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Child Health Education Scale Under Pandemic Measures: Confirmatory Factor Analysis for Validity and Reliability Test

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Abstract

Firstly, the concepts of health education and health education for children were explained in the study. The aim of the study is to develop a scale to measure the health knowledge of childhood participants within the scope of epidemic prevention. The scale was created by revising from another study. The scale consists of 28 statements and 5 dimensions. The data were taken from 359 students studying at a primary school. Reliability analysis was performed first on the data obtained and the data were found to be reliable. Confirmatory factor analysis was performed for the validity of the scale. As a result of the analysis, the scale found a good fit. Factor loadings were found to be high and model compatibility was found suitable for analysis. According to the analysis results, the Health Education Scale was developed and divided into appropriate factors.

Keywords: Child, Health Education Scale, Confirmatory, Validity, Reliability

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Introduction

Health education aims to facilitate children to learn healthy behaviors and to have correct behaviors. Looking at the definition of the World Health Organization, health education is a tool that makes people believe in adopting, gaining and applying the necessary measures for healthy life and behavior, especially starting from childhood. Health education teaches people the correct use of health services provided. It also allows them to make responsible decisions individually or collectively in order to improve their health and environment (WHO, 2012).

Children learn behavior training and rules only through daily routines. Children should be taught to adhere to the expectations of adults around them without supervision and to internalize and demonstrate the standard rules. Actually, this is the success of education. This type of self-control can be imparted to the child in the first ten years of life. At this point, education at school and family is important. It is very important for the child to be in the education system both in his family and in primary school (Masciotra, 2013).

It is important for a child to gain skills such as reasoning, inference, and questioning by learning social behavior and basic life rules. The child gains many knowledge and skills in primary school and in his family, including developing a sense of confidence, expressing himself correctly and expressing his needs, and health (Hossain, 2015).

One of the most important features of health education is that it includes the education given by the family as well as the health education given at schools. Health education is a very different subject in principle and method, and this education and transfer of knowledge should only be done correctly by families (Cleary, 1988).

There is also a social dimension to health education because in societies people's wrong beliefs, knowledge and habits are a part of their culture and wrong learning takes place. For this reason, health education studies should be handled not only at the individual level but also at the society level. Health education has an important place for children to learn correct attitudes and behaviors to protect themselves and meet their own needs (UNESCO, 2011).

Preschool education can be defined as a process of gaining experience in a structured way under the supervision of adults and in a suitable environment for the small experiments of those existing in real life. The contribution of pre-school education to the child's individual development and long-term quality of life is enormous Education and knowledge are the most important tool used

in this century in promoting health, preventing adversity. Campaigns and projects carried out on this subject emphasize child health and support children to be in a full well-being while preventing diseases. Health education; It directly affects the health of the individual and his / her quality of life. With this education, it is aimed to support the individual's health and to learn to avoid negative situations. All individuals can access these programs and benefit from them (Callanan, 2017).

The benefit of a society from developments in the field of health depends on the individuals to organize and change their lifestyle in line with the information they have learned. One of the most important methods in achieving this change, protecting and improving health is 'health education' which turns into behavior. Especially the primary school period constitutes an important period of consciousness in life. Children must be physically, socially and mentally healthy in order to grow, develop and be healthy. Therefore, planning, implementation and evaluation of health services is important. During the pandemic period, the importance of nutrition, hygiene, physical and mental health has emerged. Based on the saying that a person is educated as a child, there is a need to focus more on behavior-changing health education in primary school education. The purpose of health education; needs of the individual and society is to create a change in behavior by preparing the environment and the opportunities that will meet the needs of people and enable them to protect and improve their health for a healthy life (US, 2001).

Education in primary school children aims to improve children's cognitive, social-emotional development and self-care skills. It also aims to teach them how to cope with daily life and health behavior (Boyd et al., 2005).

However, it is thought that this self-care and health education given especially in primary schools is not sufficient. It must be more emphasis on cognitive development of these children.
It is observed that many children in primary school have difficulties in meeting their own needs, health, nutrition, social relations and protecting themselves against abuse and dangerous situations.

Parents' attitudes and behaviors and education in primary schools can be criticized in this regard. Considering the studies conducted in our country, it is seen that there is no program aimed at ensuring the personal safety of children, protecting their rights and meeting their self-care needs, and these knowledge and skills are not measured with such an assessment tool (Olsen and Allensworth, 2020).

Any assessment tool for health education could not be found. Therefore, it has not been found in the literature and it is thought that the shortcoming in this matter will be somewhat closed with the development of such a scale by researchers.

This research examines the knowledge and skills of preschool children in health issues in the light of detailed research, examination and compilation of programs that will support personal safety and first aid, hygiene and self-care, nutrition, sleep, mental health and social relations and prevent abuse and neglect to support the healthy development of preschool children It is aimed to develop a scale in order to evaluate it and to examine this scale in terms of validity, reliability and various variables.

Material and Method

In this study, it was aimed to perform statistical validity and reliability analyzes of scales developed to determine health education levels in children, which are of high importance in preventing pandemics.

The "Health Education Scale" developed by Aydos (2013) was revised and summarized in 5 dimensions and 28 items and used as such. The revised version of the scale was applied to 411 child participants, 359 of these data were found worth the analysis. Data were collected through random sampling method in students studying in a primary school in Turkey.

In the first part of the scale, the demographic data of the participants were questioned, and in the second part, the health education level of the child participants was questioned with five dimensions and 28 statements. The dimensions of the scale and the order of suggestions representing the dimensions are shown in Table 1. 5-point Likert scale grading was used in the propositions.

Table 1. Dimension Names and Propositions

Dimension Names	Statements
Personal Safety and First Aid (KGI)	Statements 1 and 6
Cleaning and Self Care (TOB)	Statements 7 and 12
Nutrition (BES)	Statements 13 and 17
Mental Health and Social Relations (RSSI)	Statements 18 and 22
Negligence and Abuse (IVI)	Statements 23 and 28

H_1. The Health Education Scale model is statistically significant.

H_0. The Health Education Scale model is not statistically significant.

Their hypotheses were tested, and the data obtained as a result of the research were evaluated with the help of SPSS 25.0 and AMOS 20.0 package programs. Confirmatory factor analysis and Cronbach Alpha coefficient were used to analyze the validity and reliability of the scale.

Correlations and tests were used to analyze the data. The results were evaluated at a 95% confidence interval, and the significance level was p <0.05.

Findings

In the study, the reliability of the data obtained was examined first. The Cronbach Alpha coefficient of the entire scale and each dimension was calculated to examine the reliability. As the Cronbach's Alpha coefficient approaches 1, the reliability of the scale increases (Karagöz, 2014, Kaptanoğlu, 2013).

Table 2. Reliability analysis

Questionnaire items	Corrected Item Total Correlation Coefficients	Alpha if item deleted	Dimensional Cronbach' Alpha	Total Cronbach' Alpha
Personal Safety and First Aid (KGI)				
KGI1	,533	,942		
KGI2	,633	,941		
KGI3	,535	,942	**0.818**	
KGI4	,484	,943		
KGI5	,625	,941		
KGI6	,618	,941		
Cleaning and Self Care (TOB)				
TOB1	,682	,941		
TOB2	,765	,940		
TOB3	,698	,940	**0.860**	
TOB4	,671	,941		
TOB5	,427	,943		
TOB6	,684	,941		
Nutrition (BES)				
BES1	,647	,941		
BES2	,730	,940		
BES3	,639	,941	**0.854**	**0.943**
BES4	,566	,942		
BES5	,783	,940		
Mental Health and Social Relations (RSSI)				
RSSI1	,526	,942		
RSSI2	,660	,941		
RSSI3	,333	,952	**0.651**	
RSSI4	,790	,940		

RSSI5	,669	,941	
Negligence and Abuse (IVI)			
IVI1	,749	,940	
IVI2	,579	,942	
IVI3	,607	,941	
IVI4	,484	,943	**0.832**
IVI5	,744	,940	
IVI6	,675	,941	

Table 2 shows the correlations of the propositions that make up the scale and the Cronbach

Alpha coefficients of the dimensions and the overall scale. When the values were examined, although the reliability of the Mental Health and Social Relations (RSSI) dimension (α = 0.651) was found to be normal, the reliability of the other four dimensions was found to be high. When looking at the general reliability of the scale (α = 0.943), it is seen that it is quite high. In the light of these data, it is seen that the Health Education Scale is reliable. Confirmatory Factor Analysis was applied after the data were found to be reliable.

Confirmatory Factor Analysis: (CFA) is an analysis method that is frequently used in the development of measurement models and provides important facilities. This method is a process for creating a latent variable (factor) based on observed variables through a previously created (Myers, 2000). It is generally used in scale development and validity analysis or aims to verify a predetermined structure (Bayram, 2010).

CFA is used to describe multivariate statistical analyzes that include latent structures represented by a large number of observed or measured variables (Bayram and Bilgel, 2008). CFA is a factor analysis used to test the compatibility of factors determined by Explanatory Factor Analysis (EFA) to factor structures determined by hypothesis. In CFA, while researchers determine the correlation between measurement errors, it is expected that the correlations of factors with each other are equal (Gülden and Miran, 2008). The model is a model that has been determined theoretically and tested with CFA by the researcher.

In order to test the validity and reliability of the scale used in the study, a confirmatory factor analysis was first performed on the Health Education scale, consisting of 28 statements and five dimensions.

Table 3. Distribution of Statements to Their Dimensions and Factor Loads

Items	Dimension				
	KGI	TOB	BES	RSSI	IVI
1. I know that she should not touch any cleaning agents other than her daily use.	**0.613**				
2. I know that I should not take the medicine at home / school without telling my mother / father or teacher.	**0.729**				
3. I know that the harmful effects of the sun and playing in the street or in the park is dangerous when the sun is very effective.	**0.614**				
4. I know that I have to ride my bike on the bike path.	**0.570**				
5. I know that I should stay away from substances that could put myself in danger.	**0.711**				
6. If I get lost somewhere I know what to do.	**0.686**				
7. I care about my dental and oral hygiene.		**0.752**			
8. I know that I have to take a bath regularly.		**0.828**			
9. I use soap, toilet paper and towels for school and home cleaning.		**0.755**			
10. I know that I have to be vaccinated for a healthy life.		**0.720**			
11. I know how diseases spread.		**0.464**			
12. I know that I need to go to the doctor regularly for my health.		**0.767**			
13. I know the importance of breakfast and I make sure to have it regularly every day.			**0.717**		
14. I know that I need a regular and balanced diet in order to maintain my healthy development and body health.			**0.803**		
15. I know that I have to consume the appropriate amount of milk and dairy products every day for my healthy development.			**0.701**		
16. I know that fast food (fast snacking) is harmful to my health.			**0.607**		
17. I know that drinking water is beneficial for health and that I need to consume enough water for my body during the day.			**0.848**		
18. I can easily express my feelings.				**0.559**	
19. I am aware of my strengths and weaknesses.				**0.686**	
20. I do not give up immediately in situations that force me.				**0.347**	
21. I care about my friends and environment.				**0.821**	
22. I do not do behaviors that my parents and teachers have declared inappropriate.				**0.716**	
23. I am aware of what my rights are as a human being.					**0.815**

24. If my needs are not met adequately and on time, I seek help from someone I trust.	**0.613**
25. I understand that someone has contacted me for good or bad intent.	**0.633**
26. I know that I have to be careful when approaching or communicating with a stranger.	**0.533**
27. I know how to say "NO" to something I don't want.	**0.802**
28. When I am exposed to a behavior that I am uncomfortable with, I always tell an adult.	**0.738**

Factor loads range from 0.57-0.72 for the KGI variable, 0.34-0.82 for the RSSI variable, 0.47-0.82 for the TOB variable, 0.53-0.81 for the IVI variable, and 0.60-0.84 for the BES variable (see Table 3).

Table 4. Correlation Between Dimensions

			r	S.E.	C.R.	P
KGI	<-->	RSSI	,828	,047	7,544	***
KGI	<-->	TOB	,910	,055	9,071	***
KGI	<-->	IVI	,776	,056	8,667	***
KGI	<-->	BES	,791	,053	8,861	***
RSSI	<-->	TOB	,888	,049	8,103	***
RSSI	<-->	IVI	1,000	,060	8,585	***
RSSI	<-->	BES	,941	,054	8,523	***
TOB	<-->	IVI	,836	,057	9,600	***
TOB	<-->	BES	,843	,055	9,793	***
IVI	<-->	BES	,914	,063	10,503	***

*** = P<0,05

Table 4 shows the correlation relationships of dimensions. When the values were examined carefully, they were all positive. In addition, when looking at the correlation intensity, the intensity of almost all of them was calculated as strong. This means that there is a significant relationship between the dimensions of the Health Education scale. P values are also less than 0.05.

Path Diagram of Health Education scale is given in Figure 1 below. Factor loadings of the propositions and the relationships between dimensions were visualized.

Figure 1. First Level Multifactor Model for the Sub-Dimensions of Health Education Scale

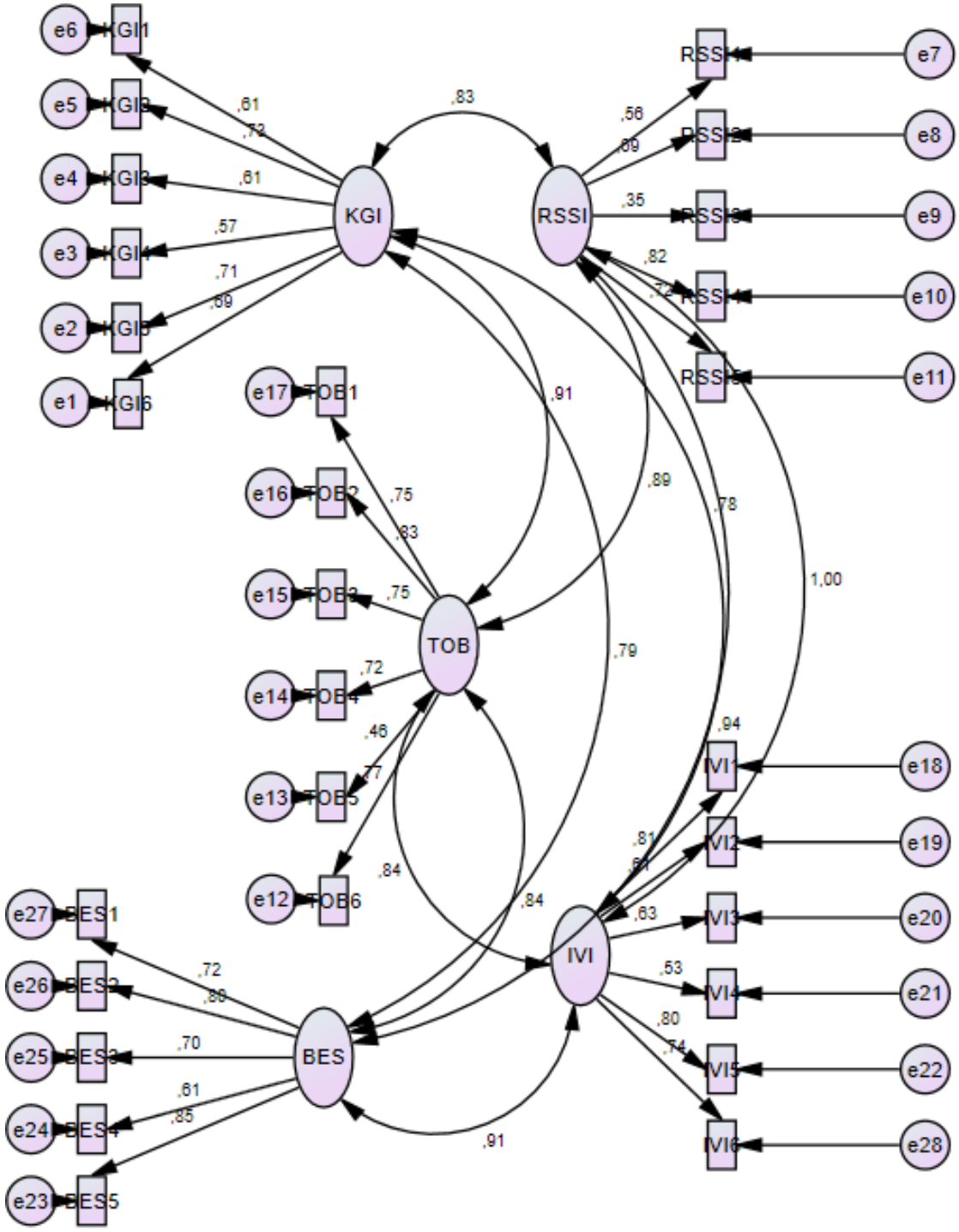

Table 5. Goodness of Fit Indices; Normal Values and Calculated Values

Goodness of Fit Indices	Normal Values	Calculated Values
X^2/df	≤ 2	1,707
RMSEA	≤ 0,05	0,044
CFI	≥0,95	0,955
GFI	≥0,85	0,896

The above table shows the results of the model's goodness of fit. As a result of the analysis, it was determined that the data set has the desired compliance values. Accordingly, compliance indices for the Health Education scale; Degrees of Freedom (sd=152, p=0.000), $\chi 2$ /DF=1.70 were calculated. Similarly, Root Mean Square Error of approximation (RMSEA)= 0.044, Comparative fit Index (CFI)= 0.95 and Goodness of fit Index (GFI)= 0.89 are calculated (see Table 5). Although there is no consensus in the literature regarding which of these goodness of fit statistics to use, these four are generally used (Karagöz, 2014). According to the fit values obtained as a result, the first-order multi-factor model shows good fit. So the model is suitable for use.

Discussion

Confirmatory factor analysis was conducted to examine the structure underlying the initial form of the scale with 28 items. There are five dimensions in the scale. Before conducting a Confirmatory Factor analysis, the reliability analysis of the data from 359 participants of all scales and dimensions were performed. The data were reliable for all five dimensions and scales. After this explanation, confirmatory factor analysis was performed.

According to the confirmatory factor analysis, dimension and factor loads are distributed as follows: Factor loads range from 0.57-0.72 for the KGI variable, 0.34-0.82 for the RSSI variable, 0.47-0.82 for the TOB variable, 0.53-0.81 for the IVI variable, and 0.60-0.84 for the BES variable. Considering the correlations between dimensions, it was seen that all dimensions were statistically and significantly correlated with each other. These relationships are positive. The dimensions with the highest association are: RSSI-IVI (1,000), RSSI-BES (, 941) and IVI-BES (, 914).

When the factor loads of the expressions are examined, it is seen that the factor loads of all expressions are greater than 0.50. This means that expressions are highly correlated with their dimensions. Also, there was no need for any statement to be removed.

Looking at the confirmatory factor analysis, it is seen that the model fit is at the desired level. This shows that the scale can be used for analysis.

Literature review recommend that child health education according to pandemic measures should therefore be considered when evaluating the instrument. Overall reliability for this newly developed, Health Education Scale-indicator instrument was fine (α = 0.943). Corrected item-to-total corrections for the entire scale as well as various sub groups were more than adequate. Cronbach's alpha coefficient for internal consistency reliability for all dimensions was between (α = 0.651-0.860). This shows that scale dimensions are reliable.

Conclusion

It is determined by calculation that validity is a survey of consistency of interrogating items of an instrument, so the questioned items are extremely believed to be able to measure what is to be restrained. Settling of the validity criteria is not enough to report that the instrument is valid and reliable.

Reliability is a level of an instrument, so firmly believed that the instrument is capable of providing a steady data (fixed), although given at different times to the same defendant.

Confirmatory Factor Analysis (CFA) in the Structural Equation Modeling (SEM) gives better results in testing the validity and reliability of a scale. The test results can be indicated by; Regression Weights, Standardized Regression Weights, Convergent Validity, Variance Extracted, Construct Reliability, and Discriminant Validity.

Limitations of this study.

The present analysis was conducted based on a sample of children with Istanbul region, which may limit the epidemiological application of these results in other children populations will be beneficial.

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