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ORIGINAL ARTICLE

Psycometric Characteristics of the Turkish Version of the Caregiver Vaccination Attitudes Scale

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Abstract

Objective: This study aims to determine the psychometric properties of the Turkish version of the Caregiver Vaccination Attitudes Scale.

Method: This methodologically designed study consists of parents ($n = 220$) of 12–35 months old children applying to the Department of Child Health and Diseases in one Research and Application Center for any reason between July 2020 and June 2021. The data were collected using the "Descriptive Information Form" and "Caregiver Vaccination Attitudes Scale" and the analysis was made by transferring them to IBM Statistical Package for the Social Sciences Statistics 23 and IBM Statistical Package for the Social Sciences AMOS 23 programs. Frequency distribution for categorical variables, descriptive statistics for numerical variables, exploratory and confirmatory factor analysis for scale validity, Cronbach's alpha value for reliability, and intraclass correlation coefficient analysis for test–retest reliability were used.

Results: In the construct validity of the scale, the Kaiser–Meyer–Olkin value was found to be .951 and the Barlett's test showing its suitability for factor analysis was significant ($p < .001$). The scale consisted of 13 items and a single factor. The Cronbach's alpha coefficient was .941, and the total explained variance was 62.822%. The fit index values for the confirmatory factor analysis model of the scale were determined as $\chi^2/df = 2.368$, goodness of fit index = .908, normed fit index = .941, comparative fit index = .965, root mean square error of approximation = .079, and standardized root mean square residual = .035, and they were well-matched.

Conclusion: The Caregiver Vaccination Attitudes Scale is a valid and reliable scale adapted to Turkish society, and it is sufficient and satisfactory in terms of distribution, measurement skill, internal consistency, and model fit.

Keywords: Reliability, scale, vaccination, vaccine rejection, validity

Introduction

Infectious diseases can threaten human health and cause the death of children and adults (Lounis et al., 2022; Vezzosi et al., 2017). From another point of view, it is very clear that diseases and epidemics bring great financial burdens. Immunization is the basic public health practice for maintaining health and protecting the community from infectious diseases and epidemics that these diseases may cause (CDC, 2020; Zimmermann et al., 2019). The history of immunization dates back to ancient times and has undergone method changes in the process (Aaby et al., 2014; Argüt et al., 2016). Immunization programs raise public awareness by supporting childhood vaccination practices. The main goal of the immunization program is to spread the vaccine applications and reduce the unvaccinated individuals (WHO, 2021). Nurses, who are members of the health team, have a great role in the protection of child health with immunization services, and the implementation and continuity of childhood vaccination programs (ICN, 2019; Mcenroe-Petitte, 2020). Nurses need to establish effective, accurate, and safe communication with parents, as they are the first healthcare team member that the baby–child encounters and they work in primary healthcare institutions (Mcenroe-Petitte, 2020). Since most of the vaccines are administered during infancy and childhood, the indecisiveness of parents causes infants and children not to be vaccinated, and infectious diseases seen in infants and children are increasing (Deborah et al., 2019; WHO, 2014; Yiğit et al., 2020). It is seen the World Health Organization (WHO) included vaccine rejection in its report

This study was presented as an oral presentation at the third International Mediterranean Pediatric Nursing Congress between 12 and 15 October 2022 with the title of "Parents' Attitudes and Beliefs on Childhood Vaccination." This study is the translation of the thesis titled "Parents' attitudes and beliefs about childhood vaccinations" published in 2021 into an article.

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titled "10 Threats to Global Health" in 2019 (WHO, 2019). In our country, vaccination indecision among parents and the number of unvaccinated children have increased rapidly by 81% in recent years (Büyüksoy, 2019). It is of great importance to investigate the causes of this indecision in parents and to solve the problems in terms of the development of public health.

Methods

Study Design and Sample

This study is a methodological design. The research population consists of the parents of 12–35 months old children who applied to the pediatric departments of one Research and Application Center for any reason between July 2020 and October 2020. The debts of the research go between five and ten times depending on the substance load (DeVellis, 2017; Hair, 2010; Nunnally, 1978; Tavşancıl, 2006). For this reason, while calculating the sample size, 220 people were determined by taking 10 times the number of scale items for the 22-item Caregiver Vaccination Attitudes Scale (CVAS) (Bryman & Cramer, 2001; Nunnally, 1978; Tavşancıl, 2006).

Data Collection

Data were collected in a quiet room with caregivers who met the inclusion criteria at the center where the study was conducted using KBF (Kişisel Bilgi Formu / Personal Information Form) and CVAS. The Personal Information Form, which was prepared to determine the introductory characteristics of parents and children, consists of 13 questions including socio-demographic characteristics.

The Vaccination Confidence Scale

Caregiver Vaccination Attitudes Scale was developed by Wallace et al. in Ghana in 2017 with a multi-agency team of CDC, Emory University, and Ghana Health Services and published in 2019. The scale consists of 5 sub-dimensions and 22 items at the first stage. Sub-dimensions are vaccine-preventable disease consciousness/awareness, vaccine benefits, vaccine efficacy and safety, past behavior, and trust. The scale is in triple Likert type and consists of questions in which the first 10 questions are answered as [3] I do not agree, [2] I am not sure, and [1] I agree and the last 12 questions are answered as [3] I don't know, [2] No, and [1] Yes. In the second stage, the scale was divided into five sub-dimensions and three sub-dimensions and scales with the same questions were formed (Wallace et al., 2019).

Statistical Analyses

Data collection was carried out in a quiet room with caregivers who met the inclusion criteria of the study at the center where the study was conducted. During the scale validity and reliability phase of the study, the data of 220 participants were completed by transferring to IBM Statistical Package for the Social Sciences (SPSS) Statistics 23 and IBM SPSS AMOS 23 programs. While evaluating the study data, frequency distribution for categorical variables and descriptive statistics for numerical variables are given. Explanatory factor analysis and confirmatory factor analysis (CFA) were used for scale validity, Cronbach's alpha value was used for reliability, and intraclass correlation coefficient (ICC) analysis was used for test–retest reliability.

Main Points

- The "Caregiver Vaccination Attitudes Scale" is a measurement tool with validity and reliability indicators.
- The resulting scale is a single factor (attitude), 13-item scale and was created to measure the attitudes of caregivers.
- Other factors leading to vaccine rejection have been identified.

Ethical Considerations

Approval dated 20 July 2020 and numbered 2020/171 from Düzce University Clinical Researches—Non-Interventional Health Research Ethics Committee and necessary institutional permission from Düzce University Health Application and Research Center, Wallace et al. necessary permissions were obtained for the validity and reliability study of the scale in Turkish, verbal—written consent of the participants were obtained.

Results

When the demographic findings of the parents were examined, it was determined that 92.7% of the caregivers ($n = 220$) were mothers, 6.4% were fathers, and 1% were other (grandmother, grandmother, grandfather, older sister, brother, caregiver, relative, etc.) caregivers. The mean age of the participants was 31.33 ± 5.5 years.

Caregiver Vaccination Attitudes Scale Validity and Reliability

A. Translation Phase of the Scale. The scale was translated from English to Turkish by three independent experts in the field and then back-translated by two independent experts

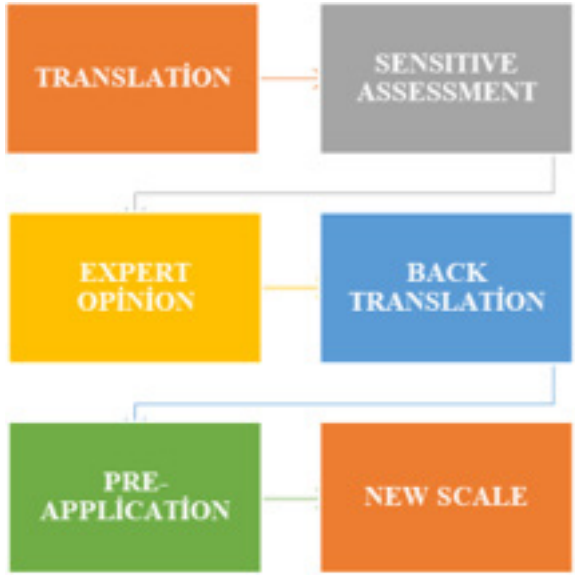

Figure 1.
Scale Validity and Reliability

(Baker, 2010; Epstein et al., 2015; Johanson et al., 2010; Sidani et al., 2010) (Figure 1).

B. Construct Validity of the Scale. The validity was evaluated in terms of content and construct validity.

Content Validity

Since the number of experts is 13, it is suggested that all items remain in the scale, concluding that the content validity of the items with a Content Validity Ratio (CVR) value greater than .54 is ensured. Assuming there is more than one dimension, it can be said that the scale is statistically significant since each Content Validity Index (CVI) is >.67.

Construct Validity

In order to examine the factor structure, the Kaiser–Meyer–Olkin (KMO) value was found to be .951. According to the result of Bartlett's sphericity test, variables and data were found suitable for factor analysis (χ^2: 2460.753, SD: 78, $p < .001$). There is no limitation on the number of factors. In the exploratory factor analysis, the limit value for the load values in the factor in which the items took place was taken as .50. After the analysis, the 4th, 6th, 9th, 14th, 15th, 16th, 19th, 20th, and 21st items were removed from the scale because they had a factor load of less than .50 and the number of items decreased from 22 to 13. As a result of the content validity of these 13 items, it was seen that they were collected in a single factor. The CVAS explains 62.822% of the total variance (Table 1).

In the first stage, the first degree CFA model, in which the single factor dimension is the latent variable (F1: CVAS) and the expression constituting these factors is the indicator variable. Since the latent variable is not a metric, in order to estimate the parameter values, it is necessary to assign a value of 1 to one of the paths drawn from the latent variables to the observed (indicator) variables (factor loading equal to 1) or to assign a value to the variance of the latent variable (usually 1) (Hu & Bentler, 2009). In order to improve the fit indices, a two-way relationship was established between the error terms of the items "s1" and "s2," "s3" and "s12" in the CVAS, which has the highest modification indices (Figure 2).

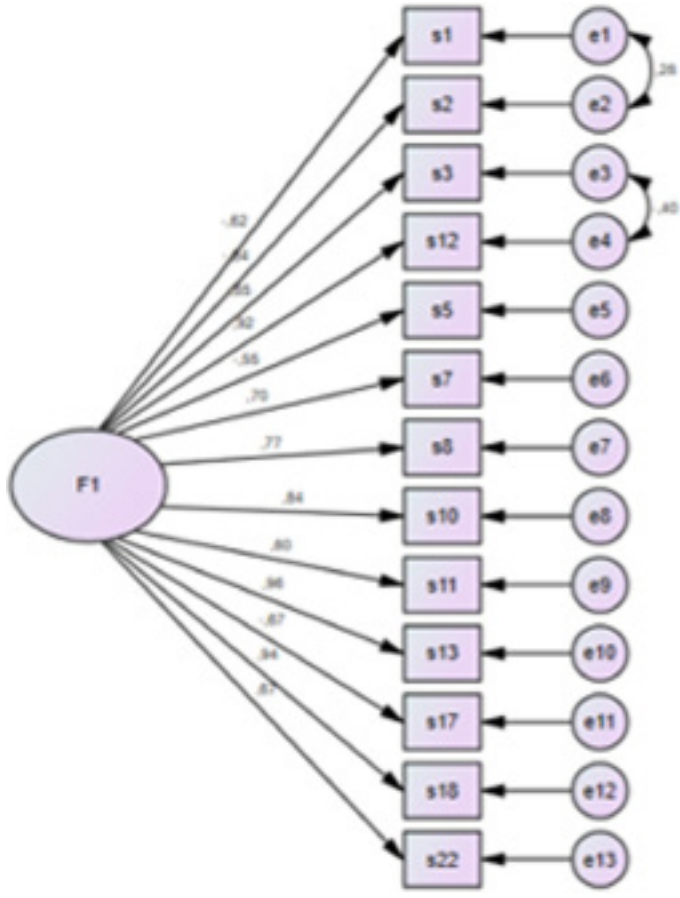

Figure 2.
One-Dimensional 1st Order DFA Model

When the findings are examined, it is seen that the single-factor structure of the CVAS, consisting of 13 items, generally fits well**.** When the fit indices are examined in general, it is seen that the CVAS is acceptable (Table 2, Table 3).

Table 1.
Factor Analysis Results of Caregiver Vaccination Attitudes Scale Items

Scale	Questions	Loads	Variance Disclosure Rate	Eigenvalue
Caregiver Vaccination Attitudes	S13	.941	**62.822**	8.167
	S18	.937		
	S12	.902		
	S2	–.871		
	S3	.856		
	S10	.855		
	S8	.810		
	S7	.744		
	S22	.710		
	S17	–.684		
	S1	–.670		
	S11	.619		
	S5	–.592		

Table 2.
Goodness of Fit Indexes and Accepalue Ranges Used in the Study

Indexes	Good Fit	Acceptable Fit	Results
χ^2/df	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 4$	2.368
GFI	$.95 \leq GFI \leq 1$	$.90 \leq GFI \leq .95$	.908
NFI	$.95 \leq NFI \leq 1$	$.90 \leq NFI \leq .95$	.941
CFI	$.95 \leq CFI \leq 1$	$.90 \leq CFI \leq .95$	.965
RMSEA	$0 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$	.079
SRMR	$0 \leq SRMR \leq .08$	$.05 \leq SRMR \leq .10$	.035

Note: χ^2/df = Chi-square/degrees of freedom; CFI = comparative fit index; GFI = goodness of fit index; NFI = normed fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

Table 3.
Standard Regression Coefficients

			Standard Regression Coefficients
S1	←	F1	–.622*
S2	←	F1	–.842*
S3	←	F1	.854*
S12	←	F1	.918*
S5	←	F1	–.549*
S7	←	F1	.702*
S8	←	F1	.772*
S10	←	F1	.840*
S11	←	F1	.596*
S13	←	F1	.956*
S17	←	F1	–.667*
S18	←	F1	.942*
S22	←	F1	.674*

*$p < .001$.

C. Reliability of the Scale. Calculations were made for the scale and sub-dimensions, and Cronbach's alpha value was calculated. These values are generally higher than the acceptable value of .70 (Hair et al., 2010). Since the Cronbach's alpha value did not change significantly when any item was deleted in the item analysis, it was decided not to remove any item from the scale at the reliability stage (Table 4).

Table 4.
Caregiver Vaccination Attitudes Scale and Sub-Dimensional Reliability

		Item-Total Correlation	Cronbach's Alpha When the Question Is Removed	Cronbach's Alpha
Caregiver Vaccination Attitudes Scale	S1	.621	.940	**.941**
	S2	.838	.933	
	S3	.814	.934	
	S5	.542	.945	
	S7	.693	.937	
	S8	.762	.935	
	S10	.814	.934	
	S11	.559	.942	
	S12	.874	.932	
	S13	.915	.931	
	S17	.621	.939	
	S18	.914	.931	
	S22	.652	.938	

Table 5.
Test–Retest Reliability

	Mean	Sdt. Deviation	Minimum	Maximum	ICC
Pre-test	35.05	6.01	13	39	**.811**
Post-test	30.13	2.54	20	33	

Note: ICC = Intraclass correlation coefficient.

In the study, the scale was applied to 40 participants with an interval of 2 weeks. According to the ICC analysis result applied for test–retest reliability, the ICC value for CVAS was found to be .811 (Table 5).

Discussion and Conclusions

There are measurement tools developed to evaluate many concepts in different countries, cultures, and languages. It is necessary that these developed measurement tools can be used in another country, culture, and language, and whether they measure the intended features should be proven by validity and reliability studies (Pena, 2007; Sidani et al., 2010; Yurdugül, 2005). There are many psychometric scales designed by many researchers in high-income countries to measure families' vaccination attitudes. However, the fact that families' attitudes toward vaccination in low- and middle-income countries differ compared to high-income countries emphasizes the importance of studies in this area (Oyo-ıta et al., 2016).

The quality that the items of measurement tools aim to measure and how much they represent this quality are evaluated with content validity and are accepted as a prerequisite in scale development-adaptation studies (Nunnally, 1994; Polit & Beck, 2010). It is very important to present the scale items to expert opinion to ensure the harmony of language and content and to evaluate the content validity (Ozolins et al., 2020; Wild et al., 2005). The scale was evaluated by 13 experts for content validity in assessing the relevance of its items to Turkish society. As a result of the evaluation, it was concluded that the content validity of the items with a CVR value greater than .54 was achieved (Lashwe, 1975). CVI was obtained for each dimension because the features to be measured were collected in more than one dimension. The scale was found to be statistically significant since the obtained CVI was .990 and a CVI > .67 indicated that the item was sufficient in terms of content validity (Davis, 1992; Özdamar, 2005; Yusoff, 2019). Factorization of the created data set is possible with the border between the objects. The positivity of the boundary coefficients of the items is determined by Bartlett's sphericity test ($p < .05$). The Bartlett's sphericity test result of the studied scale was found as χ^2: 2460.753, SD: 78, $p < .001$ (Jeong, 2004). The KMO test is a test that evaluates the suitability of the sample for factor analysis. If the value obtained as a result of the test is .60 and above, it means that the sample is sufficient for factor analysis (Boateng, 2018; Osborne, 2014). KMO in our study setting the value as 0.951 will be applied to the data. Factor analysis results will be useful and usable demonstrated (Nunnally, 1978). While it is recommended in the literature that the factor loaders should be above .32 for the item total score limitation, it showed that a low level of .32–.50, a good level of .50–.60, a high level of .60–.70, and a value of .70 to excellent level (Boateng, 2018; Carpenter, 2018; Osborne, 2014). To obtain a good attitude between the items, items with a factor load value below .50 were excluded from the dimension. There are variance ratios explained by each factor in the measurement regions, and the higher these ratios, the stronger the factor structure of the scale. It is available

in the literature that this value should be at least 30% in unidimensional scales and 40%–60% in multidimensional scales. (Boateng, 2018; Carpenter, 2018; Şencan, 2005). The CVAS explained 62.822% of the total variance, and it was concluded that it had a strong factor structure. Confirmatory factor analysis, on the other hand, evaluates whether the relationship between the factors forming the factor and the factor is at an appropriate level (Akgül, 2005). To determine whether the obtained CVAS was confirmed or not, CFA was performed and the single factor 13-item scale was finalized. The important thing in CFA is that the goodness-of-fit statistics are at the desired level. When the fit indices for the unidimensional first-degree CFA model are examined, it is seen that the single-factor structure of the CVAS, consisting of 13 items, generally provides a good fit (Ercan & Kan, 2004). According to the literature, an attitude scale is not considered reliable if Cronbach's alpha is less than .40. A coefficient between .40 and .59 indicates low reliability, between .60 and .79 good reliability, and values between .80 and 1.00 indicate excellent reliability (Alpar, 2018). A Cronbach's alpha coefficient of .70 is generally an acceptable threshold for reliability, but between .80 and .95 is preferred for the psychometric quality of the scales (Boateng, 2018; Kılıç, 2016). When the literature is examined, it is seen that the time interval given for the test–retest should be between 2–3 and 4–6 weeks (Ercan & Kan, 2004). In our study, the scale was applied to 40 participants with an interval of 2 weeks. The Cronbach's alpha value of the CVAS was .941 and the ICC value was .811.

The Turkish validity and reliability of the Caregiver Vaccination Attitudes Scale (CVAS) was made and "Bakım Verici Aşılama Tutumları Ölçeği" (BVATÖ), which is a valid and reliable scale, was obtained due to the high reliability coefficients obtained. The resulting scale, a single factor (attitude), 13-item scale is a comprehensive, easy-to-host, and up-to-date measurement tool for the stability of caregivers' attitudes. With these scales, the positive–negative attitudes of caregivers about early childhood vaccinations can be determined, they can reveal the importance of vaccination decisions, and they can be a guide for the outcomes of infant–child vaccination. It is recommended that the scale be used in new studies in different cultures with a larger sample in order to determine other factors that cause vaccine rejection.

Ethics Committee Approval: Ethics committee approval was received for this study from the Düzce University Clinical Researches Non-Interventional Health Research Ethics Committee (Date: July 20, 2020, No: 2020/171).

Informed Consent: Written informed consent was obtained from the participants of this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – S.S., S.A.; Design – S.A.; Supervision – S.A.; Resources – S.S., S.A.; Data Collection and/or Processing – S.S.; Analysis and/or Interpretation – S.S., S.A.; Literature Search – S.S., S.A.; Writing Manuscript – S.S.; Critical Review – S.A., S.S.

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