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Modification and Validation of the Vaccine Hesitancy Scale for Turkish Adult Vaccination

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Background and Purpose: For public health, it is important to investigate vaccine hesitancy, determine populations reluctant for vaccines, and investigate barriers and facilitators for vaccination in these groups. This study aims to modify and validate the Vaccine Hesitancy Scale specific to adults in Turkish society. **Methods:** The study, which was designed as a methodological and survey type, was conducted using a Google questionnaire with 720 participants who met the inclusion criteria with a convenient sampling method. **Results:** After factor and reliability analysis, a 2-factor, 10-item scale with an acceptable and perfect range of fit index values emerged. It has been observed that individuals who are young, single, do not have children, have vaccine allergy, and do not believe that the vaccine will protect the society are adversely affected by the environment, and those who do not have COVID-19 and flu have a high level of hesitancy to vaccine. **Conclusions:** The Vaccine Hesitancy Scale is a valid and reliable tool to detect vaccine hesitation in adults in Turkish society.
Keywords: public health; vaccine; vaccine hesitancy; scale; adult

The term *vaccine hesitancy* is now frequently used in discussions regarding vaccine acceptance to reflect indecision about vaccines (Dubé & MacDonald, 2018). The World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) Working Group on Vaccine Hesitancy defined vaccine hesitancy as "delay in acceptance or refusal of vaccination despite the availability of vaccine services" (MacDonald & SAGE Working Group on Vaccine Hesitancy, 2015). An individual who is hesitant about vaccines could delay vaccines and be reluctant about vaccines but might still accept or refuse a specific vaccine or some or all vaccines (Dubé et al., 2015). According to SAGE, factors affecting individual vaccination include the following: (a) experiences about vaccination; (b) beliefs and attitudes about health and prevention; (c) knowledge and awareness; (d) trust in the health system and providers and personal experience; (e) risk/benefit (perceived); and (f) social norms regarding the necessity/hazard of vaccines (Larson et al., 2015).

In 2019, WHO determined vaccine reluctance or refusal as one of the top 10 threats to global health. Despite the acknowledgment of vaccines as the most important and effective medical discovery (WHO, 2021), measles is known to reach peak levels and, therefore, put the health system in a difficult condition in various parts of the world by causing severe complications and deaths (WHO, 2019b). Hesitancy in vaccination causes a decrease in individual immunization rates and herd immunity (Tustin et al., 2017); it also causes an increase in disease-related death and disease rates as well as the emergence of pandemics (Phadke et al., 2016).

Vaccine-preventable diseases, including measles, polio, diphtheria, and pertussis, in various parts of the developed world have been primarily associated with undervaccinated or unvaccinated populations (Falagas & Zarkadoulia, 2008; Omer et al., 2009; Oostvogel et al., 1994). Ten years after the influenza pandemic that had worldwide effects in 2009, approximately half of the U.S. population did not have seasonal flu vaccines (Centers for Disease Control and Prevention, 2019). The total number of measles cases worldwide was 324,277 in 2018, increasing to 413,308 in 2019 (WHO, 2020). Even in the midst of the deadly smallpox epidemic, growing resistance to the smallpox vaccine has led to mandatory vaccination in the United Kingdom (Wolfe & Sharp, 2002). The number of families in Turkey who did not want their children to have childhood vaccinations was 183 in 2011, 980 in 2013, 5,400 in 2015, and approximately 12,000 in 2016. The number of cases related

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to vaccine rejection has exceeded 23,000 as of 2018 (Gür, 2019). The Turkish Medical Association reported the percentage of those who thought of having the COVID-19 vaccine was between 40% and 45% in Turkey and between 40% and 80% worldwide during the pandemic period (Turkish Medical Association, 2021). According to the systematic review, COVID-19 acceptance rates are below 60%, which will pose a serious challenge to efforts to control the current COVID-19 pandemic (Sallam, 2021). Studies on COVID-19 vaccines worldwide reported vaccine hesitancy as 25.6% in Ireland, 24.8% in England (Murphy et al., 2021), and around 20% in European countries (Neumann-Böhme et al., 2020).

When the dynamic nature of vaccine hesitancy is taken into consideration (Larson et al., 2015), understanding the importance of underlying indicators and dynamics better and designing effective and specific interventions have critical importance for both community and health service providers (Dubé & MacDonald, 2018; Nazlı et al., 2021).

There is a need for tools for investigating vaccine hesitancy, defining hesitant populations for vaccines, and determining barriers and facilitators for vaccination in these groups (Dubé & MacDonald, 2018). Individuals' vaccine hesitancy has been investigated through various measurement tools that included only parents (Opel et al., 2011; Shapiro et al., 2016, 2018), worked in specific age groups (Szczerbińska et al., 2017), or measured vaccine hesitancy in terms of specific vaccines (Perez et al., 2016). In Turkey, scales were developed to measure individuals' antivaccination attitudes (Kilinçarslan et al., 2020) and the attitudes of society toward vaccination (Kocoglu-Tanyer et al., 2020).

There is a need for confirmed tools to evaluate and compare vaccine hesitancy at an international level among adults and older individuals in Turkey. The WHO SAGE developed a common measurement tool, the Vaccine Hesitancy Scale (VHS), for determining and comparing hesitancy in different global environments. The working group encouraged further evaluation of VHS in various cultural environments to determine whether it provided a valid and reliable vaccine hesitancy prediction (Larson et al., 2015). For these reasons, the purpose of this study is to modify and confirm the scale prepared by the Working Group on Vaccine Hesitancy for Turkish society by adapting it to individual users.

METHODS

Design

This study utilized a methodological and survey design. While the methodological design was used for assessing and confirming the psychometric characteristics of VHS in Turkish society, the screening design was utilized for obtaining general information from the study group via the confirmed scale. In this regard, the purpose of this study is to develop a valid and reliable scale to reveal the vaccine hesitancy levels of the participants.

Settings

The process of evaluating and confirming the psychometric properties of VHS consists of two phases. First, the translation of the scale into Turkish language and its cultural adaptation were provided. The final version of the scale was tested on a sample to reveal the item–factor relationships and test its reliability. Research phases are given in Figure 1.

Population

The accessible target population of the study was individuals aged 18 years and over, who lived in Adana, a city located in the Mediterranean region of Turkey, and Erzincan, a city located in the eastern Anatolian region of Turkey, between May 15, 2021, and July 15, 2021. To enhance external reliability, the sample in methodological studies should be 10 times higher than the number of items in the scale (Pallant, 2020). The VHS utilized in this study was composed of 10 items. The participants were involved in this study using the convenience sampling method, which is the sampling method that enables the involvement of participants in the study based on a time and place easily accessible to the researcher (Creswell, 2009). Data were collected through a Google questionnaire, and a sample of 750 participants who met the inclusion criteria was accessed. Data from those who did not meet the inclusion criteria or the forms that included inaccurate, inadequate, or inconsistent data were excluded, and the analysis was performed with 720 participants. The sample was divided into two parts to confirm the scale and subscales that emerged in the exploratory factor analysis (EFA) in a different sample. While one part included the EFA, the other part included confirmatory factor analysis (CFA).

Inclusion Criteria. This study included individuals who were aged 18 years and over, who were literate, who did not have any disabilities, and who had a smartphone. The illiterate participants filled out the question-

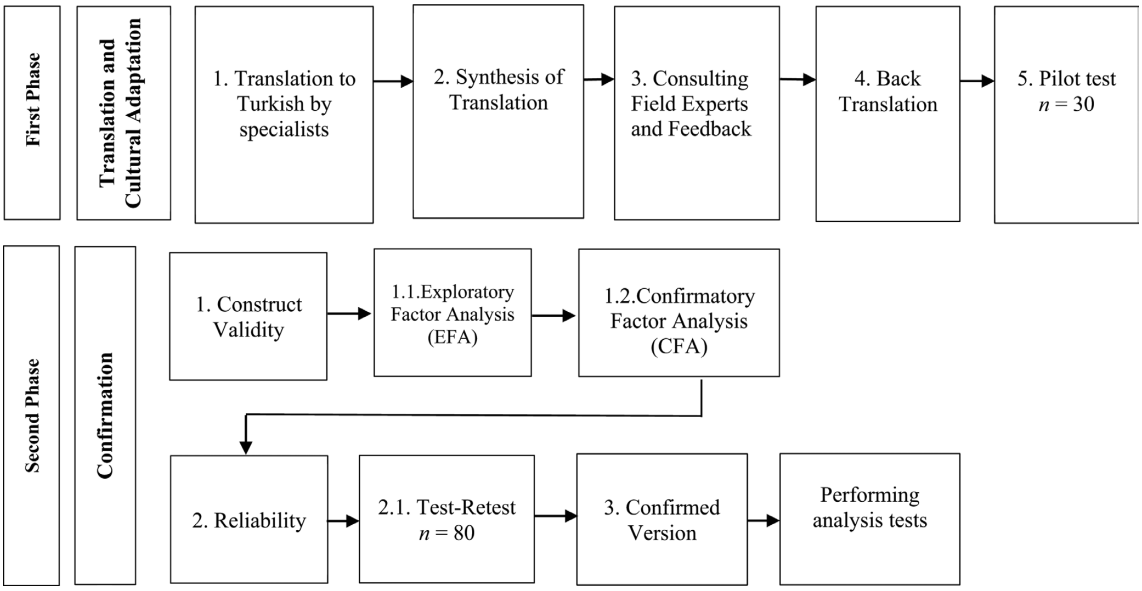

Figure 1. General definition of the algorithms of the Vaccine Hesitancy Scale translation, cultural adaptation, and confirmation.

naire with the support of the researcher. The sociodemographic characteristics of the participating individuals are demonstrated in Table 1.

Instruments

The instruments used in this study included the Sociodemographic Characteristics Form and the VHS developed by Larson et al. (2015). The Sociodemographic Characteristics and Vaccine Hesitancy–Related Characteristics Form was developed based on the literature (Larson et al., 2015; Luyten et al., 2019; Shapiro et al., 2018) and included questions regarding the participants' sociodemographic characteristics.

The Vaccine Hesitancy Scale. The VHS was developed by SAGE in 2015. This working group developed a measurement form to measure parents' vaccine hesitancy by making a systematic analysis of the current studies, analyzing the questions used by the WHO-UNICEF Joint Reporting Form, and having expert consultations. VHS is rated on a 5-point Likert scale ranging from "I strongly disagree" to "I strongly agree" (Larson et al., 2015). Shapiro et al. (2018) confirmed the psychometric characteristics of the scale on parents. The final form of the scale was composed of two subscales and nine items. While the first factor (1, 2, 3, 4, 6, 7, 8) represented "lack of confidence," the second factor (5, 9) represented "risks." Items in the lack of confidence factor were scored reversely. Higher scores obtained from the scale indicated an increase in hesitancy. While the coefficient alpha value was .92 for lack of confidence, it was .64 for risks (Shapiro et al., 2018).

This scale evaluating parents' attitudes was adapted to a more general version that determined parents' general attitudes toward vaccination and analyzed, in England, in terms of its psychometric features. The items that aimed to measure the hesitancy about childhood vaccines were adapted in a way to be asked to anyone without referring to children. For instance, the item "childhood vaccines are important for my child's health" was adapted as "vaccines are important for my health." After the analysis, the seven-item "lack of confidence" part and the two-item "risk perception" part demonstrated the best psychometric characteristics of the scale (Luyten et al., 2019).

Translation

In this study, the working form developed by WHO was utilized and translated into Turkish (WHO, 2014). The items of the form developed by the WHO SAGE Working Group on Vaccine Hesitancy, which originally included 10 items, were translated from English to Turkish by two foreign language specialists, without referring to children and in a way to be asked to anyone. To protect the balance between faithfulness to text and fluency, the translated form was checked by three community health specialists who knew English. After the necessary revisions in the translation process, the final Turkish draft of the

TABLE 1. Distribution of the Data Regarding the Participants' Demographic Characteristics

		EFA SAMPLE		CFA SAMPLE		TOTAL	
VARIABLES	**GROUPS**	***N***	**%**	***N***	**%**	***N***	**%**
Gender	Men	119	33.1	167	46.4	286	39.7
	Women	241	66.9	193	53.6	434	60.3
Age	18–28 years	169	46.9	121	33.6	290	40.3
	29–38 years	108	30.0	76	21.1	184	25.6
	39–48 years	54	15.0	94	26.1	148	20.6
	49 years and older	29	8.1	69	19.2	98	13.6
Having had the COVID-19 vaccine	Yes	290	80.6	273	75.8	563	78.2
	No	70	19.4	87	24.2	157	21.8
Having any beliefs preventing vaccination	Yes	26	7.2	60	16.7	86	11.9
	No	334	92.8	300	83.3	634	88.1
How does your social environment affect you on vaccines/ vaccination	Positively	125	34.7	124	34.4	249	34.6
	Negatively	42	11.7	57	15.8	99	13.8
	No effects	193	53.6	179	49.7	372	51.7

Note. CFA = confirmatory factor analysis; EFA = exploratory factor anaylsis.

VHS was sent to 12 educators who were specialists in their fields (two pediatric nursing specialists, one assessment and evaluation specialist, and nine community health nursing specialists) so that they could identify the inaccurate phrases/concepts in the translation and identify and resolve inconsistencies between the two languages. Expert opinions were found to be above .80 by using the Davis technique, which includes at least 3 and a maximum of 20 expert opinions, and a value of .80 is accepted as a criterion (Davis, 1992). The scale approved by the experts was back-translated by two experts, and the Turkish and English versions were made consistent with each other. After it was found that the language and content equivalence of the scale was adequate, 30 individuals who were not involved in the study evaluated the comprehensibility and readability of VHS. The pilot study indicated no language issues.

Data Collection

Data were collected between May 15, 2021, and July 15, 2021. Data could not be collected face to face due to pandemic conditions. The Google survey form was sent to people who met the inclusion criteria. All questions in the Google survey form were set to mandatory.

Data Analysis

The data obtained with the Google survey form were transferred to the SPSS 22 program. Then, outliers in the descriptive analysis and data that did not meet the inclusion criteria were not included in the study. To determine whether data were appropriate for a normal distribution, the files were divided based on cells, and a normal distribution analysis was performed. For the normal distribution of the data, median, mode, and arithmetic means are expected to be close to each other, and skewness–kurtosis coefficients are expected to be between +1 and −1. The significance level was accepted as .05 (Pallant, 2020). A descriptive and further analysis of the data was performed in SPSS 22.0, and Lisrel 8.71 program was utilized for construct validity. EFA was performed to determine the construct validity of the scale, which was done in the SPSS 22.0 program. While the Bartlett's test was performed to determine the normal distribution, the Kaiser–Meyer–Olkin (KMO) test was performed to determine the sample size. For a normal distribution, the KMO value should be higher than .05, and for sample adequacy, the Bartlett value should be smaller than .05 (Pallant, 2020).

Ethical Considerations

Permission was obtained from the corresponding author for VHS. The Cukurova University Ethics committee approval was obtained for conducting the study, and informed consent was obtained from the participants.

RESULTS

Results on Construct Validity

Exploratory Factor Analysis. The results of the factor analysis showed that the KMO value was .896, and the Bartlett value was 0. According to the EFA results, the extraction value of each item in the scale should be over .3, and the ones below .1 should be removed (Pallant, 2020). All the items on the scale meet this criterion. The analysis results indicated two factors with total values higher than 1.0, and these two factors explained 66.95% of the total variance (Büyüköztürk, 2012). The variance explained by each factor was over 5% (Factor 1 = 53.66, Factor 2 = 13.29). The explained variance was found to be in the appropriate range (Pallant, 2020).

EFA indicated no overlapping items. An analysis indicates that all factor loads are over 0.30. Factor loads of the scale items were found to range between .569 and .905 (Component factor 1: a2: .905, a1: .892, a7: .884, a8: .873, a3: .865, a4: .774; Component factor 2: a9: .810, a5: .737, a10: .569). Higher factor loads are considered to be an indicator that the observed variable could be found under the factor indicated (Büyüköztürk, 2012).

The direct oblimin rotation technique was utilized to see the theoretical relationship between the subscales of the scale (Seçer, 2017). A low level of correlation was confirmed between the factors using this technique (r = .357). As a result, while items 2, 1, 7, 8, 3, 4, and 6 were collected under Factor 1, items 9, 5, and 10 were collected under Factor 2.

Confirmatory Factor Analysis. The purpose of CFA is to determine the appropriateness of the scale to the original structure (Seçer, 2017).

The two-factor structure that emerged after the EFA analysis was included in the CFA analysis. Some fit tests were not good enough after the first CFA was performed, and the required fit values were obtained with the modifications. No items were removed in the CFA procedure. Acceptable and perfect fit index values following the CFA confirmed the appropriateness of the scale to the original structure. The final form of the scale was composed of 10 items and 2 subscales (Table 2).

Results on Reliability

With its fundamental meaning, reliability is the consistency level of the measurement results. A scale should ideally have a coefficient alpha value of .70 and over (Pallant, 2020).

As shown in Table 3, the coefficient alpha values were .883 for VHS, the 10-item scale after factor analysis, .935 for the first subscale, and .721 for the second subscale. The reliability levels of VHS and subscales are in acceptable ranges (Seçer, 2017). According to Bloxom and Knapp, an acceptable test–retest reliability correlation should range between .55 and .85 (Waite et al., 1990). These results show that the scale is consistent over time ($p > .05$). It was found that the lack of confidence mean score of the sample was at a low level, the risk perception mean score was at a moderate level, and the vaccine hesitancy mean score was at a low level.

Results on Descriptive and Inferential Analysis

Levels of the VHS scores: The vaccine hesitancy mean score was found as 23.18, and the levels ranged between 10 and 50, indicating low mean scores. While lack of confidence (13.91, min 7–max 35) showed a low level, the risk perception (9.26, min 3–max 15) showed a moderate level. The scores to be obtained from the scale range between 10 and 50. Higher total scores indicate higher vaccine hesitancy levels. The vaccine hesitancy levels of the participants were found to be low.

As shown in Table 4, a statistically significant difference was found between the participants' VHS total mean scores and age groups, marital status, and having children ($p < .01$). The VHS total mean score of the age group of 18–28 years was found to be higher than the age groups of 29–38 years and 49 years and older. The VHS total mean score of the single participants was found to be higher than the married participants. The VHS total mean scores of those who did not have children were higher than the ones who had children.

As shown in Table 5, a statistically significant difference was found between the VHS total mean scores and a history of vaccine allergy, beliefs preventing vaccines, believing in the protection of the vaccine, the effect of social environment on vaccination, and having had the COVID-19 and flu vaccine ($p < .01$). The VHS total mean scores were higher in those who had a history of vaccine allergy, who had beliefs preventing vaccines, who thought that vaccines are not protective, and who were negatively affected by their social environment on vaccination. The VHS total mean scores were higher in those who did not have COVID-19 and flu vaccines.

TABLE 2. Confirmatory Factor Analysis Fit Index Results

FIT INDEX		COEFFICIENTS	PERFECT FIT LIMIT	ACCEPTABLE FIT LIMIT	FIT STATUS
Pre *m*.	χ^2/SD	7.07	The value found should be statistically insignificant and $\chi^2/SD \leq 3$		Unacceptable
Post *m*.		1.99			Acceptable
Pre *m*.	RMR	.071	.000 ≤ RMR < .050	.050 ≤ RMR ≤ .080	Acceptable
Post *m*.		.055			Acceptable
Pre *m*.	GFI	.88	.90 ≤ GFI ≤ 1.00	.85 ≤ GFI < .90	Acceptable
Post *m*.		.97			Perfect fit
Pre *m*.	AGFI	.81	.90 ≤ AGFI ≤ 1.00	.85 ≤ AGFI < .90	Unacceptable
Post *m*.		.94			Perfect fit
Pre *m*.	RMSEA	.13	.000 ≤ RMSEA < .050	.050 ≤ RMSEA ≤ .080	Unacceptable
Post *m*.		.053			Acceptable
Pre *m*.	RFI	.93	.95 ≤ RFI ≤ 1.00	.90 ≤ RFI < .95	Acceptable
Post *m*.		.98			Perfect fit
Pre *m*.	CFI	.96	.97 ≤ CFI ≤ 1.00	.95 ≤ CFI < .97	Acceptable
Post *m*.		.99			Perfect fit
Pre *m*.	IFI	.96	.95 ≤ IFI ≤ 1.00	.90 ≤ IFI < .95	Perfect fit
Post *m*.		.99			Perfect fit
Pre *m*.	NFI	.95	.95 ≤ NFI ≤ 1.00	.90 ≤ NFI < .95	Perfect fit
Post *m*.		.99			Perfect fit
Pre *m*.	NNFI	.94	.95 ≤ NNFI ≤ 1.00	.90 ≤ NNFI < .95	Acceptable
Post *m*.		.99			Perfect fit

Note. *m*. = modification.

DISCUSSION

This study aimed to confirm and adapt the scale developed for determining vaccine hesitancy of different cultures to Turkish society. Vaccine hesitancy is an important concept that has effects on delay, reluctance, lack of confidence, refusal, or all worries about vaccines, the biggest weapon of community health (My et al., 2017; Tustin et al., 2017; WHO, 2019a). In line with the recommendations of WHO, there is a need for understanding and analyzing vaccine hesitancy at a local level, particularly in periods when there are pandemics and wars (WHO, 2014). In this regard, it is important to understand the concept of vaccine hesitancy accurately for Turkish society as well.

As a result of the Bartlett analysis performed for normal distribution and the KMO analysis performed for sample size, data were found to distribute normally, and the sample size was found to be adequate for the study (Pallant, 2020). The extraction value of each item in the scale was over .3, and no items were excluded since there were no items below .1. Factors explained 66.5% of the total variance, and each factor separately explained 5% of the variance. While the explained variance is accepted as normal between 40% and 60% (Büyüköztürk, 2012; Pallant, 2020), it was found to be higher in this study. EFA results indicated no overlapping items, and the lowest factor loads were found to be over .30. Factor loads of scale items were also found to be high.

The CFA procedure performed to confirm the factor structure following EFA analyzed the relationship between scale factors, factor adequacy, and the appropriateness of the scale used in the study to the original structure (Büyüköztürk, 2012; Seçer, 2017). CFA results showed that the model fit indexes postmodification (X^2/SD = 1.99, NFI = .99, GFI = .97, CFI = .99, RFI = .98, IFI = .99, AGFI = .94, and REMSEA = .053) were

TABLE 3. Reliability Analysis and Test–Retest Results

ITEM	CORRECTED ITEM–TOTAL CORRELATION	ITEM–SUBSCALE CORRELATION	RELIABILITY COEFFICIENT	TEST x1 ± ss1	RETEST x2 ± ss2	*T*	*P* PEARSON CORRELATION*
Lack of confidence subscale			.935	14.73 (7.35)	14.35 (7.08)	.641	.524 *r*: .720*
1	.776	.878**					
2	.763	.876**					
3	.751	.857**					
4	.732	.831**					
6	.694	.797**					
7	.770	.878**					
8	.727	.847**					
Risks subscale			.620	9.42 (3.13)	9.76 (2.99)	−1.057	.294 *r*: .566*
5	.328	.734**					
9	.447	.785**					
10	.354	.743**					
Total			.883	24.16 (8.25)	24.11 (7.78)	.088	.930 *r*: .799*

Note. *p = .000. **p < .01.

TABLE 4. Analysis of Sociodemographic Characteristics and the VHS

VARIABLES	*N* = 720	%	VHS	Mean	±*SD*
Age					
18–28 years[a]	290	40.3	***F*: 6.124 *p*: .000**	24.44	7.87
29–38 years[b]	184	25.6		21.93	7.97
39–48 years	148	20.6		23.63	9.45
49 years and older[b]	98	13.6		21.14	8.13
Gender					
Men	286	39.7	t: .978 *p*: .932	23.22	8.47
Women	434	60.3		23.16	8.30
Education level					
Illiterate	23	3.2	*F*: 2.181 *p*: .075	23.26	10.62
Primary school	79	11.0		22.79	9.01
High school	116	16.1		24.48	9.01
University	388	53.9		23.36	8.18
Postgraduate	114	15.8		21.51	7.11
Marital status					
Married	383	53.2	***t*: −2.770 *p*: .006**	22.38	8.75
Single	337	46.8		24.10	7.81
Having children					
Yes	370	51.4	***t*: −2.960 *p*: .003**	22.29	8.80
No	350	48.6		24.13	7.77
Income level					
Income less than expenses	209	28.9	*F*: 1.369 *p*: .255	23.99	8.93
Income equal to expenses	394	54.7		22.81	7.91
Income more than expenses	118	16.4		23.00	8.76

Note. *SD* = standard deviation; VHS = Vaccine Hesitancy Scale.

**p* < .01 was considered statistically significant.

[a]Variables with statistically significant differences between them.

[b]Variables with statistically significant differences between them.

in acceptable or perfect fit limits (Schumacker & Lomax, 2004; Seçer, 2017). While items 1, 2, 3, 4, 6, 7, and 8 formed the "lack of confidence" subscale, items 5, 9, and 10 formed the "risks" subscale. These results are similar to the original structure.

After the VHS factor structure was determined, reliability analysis was performed to measure the stability of measurement results (Seçer, 2017). The coefficient alpha reliability coefficient was used to measure the scale's internal consistency level, and the ideal coefficient was accepted as .70 (Pallant, 2020). The coefficient alpha values of the scale were found to be .935 for the first subscale (lack of confidence), .620 for the second subscale (risks), and .883 for the total scale. The item–subscale correlation coefficient ranged between .73 and .87. As a result of these values, the coefficient alpha coefficient of the total scale was found to be high (Seçer, 2017).

TABLE 5. Analysis of Vaccine Hesitancy–Related Characteristics and the VHS

VARIABLES	*N* = 720	%	VHS	Mean	±*SD*
Having a chronic disease					
Yes	129	17.9	*t*: .072 *p*: .943	23.24	9.45
No	591	82.1		23.17	8.11
Having vaccine allergy					
Yes	23	3.2	***t*: 2.869** ***p*: .004**	28.08	10.56
No	697	96.8		23.02	8.24
Having medicine allergy					
Yes	57	7.9	*t*: .665 *p*: .509	24.01	9.95
No	663	92.1		23.11	8.22
Beliefs preventing vaccination					
Yes	86	11.9	***t*: 12.678** ***p*: .000**	32.89	8.61
No	634	88.1		21.87	7.41
Believing that vaccines protect self and society					
Yes	583	81.0	***t*: −22.703** ***p*: .000**	20.56	6.17
No	137	19.0		34.33	7.22
Effect of the social environment on vaccination					
Positive[a]	249[a]	34.6	***F*: 72.332** ***p*: .000**	18.76	5.80
Negative[b]	99[b]	13.8		27.35	7.60
No effects[b]	372[b]	51.7		25.03	8.75
Having had the COVID-19 vaccine					
Yes	563	78.2	***t*: −16.099** ***p*: .000**	20.69	6.52
No	157	21.8		32.10	8.18
Having had the flu vaccine					
Yes	137	19.0	***t*: −3.426** ***p*: .001**	21.00	7.48
No	583	81.0		23.70	8.48

Note. *SD* = standard deviation; VHS = Vaccine Hesitancy Scale.

**p* < .01 was considered statistically significant.

[a]Variables with statistically significant differences between them.

[b]Variables with statistically significant differences between them.

When the time independence of the scale items is analyzed, test–retest reliability should range from .55to .85 (Waite et al., 1990). This study found the lack of confidence subscale as .72, the risks subscale as .56, and total scale as .79, and the scale was found to demonstrate consistency over time as a result of the test–retest analysis.

Vaccine hesitancy was found to be higher among young age groups in comparison with older age groups. The literature reports that hesitancy was higher in the age groups of 20–30 years and 55 years (Kaydirak et al., 2020; Neumann-Böhme et al., 2020). The literature also includes qualitative and quantitative studies (Aygün & Tortop, 2020) that reported no relationships between age and vaccine hesitancy (Özlem, 2020; Shapiro et al.,

2018). Murphy et al. (2021), on the other hand, found higher vaccination hesitancy scores of participants in the age group of 35–44 years in Ireland and those under age 65 years in England. In line with these findings, vaccine hesitancy seems to vary in different age periods and cultural structures.

This study found that vaccine hesitancy was higher in single young people in comparison with married people and people with no children in comparison with those with children. Studies in the literature reported that single individuals had higher hesitancy in comparison with married individuals (Larson et al., 2015; Mugan, 2020). Unlike the study findings, Luyten et al. (2019) and İlter (2020) reported that individuals who had children had higher vaccine hesitancy in comparison with those who did not. This study found that individuals experienced less hesitancy, depending on their experience in vaccination and care responsibilities.

Individuals who had an allergy as a factor affecting vaccination were found to have higher hesitancy. Some people were reported to have vaccine hesitancy because they were worried about reactions after vaccinations either for themselves or for their children (İlter, 2020). Although multiple factors contribute to vaccine hesitancy, concern about side effects is one of the leading causes of vaccine rejection and delay in vaccination (Rief, 2021). It is possible that the negative and painful experiences in the past make individuals nervous or frightened, and their hesitation will increase.

This study found that hesitancy was very high in the case of the presence of individuals' beliefs preventing vaccines. Individuals who did not believe in the efficiency of vaccines either did not get the vaccines regularly or refused vaccines (Shapiro et al., 2018). People's hesitancy is quite normal in cases when they do not believe or trust.

Hesitancy was found to be very high in individuals who believe that vaccines do not protect themselves or the community. Some studies also reported that some individuals did not believe that ceasing vaccination would increase some rare diseases in society or thought that vaccines did not have any effects (Aygün & Tortop, 2020; İlter, 2020). Production and use of vaccines through companies also cause a lack of confidence in vaccines (Özceylan et al., 2020). The authors of a study conducted in the Netherlands concluded that confidence in the physician's impartiality is highly influential in parents' decisions. Some parents believed that doctors did not inform them about possible side effects but only about the advantages of the vaccine (Paulussen et al., 2006). It is thought that the rapidity of the vaccine development process, the sanctions and incentives of the countries on the vaccination service, and the false information circulating in the media and the internet regarding the vaccination process increase the hesitancy of the vaccine among the participants.

Vaccine hesitancy was found to be higher in those who were negatively affected and who were never affected by their social environment on vaccination services in comparison with those who were affected positively. Mugan (2020) and İlter (2020) reported that the majority of individuals who refused to be vaccinated were affected by people in their social environment or media negatively. Additionally, the rise in publicized antivaccine arguments has sparked a tremendous public backlash against vaccines (Poland & Jacobson, 2011). Emphasizing the risks of pandemics rather than the risks of vaccines is considered to be more effective (Nyhan et al., 2014).

Vaccine hesitancy scores were found to be higher in those who did not have COVID-19 and flu vaccines. Individuals were reported to experience vaccine hesitancy due to the obscurity of the long-term side effects (Özlem, 2020). Individuals who refused to have the COVID-19 vaccine reportedly found the vaccine unreliable (Al-Qerem & Jarab, 2021). Vaccine hesitancy was found to have a significant impact on the course of epidemics.

CONCLUSION AND RECOMMENDATIONS

This study has confirmed that VHS is a valid and reliable tool for Turkish society. With this scale, the vaccination hesitation of individuals in Turkish society can be compared accurately at the international level. Factors influencing vaccine hesitancy using the validated scale are discussed earlier. It is important that nurses eliminate vaccine hesitations by working on individuals with vaccine hesitancy.

In this pandemic period, the most effective solution for preventing diseases and pandemics seems to be informing the public about the benefits of vaccines, preventing information pollution circulating in media, providing the public with answers to their questions about vaccination in light of science, and preventing vaccine hesitancy. Nurses in our country should repeat our work to determine the characteristics of vaccine-reluctant or vaccine-resistant subgroups in their own context and direct their public health messages to specifically target these groups. The results should be presented individually or through mass media in accordance with the education level of the society. Counseling by nurses to individuals with vaccine hesitancy will contribute to the reduction or elimination of this hesitation. It should not be forgotten that in attempts to reduce vaccine hesitancy, attention should be paid to the personal beliefs, values, and concerns of individuals.

It would be a good practice to include courses on antivaccination and an approach to the curriculum of nurses who will address the questions of the society about vaccines, to ensure social confidence in vaccines.

With this scale, which has been validated for the Turkish population, it is recommended to determine the vaccination hesitancy levels of the elderly population and the affecting factors. We suggest discussing our results with a vaccine hesitancy study to be conducted in other countries.

Limitations

The limitations of the study are that it was conducted during the pandemic period in an electronic environment (illiterate and older individuals had difficulties, and, thus, fewer participants were accessed), and it was conducted in two cities. The data collection method with the Google survey created a limitation for the illiterate participants.

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