



# Turkish Adaptation and Reliability and Validity Study of Parent Attitudes About Childhood Vaccines Survey

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## ABSTRACT

**Aim:** Since the discovery of vaccines, opposing views have emerged and spread to the present day. Despite being based on different beliefs in different societies, anti-vaccination has become a rapidly growing social movement worldwide. Resistance to vaccination was included among health hazards at a global level by the World Health Organization in 2019. In a review of the literature, some studies conducted on vaccine rejection, vaccine hesitations and vaccine acceptance were found in different countries, but no studies in which vaccine hesitation was examined had been conducted in Turkey. The main reason was considered to be the lack of a vaccine attitude scale adapted into the Turkish language.

The aim of this study was to carry out a vaccination attitudes scale validity and reliability test on a scale which had been proven in foreign empirical studies and been translated into the Turkish language and to publish the scale in the field literature to be used in future vaccination attitudes studies in Turkey.

**Materials and Methods:** This study is a methodological study. The Parent Attitudes about Childhood Vaccines (PACV) scale was translated into Turkish by three experts who were competent in both English and Turkish, then it was translated back into English again. As a result of the comparison made, several changes were made to the Turkish scale. A pilot application was used and its results were evaluated. Confirming the results of the pilot application, the scale was applied to 225 parents. The reliability of the analyzed data was tested via Cronbach's alpha.

**Results:** The reliability of the data was determined to be 0.84, and the scale was considered reliable. Confirmatory factor analysis for the adapted scale was carried out, and the adaptation of the scale into Turkish was completed.

**Conclusion:** The Turkish version of the PACV scale is a valid and reliable scale for evaluating vaccine attitudes including vaccine rejection, vaccine hesitations and vaccine acceptance.

**Keywords:** Anti-vaccination movement, vaccination refusal, reliability and validity, questionnaires

## Introduction

Vaccination is one of the most effective methods to protect against infectious diseases and maintain health. Starting from infancy, vaccination is an important factor for healthy growth and development. Despite its effectiveness and safety proven by scientific studies, anti-vaccination

opinions have become widespread in society nowadays (1). Although the growth of the anti-vaccination as a social movement all around the world is fed with some common beliefs, the development of anti-vaccination attitudes in parents can happen as a result of different dynamics (2). Today, the 'Strategic Advisory Group of Experts' (SAGE)

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meetings are held by the World Health Organization with regard to these rapidly growing anti-vaccine movements (3). In a report prepared by SAGE, the reasons for anti-vaccination are mainly grouped under three titles. These were classified as contextual effects, individual and group effects, and also specific subjects related to vaccine/vaccination (4). The causes of anti-vaccination trends are shown in Table I.

With the proliferation of anti-vaccination movements, adherence to vaccination schedules and immunization rates have begun to decline in many countries and the number of cases of some infectious diseases, which were close to elimination, have increased. The main obstacle to the implementation of vaccination programs is regarded as the fact that some families have doubts or direct resistance to the vaccination calendar (5).

Hagood and Herlihy (6) defined the classification of parents experiencing anxiety about vaccination into three groups. The first group is vaccine rejectors (VRJ) who strongly reject vaccination. The second group include vaccine resisters who are more willing to assess the safety and efficacy of vaccines than VRJ although they still refuse vaccination. The third parent group is made of people who have some hesitancy about some vaccines and are generally concerned about vaccinations.

Although anti-vaccination is the main concept which is emphasized in maintaining social immunity, recently

vaccination hesitancy, which is the invisible part of the iceberg, has been more controversial (7). According to Dubé et al. (8), the concept of “vaccine hesitation”, which was introduced in response to an inability to consider attitudes and behaviors towards vaccination as just “acceptance” or “rejection”, defines doubts about vaccination resulting in delays in vaccination schedules and rejection although it is provided as a service. Since the concept covers individuals who reject vaccination and those who have doubts, it offers a more holistic approach.

In studies conducted so far, it has been determined that some important reasons for hesitation against vaccinations include concerns about the safety of vaccinations, perception that vaccinations are not beneficial, fear of injections or insecurities about the implementation of vaccination programs and towards the pharmaceutical industry (9-11). In a study conducted in Turkey, similar results were obtained, and it was determined that parents’ hesitations about vaccines included concerns about the contents of vaccines and the side effects of vaccinations, the inability to obtain adequate information about vaccines, religious beliefs, mistrust of the pharmaceutical industry and the probable relations of interest between the industry and authorities (12).

It is important to determine those people who are hesitant about vaccination primarily in the planning of interventions concerning vaccine hesitation. Although SAGE

**Table I.** The causes of anti-vaccination

Contextual effects	Individual and group effects	Vaccine and vaccination specific issues
a. Communication and media environment	a. Personal, family and/or community members’ experiences related to vaccines including pain	a. Risk/benefit (epidemiological and scientific evidence)
b. Effective leaders, vaccination program guardians and anti-vaccination or vaccination lobbies	b. Attitudes towards beliefs, health and protection	b. Applying a new vaccine or a new formulation or a new recommendation for an existing vaccine
c. Historical influences	c. Knowledge/awareness	c. Management mode
d. Religion/culture/gender/ socioeconomic	d. Health system and providers-trust and personal experience	d. Design of vaccination program/delivery method (e.g. routine program or mass vaccination campaign)
e. Politics/policies	e. Risk/benefit (perceived, intuitive)	e. Reliability and/or supply of vaccine and/or vaccination equipment
f. Geographical barriers	f. Immunization as a social norm/not required/harmful	f. Vaccination program
g. Perception of the pharmaceutical industry	-	g. Costs
-	-	h. The strength of advice and/or knowledge base and/or attitude of healthcare professionals

has prepared several different types of questions to measure vaccine hesitation (13), a uniform and Global scale has not been prepared for this purpose. Many different surveys and questionnaires have been used in cross-section studies in different countries to measure parental attitudes towards vaccination (14-19). Many of these questionnaires have focused on a limited number of factors affecting vaccine hesitation, and the reliability and validity of these scales have not been tested. In this context, the Parent Attitudes about Childhood Vaccines (PACV) scale, developed by Opel et al. (5,20) and tested for validity-reliability, is one of the first vaccination hesitation scales. Consequently, the scale has been used in different country-based studies such as in Spain, Canada, Malaysia, Italy, and Iraq (21-27).

In the literature review conducted, a Vaccine Hesitation scale study for a Turkish adaptation was not found. The purpose of this study is to adapt the PACV scale developed by Opel et al. (20) in 2011, which measures parents' hesitations towards childhood vaccination, into the Turkish language and to apply a validity/reliability study on this scale so that the above mentioned gap in the literature is eliminated.

## Materials and Methods

This section describes the implementation processes of the adaptation of the scale and the analyses of its validity and reliability.

### Data Collection Tool

During the development process of the PACV scale, a literature-assisted question pool was created, interviews were made with a focus group, expert opinions on scale items were obtained, and a preliminary test was conducted on a working group of parents. As a result of this process, an 18-item scale was created (5). The Developed scale was evaluated in terms of validity and reliability by applying it to the parents of children of 19 to 35-month-old children in another study. The final form of the scale consisted of 15 items in three sub-dimensions, namely, safety effectiveness, general attitudes and behavior (20). A validation study was conducted to determine the level of accuracy in terms of prediction of the PACV scale on parents' future vaccination behaviors. This study demonstrated the prediction validity and test-retest reliability of PACV (28).

Answers on scale questions were taken from three different response formats including closed-ended (Yes/No/I don't know), 5-item Likert type (Strongly Agree/Agree/Not Sure/Disagree/Strongly Disagree) and the scoring type (from 0 to 10). While using scoring scale items, hesitant responses were scored as 2, unstable responses were scored

as 1, unhesitant responses were scored as 0, and points taken from each item were added without any weighting to determine the total score. A simple linear conversion table was used for the missing data. The lowest score that can be achieved in the scale is 0 and The highest score is 100 (100 points indicate high vaccination hesitation).

### Translation Study

In this study, a "back translation" method was used as one of the scale translation techniques. Beaton et al. (29) suggested that the original scale should be translated by two independent translators and a third translator retranslates the translated scale back into its original language.

To adapt and use PACV, Opel, who is the original developer of the scale, was contacted by email and his written approval was obtained. The PACV scale was translated from English to Turkish by three people who are competent in both languages. Then, their translations were revised and edited by the researchers, and a common translation text was created. This translation of the scale in Turkish was then retranslated into English by a different translator. For PACV, the opinions of four academics in the health field were taken. Experts were asked to give each item a rating between 1 and 4 (1= Not Applicable, 4= Completely Appropriate) to evaluate the original version and translation of the scale and to assess language/expression suitability and content appropriateness. Based on these experts' assessments, no item was removed from the scale. The final version of the translation, which was created as a result of the experts' assessments, was prepared for use in the study by consulting a linguist who specializes in the Turkish language.

The scale was applied to 30 parents who had similar characteristics with the sample group but would not be included in the pilot study. After this stage, feedback was received from each parent in order to find which of the scale items were understandable and which were difficult to understand. Parents gave feedback mostly on the sixth item of the scale and expressed that this item was unclear or hard to understand. By considering the recommendations of the parents, the scale was given its final form.

### Collection of Data

This study was conducted in the children's services and polyclinics of a private university hospital between January and February 2019. The criteria for inclusion in the study were determined as having a child under 6 years of age and an education level of being at least literate, and these

criteria were used in the selection of the sample. Written consent forms were taken from each participant. The scale forms were handed over to parents, and they were asked to deliver them after they finished answering these surveys. Completing the scale took the parents an average of 5 minutes.

### Statistical Analysis

To adapt the PACV into the Turkish language, confirmatory factor analysis was conducted to determine accuracy of the three-dimensional structure developed previously by Opel et al. (20). Before the analysis, scale items with different ratings were scored between 0 and 2 points, as in the original, and factor analysis was performed through this scoring. The robust maximum likelihood estimation method was used based on the asymptotic covariance matrix when performing confirmatory factor analysis. Confirmatory factor analysis was carried out with the LISREL 8.80 program. Cronbach's alpha and McDonald's Omega reliability coefficients were calculated to determine the reliability of the measurements obtained. Jamovi (Version 0.9.5.12) (Computer Software) (<https://www.jamovi.org>) was used to calculate the reliability coefficient.

### Ethics Committee Approval

Ethics Committee approval was given to the study at the 102<sup>nd</sup> meeting held by Istanbul Okan University Ethics Committee on 09.01.2019 (decision no: 11).

### Results

The study group consisted of 242 parents with a mean age of 36.22 years, ranging from 20 to 56 years old. The descriptive characteristics of the participants are given in Table II.

Analyzing Table II, it can be seen that 90.1% of

respondents (n=218) were mothers, and 9.9% of them (n=24) were fathers. It was determined that the ratio of parents who have a single child was 49.6% (n=120); the ratio of parents having two children was 42.1% (n=102); the ratio of parents having three children was 7% (n=17); and the ratio of parents having four or more children was 1.2% (n=3). It was determined that 12% of the participants (n=29) were 20 to 29 years old, and 87.6% of them (n=212) were 30 years old or older. Analyzing in terms of educational background, it was found that the majority of participants were holders of a bachelor's degree (n=117, 48.3%) or postgraduate degree (n=52, 21.5%) degree. 14.5% of the study group (n=35) consisted of participants whose income was less than their expenses; 26.4% (n=64) consisted of participants whose income was more than their expenses; and 58.7% of them (n=143) consisted of participants whose income was equal to their expenses.

In the confirmatory factor analysis conducted to examine the three sub-dimensions of the PACV scale, conformity of the model data was assessed by examining the conformity index values, factor load values and error variances. Conformity index values, factor load values [maximum (max)- minimum (min)] and error variance (max-min) values are presented in Table III; and the measurement model acquired as a result of this analysis is presented in Figure 1.

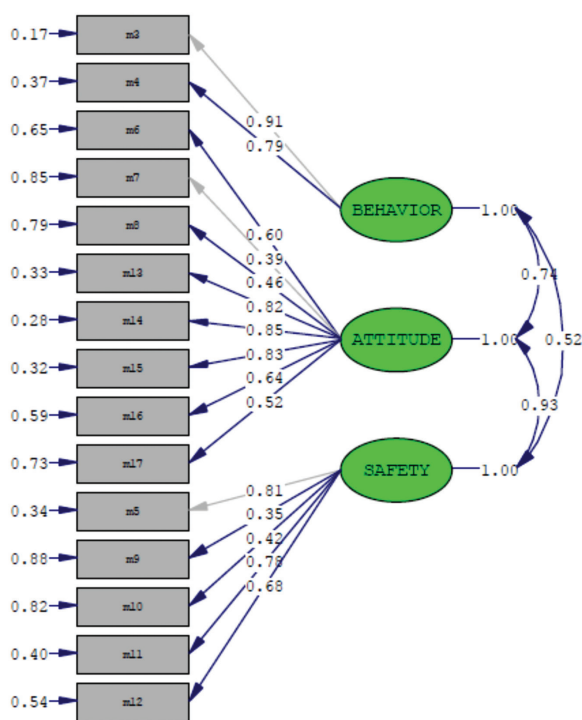
When Table III is examined, it is seen that the value is less than 3, thus, the model can be said to be very well adapted to the data. The comparative fit index value was found to be 0.97, and the Normed Fit index value was determined to be 0.95. The fact that these values were over 0.90 indicates that the model is perfectly adapted to the data. Since the goodness of fit index value was 0.71 and this value was under 0.90, it means that there was no adaptation

		f	%			f	%
<b>Parent</b>	Mother	218	90.1	<b>Educational Background</b>	Primary school/Primary education	8	3.3
	Father	24	9.9		High school	35	14.5
<b>Number of Children</b>	1	120	49.6		Undergraduate	30	12.4
	2	102	42.1		Bachelor's degree	117	48.3
	3	17	7.0	Postgraduate	52	21.5	
	4 and more	3	1.2	<b>Economic Situation</b>	My income is less than my expenses	35	14.5
<b>Age</b>	20-29 years	29	12.0		My income is more than my expenses	64	26.4
	30 years old and more	212	87.6		My income is equal to my expenses	143	58.7
	Have not specified	1	0.4		Have not specified	1	0.4

between the data and the model according to this index. The root mean error of approximation index is 0.080 for the model, and it is possible to say that the model showed adaptation to the data when it is evaluated according to this index. The general analysis of the adaptation indices shows that the three-dimensional model was adapted well to the data. Factor load values for items in each dimension varied between 0.35 and 0.91. Since the factor load values were over 0.30, it can be said that each item serves its purpose in its dimension.

Descriptive statistics and factor load values for answers given to each item in the PACV scale are presented in Table IV.

Cronbach's Alpha and McDonald's Omega Coefficients were used to examine the reliability of the scores acquired



Chi-Square=221.67, df=87, p-value=0.0000, RMSEA=0.080

**Figure 1.** Measurement model of parent attitudes about childhood vaccines scale

from PACV used within the scope of this study. These findings are presented in Table V.

When examining Table V, it can be seen that the reliability values for the scores of the scales used in the study varied between 0.61 and 0.85. Based on the calculated confidence index values, it can be said that the scores obtained from the scale in general are reliable.

### Discussion

The determination of hesitations about immunization and vaccination in the community is very important in planning necessary interventions. At the same time, measurement tools are also needed to determine the effectiveness of interventions.

In this study, the PACV scale was adapted into the Turkish language, applied to 242 parents, and its validity and reliability were determined. According to the results of our analysis, the 15 items on the original scale were preserved on the Turkish scale. According to the results of the factor analysis, it was determined that the Turkish scale was also in a three-factor structure as was the original scale. The Cronbach's alpha coefficients of the original scale had an internal consistency ranging from 0.74 to 0.84. The Cronbach's alpha reliability value of the Turkish scale was determined to be 0.84.

The determination of attitudes and hesitations towards vaccinations was not one of the main objectives of this study. However, this study yielded results regarding parents' attitudes towards childhood vaccinations. The absence of published data concerning parents' hesitations towards vaccinations in Turkey has made these results significant. 11.6% of the parents who participated in this study reported that they decided not to vaccinate their children without any exemptions. In a similar study conducted in North America, the parents' rate of declining one or more vaccines was found to be 15% (30). Another important conclusion revealed in this study is that 28.1% of parents describe themselves as hesitant about childhood vaccinations. In a study conducted in the United States, this rate was found

**Table III.** Confirmatory factor analysis results of parent attitudes about childhood vaccines scale

	p	CFI	GFI	NFI	RMSEA	Factor Load Values		Error Variances			
						max	min	max	min		
<b>Scale</b>	221.67	2.55	0.000	0.97	0.71	0.95	0.080	0.91	0.35	0.88	0.17
<b>Recommended Value</b>		$\chi^2/df \leq 3$		$\geq 0.90$	$\geq 0.90$	$\geq 0.90$	$\leq 0.080$	$\geq 0.30$		$\leq 0.90$	

Max: Maximum, min: Minimum,  $\chi^2$ : Chi square index, CFI: Comparative fit index, GFI: Goodness of fit index, NFI: Normed fit index, RMSEA: Root mean square error of approximation

**Table IV.** Descriptive statistics and factor loads of parent attitudes about childhood vaccines scale

		n (%)	Factor Load Values		
			Safety & effectiveness	General attitudes	Behavior
3. Have you ever delayed having your child get a shot without any risks of illness or allergy?	Yes	14 (5.8)			0.91
	No	228 (94.2)			
	Don't know				
4. Have you ever delayed having your child get a shot (not including seasonal flu or swine flu (H1N1) shots) for reasons other than illness or allergy?	Yes	28 (11.6)			0.79
	No	213 (88.0)			
	Don't know	1 (0.4)			
5. How sure are you that following the recommended shot schedule is a good idea for your child?	0-5*	37 (15.3)	0.81		
	6-7	28 (11.6)			
	8-10	117 (73.1)			
6. Children get more shots than are good for them.	I agree	50 (20.7)		0.60	
	I Disagree	118 (48.8)			
	I'm not sure.	74 (30.6)			
7. I believe that many of the illnesses that shots prevent are severe.	I agree	196 (81.0)		0.39	
	I disagree	22 (9.1)			
	I'm not sure.	24 (9.9)			
8. It is better for my child to develop immunity by getting sick than to get a shot.	I agree	57 (23.6)		0.46	
	I disagree	124 (51.2)			
	I'm not sure.	61 (25.2)			
9. It is better for children to get fewer vaccines at the same time.	I agree	100 (41.3)	0.35		
	I disagree	52 (21.5)			
	I'm not sure.	90 (37.2)			
10. How concerned are you that your child might have a serious side effect from a shot?	I am worried	119 (49.2)	0.42		
	I am not worried	84 (34.7)			
	I'm not sure.	39 (16.1)			
11. How concerned are you that anyone of the childhood shots might not be safe?	I am worried	73 (30.2)	0.78		
	I am not worried	122 (50.4)			
	I'm not sure.	47 (19.4)			
12. How concerned are you that a shot might not prevent the disease?	I am worried	70 (28.9)	0.68		
	I am not worried	123 (50.8)			
	I'm not sure.	49 (20.2)			
13. If you had another infant today, would you want him/her to get all the recommended shots?	Yes	201 (83.1)		0.82	
	No	11 (4.5)			
	Don't know	30 (12.4)			

14. Overall, how hesitant about childhood shots would you consider yourself to be?	I am hesitant	68 (28.1)	0.85
	I am not hesitant	148 (61.2)	
	I'm not sure.	26 (10.7)	
15. I trust the information I receive about shots.	I agree	170 (70.2)	0.83
	I disagree	20 (8.3)	
	I'm not sure.	52 (21.5)	
16. I am able to openly discuss my concerns about shots with my child's doctor.	I agree	180 (74.4)	0.64
	I disagree	32 (13.2)	
	I'm not sure.	30 (12.4)	
17. All things considered, how much do you trust your child's doctor?	0-5**	28 (11.6)	0.52
	6-7	44 (18.2)	
	8-10	170 (70.2)	
*The response category is between 0 and 10 (From "0 = I am not entirely sure" to "10 = I totally agree")			
**The response category is between 0 and 10 (From "0 = I don't trust" to "10 = I certainly trust")			

	Number of items	Cronbach's alpha	McDonald's omega
<b>Safety &amp; effectiveness</b>	5	0.70	0.72
<b>General attitudes</b>	8	0.77	0.79
<b>Behavior</b>	2	0.61	0.63
<b>Total</b>	15	0.84	0.85

to be 33%; in another study conducted in Italy, this rate was 34.7%; and in another study conducted in Iraq, it was found to be 20.9%. The change in the proportion of hesitation in different countries may arise due to the contextual or group effects based on cultural differences (4).

### Study Limitations

The sample group of the study was formed by people of relatively higher levels of income and education. This situation should be considered as a limitation of this study in assessing vaccine hesitation rates in the general population. It is recommended to carry out studies in larger samples by paying attention to provincial, district and socio-demographic distributions. Furthermore, there is a need for studies in which the correlation is assessed with another measurement tool of vaccine hesitation.

### Conclusion

The three-factor structure of the PACV scale was adapted into the Turkish language in a reliable and valid way. This adapted scale is suitable for the determination of vaccine hesitations. It will also be a proper tool to compare national results with international findings.

### Ethics

**Ethics Committee Approval:** Ethics Committee approval was given to the study at the 102<sup>nd</sup> meeting held by Istanbul Okan University Ethics Committee on 09.01.2019 (decision no: 11).

**Informed Consent:** Written consent forms were taken from each participant.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: D.A., Concept: M.A.B., Design: M.A.B., Data Collection or Processing: D.A., Analysis or Interpretation: E.D.H., Ö.G., Literature Search: D.A., Writing: D.A.

**Conflict of Interest:** None of the authors had conflict of interest.

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