivation					
1	0.559	0.700	4	0.920	0.562
2	0.640	0.713	5	0.804	0.744
3	0.633	0.732			
Eigenvalue: 8.89, percent variance: 30.97					
Exercise demand					
6	0.699	0.650	8	0.813	0.746
7	0.780	0.733			
Eigenvalue: 1.33, percent variance: 25.96					
Diet motivation					
9	0.735	0.787	12	0.671	0.645
10	0.765	0.788	13	0.874	0.785
11	0.767	0.768			
Eigenvalue: 1.17, percent variance: 13.29					
Diet demand					
14	0.815	0.745	16	0.739	0.705
15	0.682	0.642			
Eigenvalue: 1.01, percent variance: 6.29					

Table 5. Fit indices of the motivation questionnaire measurement model for children's exercise and diet

Index name		Desired limit	Index value in the model	P	Status in the model
Absolute	Chi-square	P > 0.05	245.209	0.001	Optimum according to other indicator
	DF	-	97	-	-
Comparative	TLI	> 0.9	0.957	-	Optimal
	Relative fit (CFI)		0.965	-	
Thrifty	PCFI	> 0.5	0.780	-	Optimal
	RMSEA	< 0.1	0.066	-	Optimal
	Normalized chi-square (CMIN/DF)	< 5	2.528	-	Optimal

RMSEA: Root mean square error of approximation; DF: Degree of freedom; TLI: Tucker-Lewis index; CFI: Comparative fit index; PCFI: Parsimony comparative fit index; CMIN/DF: Chi-square divided by degrees of freedom

Table 6. Results of confirmatory factor analysis (CFA) on the main factors of the motivation questionnaire for children's exercise and diet

First order factor	Standard estimate	Critical value	P
Exercise motivation	0.932		
Exercise demand	0.846	8.92	0.001
Diet motivation	0.960		
Diet demand	0.920	12.19	0.001

Internal consistency of the questionnaire using Cronbach's alpha coefficient (exercise: 0.81, diet: 0.84), composite reliability coefficient (exercise: 0.88, diet: 0.76), and classification (exercise: 0.73, diet: 0.79) was confirmed.

Discussion

In this study, the questionnaire measuring motivation towards exercise and diet among children was translated into Farsi and standardized. The results revealed that the eight items comprising the exercise subscale effectively differentiated between individuals with low and high motivation for exercise. Similarly, for the dieting subscale, each item discriminated well between individuals with low and increased motivation. The final Farsi version of the questionnaire exhibited two factors, consistent with the English version (18). The internal consistency of both factors was acceptable, albeit lower than the English version (0.87 for exercise and 0.90 for diet in the English version). The questionnaire was introduced in 2020

and has not yet been localized in any language other than Farsi, precluding the possibility of comparing its psychometric properties with different localized versions.

Limitations

The study did not use the test-retest method to determine reliability. However, if this tool needs to be used multiple times in a specific group of children, it is important to know its test-retest reliability. It should be noted that this questionnaire was designed for children aged 7 to 11, and further research is necessary to determine its psychometric properties for children of other ages.

Recommendations

According to the results of the present study, it is suggested to determine the test-retest reliability of MED-C questionnaire in future studies. You can also use this questionnaire to know the needs and motivations of children's exercise and diet, and based on that, interventions can be planned to change the motivation and behavior of children with weight problems, at risk, and without weight problems.

Conclusion

In general, the findings obtained from this study indicate that MED-C is a valid and reliable tool for evaluating the needs and motivations of exercise and diet of Persian-speaking children aged 7 to 11 years old.

Table 7. The results of confirmatory factor analysis (CFA) in the measurement model of motivation questionnaire for children's exercise and diet

Phrases	Standard estimate	Critical value	P value	Phrases	Standard estimate	Critical value	P value
1	0.883			9	0.905	14.65	0.001
2	0.882	10.30	0.001	10	0.902	14.62	0.001
3	0.896	10.36	0.001	11	0.873	14.25	0.001
4	0.509	10.30	0.001	12	0.655		
5	0.459	7.24	0.001	13	0.350	5.94	0.001
6	0.796	16.79	0.001	14	0.830	18.24	0.001
7	0.888	19.20	0.001	15	0.795	17.17	0.001
8	0.833			16	0.838		

Table 8. Internal correlation results of motivation subscale for physical exercise and convergent validity index

Variables	Motivation subscale for exercise	AVE
Motivation subscale for exercise	-	0.597
The amount of exercise	P < 0.001, 0.730[*]	-

AVE: Average variance extracted

Authors' Contribution
Study design and ideation: Rokhsareh Badami
Getting financial resources for the study: This research was done at the personal expense of the first author, Najme Beigi
Scientific and executive support of the study: Rokhsareh Badami, Najme Beigi
Data collection: Najme Beigi
Analysis and interpretation of the result: Rokhsareh Badami
Specialized statistics services: Rokhsareh Badami
Manuscript preparation: Rokhsareh Badami, Najme Beigi
Specialized scientific evaluation: Rokhsareh Badami, Najme Beigi
Confirming the final manuscript to be submitted: Rokhsareh Badami, Najme Beigi
Maintaining the integrity of the study process from the beginning to the publication: Rokhsareh Badami, Najme Beigi

Conflict of Interest
There is no conflict of interest. The findings of the present research are extracted from the thesis at Islamic Azad University, Isfahan Branch (Khorasgan). Rokhsare Badami is a member of the faculty and supervisor of the thesis and Najmeh Beigi is a master of motor behavior at Islamic Azad University, Isfahan (Khorasgan) Branch.

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