SciencePG
Science Publishing Group

The Psychometric Properties of a Romanian Version of the Vaccination Attitudes Examination (VAX) Scale

Gheorghe Huza

Department of Psychology, Faculty of Psychology and Education Sciences, Alexandru Ioan Cuza University, Iaşi, Romania

Email address:
george_huza60@yahoo.ro

To cite this article:
Gheorghe Huza. The Psychometric Properties of a Romanian Version of the Vaccination Attitudes Examination (VAX) Scale. *International Journal of HIV/AIDS Prevention, Education and Behavioural Science*. Vol. 6, No. 1, 2020, pp. 25-31. doi: 10.11648/j.ijhpebs.20200601.14

Abstract: Objective: To validate a Romanian version of the Vaccination Attitudes Examination (VAX) Scale and determine its psychometric properties in Romanian people. Methods: A cross-sectional survey was conducted in different social categories. The sample consists of 124 (30.6%) males, 259 (64.0%) females, 22 (5.4%) not specified gender with ages ranging from 16 to 62 years. Data were collected on the Romanian version of the Vaccination Attitudes Examination (VAX) Scale, the Attitudes Toward Vaccination Questionnaire, the General Health Perception Scale and the Perceived Sensitivity to Medicines Scale. Results: Scale's reliability analysis revealed an overall Cronbach's alpha of a 0.82 showing good internal consistency. The Spearman correlation between the VAX scale's total score and the Attitudes Toward Vaccination Questionnaire, indicate good levels of convergent validity. Confirmatory Analysis revealed a good fit. Conclusion: The validated Romanian version of the Vaccination Attitudes Examination (VAX) Scale is a valid and reliable measure in detecting the vaccine-hesitant Romanian people.

Keywords: Attitudes Toward Vaccines, Validation, The Vaccination Attitudes Examination (VAX) Scale

1. Introduction

Attitude towards immunization vaccines is a widely debated issue among the population. Medical, philosophical and religious considerations polarize human attitudes and behaviours, generating debates and adverse stances. Knowledge of attitudes toward vaccines can contribute to specific health and safety interventions on the population. In this study we propose a measure of attitudes to vaccines appropriate to the all social categories of general population. Many instruments address the attitudes toward different types of vaccines. In 2006 Brabin et al. [2] address the parental attitudes toward future acceptance of adolescent human papillomavirus vacination. In 2009 Kang et al. [8] developed the HPV Attitude Questionnaire that address the attitudes toward and intention to receive the human papilloma virus vaccination of female South Korean college students. Developed by McRee et al. [11] in 2010, the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS) assesed parental attitudes and beliefs toward daughters' HPV vaccination. Opel et al. (2011) have developed the Parent Attitudes about Childhood Vaccines, instrument that

identifies vaccine-hesitant parents [13]. In 2012, Chow et al. have developed a questionnaire that describes Australian parent's, attitudes, behaviours and concerns about vaccination. The respondents were parents of children age < 18. A questionnaire titled HPV and HPV vaccine-related knowledge, attitudes, and behaviours was adapted to Thai. The study was conducted in 2015 in Thailand with a sample of young women between 18 and 26 years [15]. An evaluation of attitude toward vaccines among healthcare workers was made in Italy in 2016-2017 [4]. Many of these measures are specific to the certain age groups and address parental attitudes. Other scales address only certain social categories. Developed by Martin et al. in 2017 [10], the Vaccination Attitudes Examination (VAX) Scale is a tool that asses general attitudes toward vaccines. The scale construction strategy was based on the identification of the anti-vaccination attitudes that predict vaccination behavior. Four distinct vaccine attitudes were identified: (1) mistrust of vaccine benefit, (2) worries over unforeseen future effects, (3) concerns about commercial profiteering and (4) preference for natural immunity. All four factors cover an extensive area of anti-vaccination attitudes and give the VAX

scale a high and efficient degree for identifying those with vaccination resistance. The VAX scale is appropriate for identifying the attitudes towards vaccines in general and we consider that VAX scale may be a necessary and efficient instrument on Romanian people. The aim of the study was to adapt the Vaccination Attitudes Examination (VAX) Scale, determine its reliability and validity, and to verify the adequacy of the adapted version of the four-dimensional scale.

2. Methods

2.1. Sample and Design

A total of 405 participants (124 males, 259 females, 22 gender not specified) with ages ranging from 16 to 62 years (mean=24.99, SD=11.80), were recruted from general people of various social categories of different regions of Romania. Sampling was based on convenience. Sociodemographic data included age, gender, residential environment, educational level, marital status, and religious confession.

2.2. Measures

The instruments were translated into Romanian using the forward-backward translation design and following the guidelines given by the literature [1, 6].

2.2.1. The Romanian Version of the Vaccination Attitudes Examination (VAX) Scale

Attitude towards vaccines was assessed by the Romanian version of the Vaccination Attitudes Examination (VAX) Scale. The Romanian version of the scale is derived from the English version developed by Martin et al. in 2017 [10] and it was validated with the author's agreement. The scale consists of 12 items divided in four subscales: trust/mistrust of vaccine benefit, worries over unforeseen future effects, concerns about commercial profiteering and preference for natural immunity. The measurement is done by seven levels of Likert scale (1-strongly disagree; 7-strongly agree). For the present sample, the Cronbach alpha for the VAX was 0,82 (mean=3.64; SD=.72). For the subscales, Cronbach alpha were as follows: 0.86 for Mistrust of vaccine benefit (mean=3.34; SD=1.17), 0.71 for Worries over unforeseen future effects (mean=4.17; SD=0.93), 0.83 for Concerns about commercial profiteering (M=3.47; SD=1.09) and 0.71 for Preference for natural immunity (mean=3.59; SD=0.97). Higher scores reflect stronger anti-vaccination attitudes.

2.2.2. Attitudes Toward Vaccination Questionnaire (AVC)

Attitudes Toward Vaccination Questionnaire developed in 2002 by Busse et al. consists of 11 items. [3] The measurement is done by three levels of Likert scale (0-disagree; 1- unsure; 2- agree). The total score ranging from 0 (most negative attitude toward vaccination) to 22 (most positive attitude toward vaccination). For give a generality of the scale, I replaced the item: ″The risk of pertussis vaccine outweighs its usefulness in preventing the disease (whooping cough)″ with the item: ″The risks of vaccines outweighs their usefulness in preventing infectious diseases″. For the present sample, the Cronbach alpha for the Attitudes Toward Vaccination Questionnaire was 0.79 (mean=13.90; SD=4.46).

2.2.3. The General Health Perceptions Scale (PGS)

The general health perception (PGS) was measured with a single item by the General Health Perceptions Scale developed by Ware et al. in 1992 [16]: ″In general, would you say your health is.″ Respondents indicated their agreement of the item, on a 5-point scale (1-poor, 2-fair, 3-good, 4-very good, 5-excellent). For the present sample, respondents indicated low score (mean=3.92; SD=0.68).

2.2.4. The Perceived Sensitivity to Medicines Scale (SPM)

The perceived sensitivity to medicines was measured with a single item of the Perceived Sensitivity to Medicines Scale developed by Horne et al. in 2013 [7]: ″My body is very sensitive to medicines″ on a six levels of Likert scale (1-strongly disagree; 6-strongly agree). Martin et al. [10] assume that higher scores of perceived sensitivity to medicines correlate with higher symptom reporting. In our study the respondents indicated low score (mean=2.79; SD=1.27)

2.3. Procedure

For some scales only single items have been filled. The scales were completed by participants after they were ensured that their participation in the study was anonymous and confidential. Every participant was explained the purpose of the research. The data were completed on a voluntary basis and informed consent. The respondents completed the scales individually without receiving any compensation.

2.4. Statistical Analysis

We conduct preliminary analyses to examine the descriptive statistics and the association of all analyzed variables in the study. We used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) with SPSS v. 20 in order to examine the matrix structure and the fit of the VAX scale. We chose (a) absolute match measures (CMIN/DF) that determine the degree to which the model predicts the observed correlation matrix and whose value is recommended to be below 5 and the RMSEA that indicates approximate fits of the pattern in population and (b) incremental measures (TLI, CFI) that compare the proposed model to a baseline model that all other models should overtake and which indicates the discrepancy between the two models [12]. A scale has a good reliability if on different occasions, under different conditions and administered by different people the measurements are repeatable [5]. Ranging between 0 and 1, an internal consistency index of over 0.7 ensures a good reliability to the scale. Validity refers to the quality of an instrument to measure what it has intended to measure [9]. Convergent validity was examined with Spearman correlation calculations between the scores of the VAX and the scores of Attitudes Toward Vaccination Questionnaire.

3. Results

3.1. Sample Characteristics

In Table 1, we present the socio-demographic characteristics of the participants in the present study.

Table 1. The socio-demographic characteristics of the participants.

Characteristic	Mean (±SD) or n (%)
Age	24.99 (11.80)
Gender	
Male	124 (30.6)
Female	259 (64.0)
Not specified	22 (5.4)
Residential environment	
Village	149 (36.8)
City	234 (57.8)
Not specified	22 (5.4)
Level of education	
Gymnasium	4 (1.0)
Lyceum	265 (65.4)
University	93 (23.0)
Post-university	31 (7.7)
Not specified	12 (3.0)
Marital status	
Single	277 (68.4)
Married	112 (27.7)

Characteristic	Mean (±SD) or n (%)
Other	10 (2.4)
Not specified	6 (1.5)
Religious confession	
Orthodox	150 (37.0)
Pentecostals	145 (35.8)
Seventh-day Adventists	105 (25.9)
Other	5 (1.2)

3.2. Preliminary Analysis

Kruskal-Wallis test significantly indicated statistical differences by the age categories and by the religious confessions (see Table 2). People with age 16-30 year old indicate the higher score to VAX scale toward people with age 31-45 and 46-62 year old. We did not find significant statistical differences between group 16-30 and 46-62 year old and between group 31-45 and 46-62 year old. We found significant statistical differences between Orthodox and Pentecostals and between Orthodox and Seventh-day Adventists. We did not find significant statistical differences between Pentecostals and Seventh-day Adventists (see Table 3).

Table 2. Kruskal-Wallis comparisons.

Factor	Group	N	Mean rank	H (2)
	16-30	296	212.06	
VAX_T	31-45	67	158.19	12.18**
	46-62	38	190.37	
	Orthodox	150	168.63	
VAX_T	Pentecostals	145	209.80	20.77**
	Adventists	105	233.19	

Note: VAX_T- total score to VAX scale; ** p<.01.

Table 3. Mann-Whitney comparisons.

Factor	Group	N	Mean rank	U	z
VAX_T	16-30	296	190.89	7185.50	-3.40**
	31-45	67	142.74		
VAX_T	Orthodox	150	132.64	8491.00	-3.26**
	Pentecostals	145	164.44		
VAX_T	Orthodox	150	112.02	5478.50	-4.14**
	Adventists	105	150.82		

Note: VAX_T- total score to VAX scale; ** p<.01.
The VAX scale score is unrelated to gender, marital status and level of education.

3.3. Reliability and Validity

The scale's reliability analysis revealed an overall Cronbach's alpha of 0.82. The corrected item to total correlation, was greater than 0.3 except item 4 (*Although most vaccines appear to be safe, there may be problems that we have not yet discovered*). For theoretical relevance, we have decided to keep item 4 on a scale, because the removal did not lead to a significant increase in reliability (see Table 4).

Table 4. The 12 items scale.

Items	Corrected Item Total-Correlation	Cronbach's Alpha if Item Deleted
VAX1 *M-am simțit în siguranță după ce am fost vaccinat.* (-) (I feel safe after being vaccinated)	0.403	0.808
VAX2 *Mă pot baza pe vaccinuri pentru a opri bolile infecțioase grave.(-)* (I can rely on vaccines to stop serious infectious diseases)	0.473	0.801
VAX3 *M-am simțit protejat după ce am fost vaccinat.(-)* (I feel protected after getting vaccinated)	0.475	0.801
VAX4 *Deși majoritatea vaccinurilorpar a fi sigure, pot apărea problemepe care nu le-am descoperit încă.* (Although	0.297	0.815

Items	Corrected Item Total-Correlation	Cronbach's Alpha if Item Deleted
most vaccines appear to be safe, there may be problems that we have not yet discovered)		
VAX5 *Vaccinurile pot provoca probleme neprevăzute la copii.* (Vaccines can cause unforeseen problems in children).	0.376	0.809
VAX6 *Îmi fac griji în legătură cu efectele necunoscute ale vaccinurilor în viitor.* (I worry about the unknown effects of vaccines in the future).	0.381	0.809
VAX7 *Vaccinurile fac o mulțime de bani pentru companiile farmaceutice, dar nu fac mult pentru oamenii obișnuiți.* (Vaccines make a lot of money for pharmaceutical companies, but do not do much for regular people)	0.613	0.789
VAX8 *Autoritățile promovează vaccinarea pentru câștiguri financiare nu pentru sănătatea oamenilor* (Authorities promote vaccination for financial gain, not for people's health).	0.632	0.786
VAX9 *Programele de vaccinare sunt o înșelăciune.* (Vaccination programs are a big con).	0.624	0.788
VAX10 *Imunitatea naturală durează mai mult decât o vaccinare* (Natural immunity lasts longer than a vaccination)	0.474	0.801
VAX11 *Expunerea naturală la viruși și germeni oferă cea mai sigură protecție* (Natural exposure to viruses and germs gives the safest protection).	0.421	0.806
VAX12 *Fiind expus (ă) la boli în mod natural este mai sigur pentru sistemul imunitar decât expunerea prin vaccinare* (Being exposed to diseases naturally is safer for the immune system than being exposed through vaccination)	0.406	0.807

Total Alpha=0.82.

Table 5. *Convergent validity.*

Factor	AVC_T	SPM	PGS
VAX_T	-.62**	.14**	.12*
MVB	-.45**	.02	.05
WFE	-.32**	.07	.06
CCP	-.52**	.13*	.04
PNI	-.36**	.16**	.20**

Note: VAX_T- total score to VAX scale; MVB- total score to Mistrust of vaccine benefit; WFE- total score to Worries over unforeseen future effects; CCP- total score to Concerns about commercial profiteering; PNI- total score to Preference for natural immunity; AVC_T- total score to Attitudes Toward Vaccination Questionnaire; SPM- item: "My body is very sensitive to medicines"; PGS- item: "In general, would you say your health is"; ** p <.01; * p <.05.

Convergent validity was supported by a significant correlation (-.62**) between the VAX total score and the Attitudes Toward Vaccination Questionnaire total score (see Table 5). The high score of VAX scale strongly correlates with the low score of the Attitudes Toward Vaccination Questionnaire (AVC_T). In our study the respondents indicated a higher score of VAX scale (mean=3.64; median=3.58) that reflects the anti-vaccination attitudes [10] and a lower score of AVC (mean=13.90; median=14.00) that reflects the negative attitude toward vaccination [3]. The VAX total score poorly correlates with SPM and PGS.

Discriminative validity of VAX scale was tested by the method of known groups. Based on the answer of the two items of Attitudes Toward Vaccination Questionnaire: "Vaccines should never be given to infants under 1 year of age" and "You are in favor of vaccination in general?" we divided the respondents into two groups. Those that were in favor of the vaccination in general and those that agreed the vaccination to infants under 1 year of age, have indicated a significant low score to VAX scale toward those who indicated the opposite answers. The results are depicted in Table 6.

Table 6. *Mann-Whitney comparisons.*

Factor	Group	N	Mean rank	U	z
VAX_T	In disagree with infants' vaccines	70	189.11	3737.50	-6.06**
	In agree with infants' vaccines	207	122.06		
VAX_T	Opposite of vaccination	64	221.10	2521.50	-8.00**
	In favour of vaccination	228	125.56		

Note: VAX_T- total score of VAX scale; ** p<.01.

3.4. Exploratory Analysis

For testing the factorial structure of VAX scale, we conducted an exploratory factor analysis (EFA) with SPSS 20.0. Table 7 and Figure 1 depict the results of the analysis.

Table 7. *The Romanian version VAX scale items factor loading matrix (EFA).*

Items	Mistrust of vaccine benefit	Worries over unforeseen future effects	Concerns about commercial profiteering	Preference for natural immunity
VAX1 *M-am simțit în siguranță după ce am fost vaccinat.* (I feel safe after being vaccinated).	.892			
VAX2 *Mă pot baza pe vaccinuri pentru a opri bolile infecțioase grave.* (I can rely on vaccines to stop serious infectious diseases).	.788			
VAX3 *M-am simțit protejat după ce am fost vaccinat.* (I feel protected after getting vaccinated).	.913			

Items	Mistrust of vaccine benefit	Worries over unforeseen future effects	Concerns about commercial profiteering	Preference for natural immunity
VAX4 *Deși majoritatea vaccinurilor par a fi sigure, pot apărea probleme pe care nu le-am descoperit încă.* (Although most vaccines appear to be safe, there may be problems that we have not yet discovered).		.794		
VAX5 *Vaccinurile pot provoca probleme neprevăzute la copii.* (Vaccines can cause unforeseen problems in children).		.808		
VAX6 *Îmi fac griji în legătură cu efectele necunoscute ale vaccinurilor în viitor.* (I worry about the unknown effects of vaccines in the future).		.676		
VAX7 *Vaccinurile fac o mulțime de bani pentru companiile farmaceutice, dar nu fac mult pentru oamenii obișnuiți.* (Vaccines make a lot of money for pharmaceutical companies, but do not do much for regular people).			.738	
VAX8 *Autoritățile promovează vaccinarea pentru câștiguri financiare nu pentru sănătatea oamenilor* (Authorities promote vaccination for financial gain, not for people's health).			.839	
VAX9 *Programele de vaccinare sunt o înșelăciune.* (Vaccination programs are a big con).			.802	
VAX10 *Imunitatea naturală durează mai mult decât o vaccinare* (Natural immunity lasts longer than a vaccination).				.556
VAX11 *Expunerea naturală la viruși și germeni oferă cea mai sigură protecție.* (Natural exposure to viruses and germs gives the safest protection).				.844
VAX12 *Fiind expus (ă) la boli în mod natural este mai sigur pentru sistemul imunitar decât expunerea prin vaccinare.* (Being exposed to diseases naturally is safer for the immune system than being exposed through vaccination).				.871
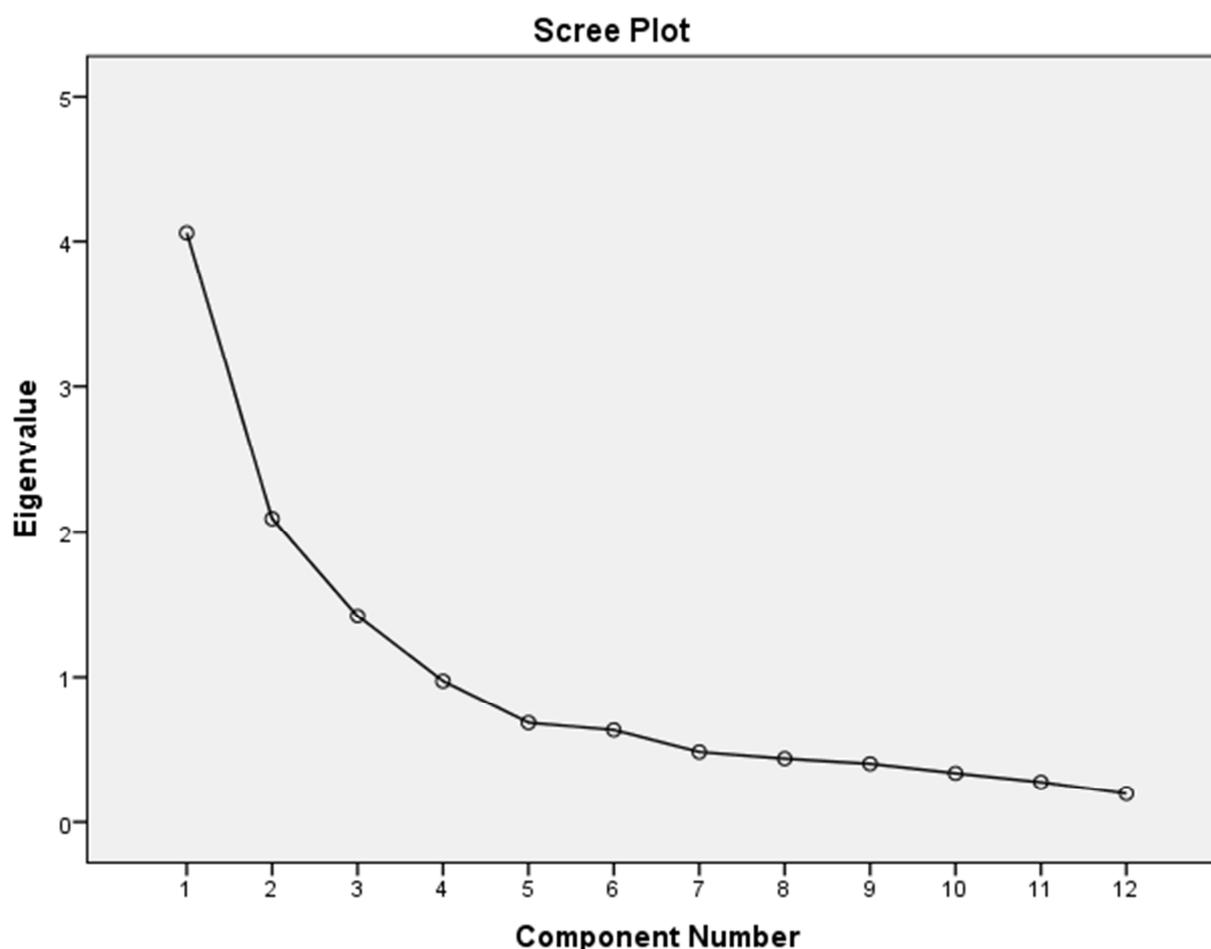
Figure 1. *Cattel's graph of factor extraction.*

The percentage of cumulative variance explained by the factors extracted is 71.22%.

3.5. Confirmatory Analysis

For testing the fit of VAX scale, we conducted a confirmatory analysis (CFA) with Amos 20.0. The results revealed a good fit of the structural model: CMIN/DF=2,992;

*p*=0.000;   RMSEA=0.070   [0.057;   0.084];   NFI=0.926; TLI=0.930; CFI=0.949. The model is shown in Figure 2.
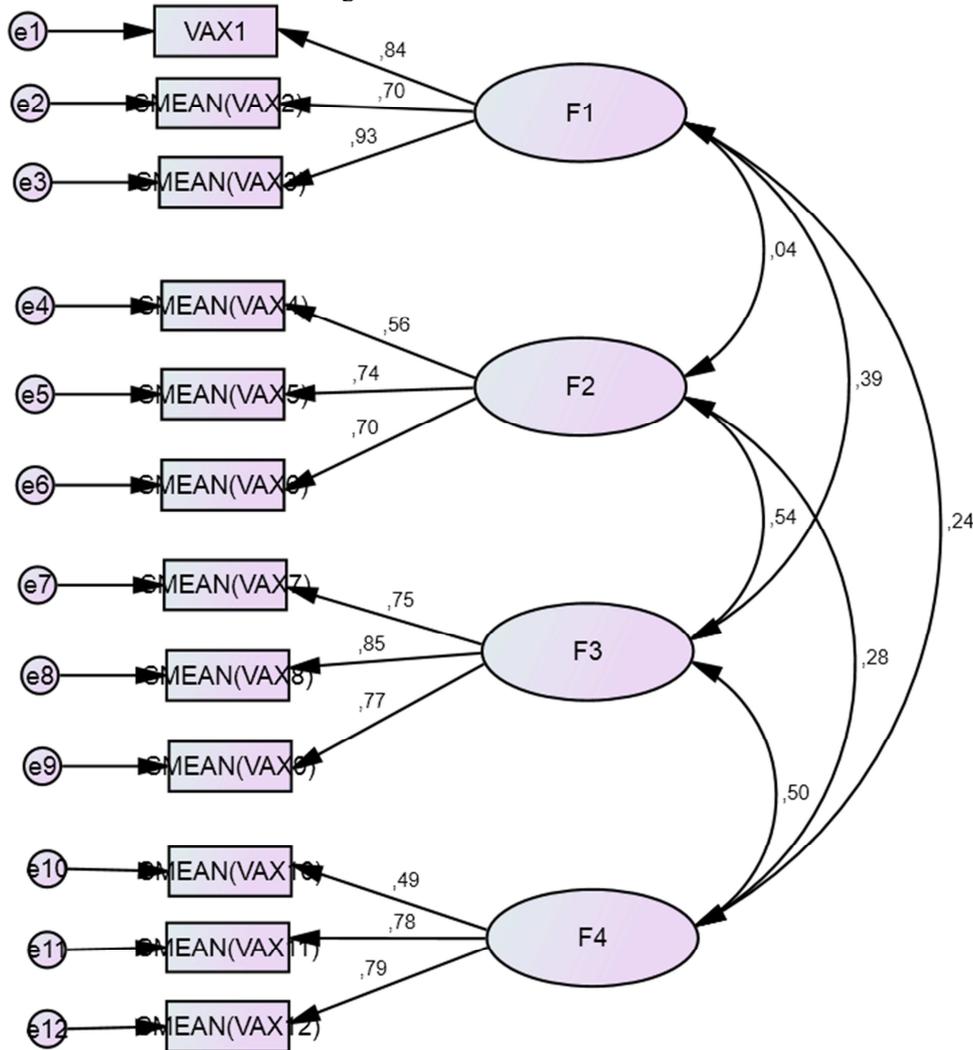
Figure 2. *The theoretical model of the Romanian version of VAX scale.*

4. Discussion

The aim of the present study was to test the psychometric properties of the Romanian version of the Vaccination Attitudes Examination (VAX) Scale in a sample of different social categories on Romanian people. This scale has not been used in Romania before. In their study, Martin et al. [10] found a good reliability for the VAX scale 0.84 (0.86-0.92 for subscales). Our study showed good Cronbach's alpha of 0.82 (0.71-0.86 for subscales). Except item 4 (Although most vaccines appear to be safe, there may be problems that we have not syet discovered) all items had correlation greater than 0.3 with the sum of the other items together. We consider that the small correlation is due to the induced suggestion of the item that assumes that there may be problems although most vaccines appear to be safe, which led to incorrect answers from many respondents. This assumption is in agreement with [5] that misinterpretation of scale instructions and the existence of a small number of items, can generate answers that lead to a greater degree of error.

The Romanian version of the VAX scale maintains the four factors of the original version. The Romanian version of the VAX scale is related to age categories and religious confessions. The age group 16-30 year old, Pentecostals and Seventh-day Adventists reported a higher score of the VAX scale, but also a higher level of general perception of health.

The Romanian version of the VAX scale is unrelated with gender, marital status, residential environment and level of education. These findings suggest intervention for the increase of acceptability of the young people, the certain religious confessions, and the groups with any level of education. The score of the VAX scale poorly correlates with perceived sensitivity to medicine and the general perception of health. The Romanian version of VAX scale is related with vaccination behavior and the intentions to receive vaccines for one'children. These findings are in agreement with Martin's results [10]. A significant correlation between the Romanian version of VAX total score and the Attitudes Toward Vaccination Questionnaire has indicated a high

convergent validity. The method of known groups revealed a good discriminative validity. The confirmatory analysis showed a good fit of the Romanian version of VAX scale. The present study has several limitations. A first limitation refers to the convenience sample that does not use the random sampling. This study was conducted with a relative sample (n=405). Some social categories were poorly represented and the respondents were recruited only from four areas of Romania. Further research with the Romanian version of VAX scale is needed to identify and other factors that are associated with vaccination behavior (eg. information on vaccine efficacy, type of source of information).

5. Conclusions

The Romanian version of VAX scale showed a high reliability and a good discriminative and convergent validity. The good fit of the scale recommend its use in detecting the vaccine-hesitant Romanian people. The positive correlation between VAX score and the perceived sensitivity to medicines (SPM) is in agreement with Martin'results and it represent an indicator of personal concern about how one body might react to substances recommended by health care providers [10]. Also the positive correlation between VAX score and the general health perception (PGS) is a subjective indicator that shows that people who perceive themselves as healthier have a stronger anti-vaccination attitude. These indicators allows decision makers to develop programs to increase the vaccines acceptability. The high psychometric qualities of the Romanian version of VAX Scale recommend it for both screening and research, becoming a useful tool for both health care providers and researchers. To confirm the high psychometric qualities of the Romanian version of VAX scale, future studies should include and homogenious populations (eg. only adolescents, only adults).

Funding

Conflicts of Interests

The author declares no conflict of interest.

Acknowledgements

References

[1] Beaton, Dorcas E., Claire Bombardier, Francis Guillemin, and Marcos Bosi Ferraz. 2000. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25* (24), 3186-3191.

[2] Brabin, Loretta, Stephen A. Roberts, Farah Farzaneh, and Henry C. Kitchener. 2006. Future acceptance of adolescent human papillomavirus vaccination: a survey of parental attitudes. *Vaccine*, *24* (16), 3087-3094.

[3] Busse, Jasona W., Abhaya V. Kulkarni, James B. Campbell, and Stephen H. Injeyan. 2002. Attitudes toward vaccination: a survey of Canadian chiropractic students. *Cmaj*, *166* (12), 1531-1534.

[4] Chow, Maria Yui Kwan., Danchin, Margie., Willaby, Harold. W., Pemberton, Sonia., & Leask, Julie. (2017). Parental attitudes, beliefs, behaviours and concerns towards childhood vaccinations in Australia: a national online survey. *Australian family physician*, *46* (3), 145.

[5] Drost, Ellen. A. 2011. Validity and reliability in social science research. *Education Research and perspectives*, *38* (1), 105.

[6] Dunn, Steven. C., Robert F. Seaker, and Mattew A. Waller, 1994. Latent variables in business logistics research: scale development and validation. *Journal of Business Logistics*, *15* (2), 145.

[7] Horne, Rob, Kate Faasse, Vanessa Cooper, Michael A. Diefenbach, Howard Leventhal, Elaine Leventhal, and Keith J. Petrie. 2013. The perceived sensitivity to medicines (PSM) scale: an evaluation of validity and reliability. *British journal of health psychology*, *18* (1), 18-30.

[8] Kang, Hee Sun., Moneyham, Linda. (2010). Attitudes toward and intention to receive the human papilloma virus (HPV) vaccination and intention to use condoms among female Korean college students. *Vaccine*, *28* (3), 811-816.

[9] Kimberlin, Carole L., and Almut G. Winterstein. 2008. Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*, *65* (23), 2276-2284.

[10] Martin, Leslie R., and Keith J. Petrie. 2017. Understanding the dimensions of anti-vaccination attitudes: The vaccination attitudes examination (VAX) Scale. *Annals of Behavioral Medicine*, *51* (5), 652-660.

[11] McRee, Anne-Laurie, Noel T. Brewer, Paul L. Reiter, Sami L. Gottlieb, and Jennifer S. Smith. 2010. The Carolina HPV immunization attitudes and beliefs scale (CHIAS): scale development and associations with intentions to vaccinate. *Sexually transmitted diseases*, *37* (4), 234-239.

[12] Nokelainen, Petri. 2009. Structural equation modeling with AMOS. *Retrieved on April 22*.

[13] Opel, Duglas J., Jones A. Taylor, Rita Mangione-Smith, Cam Solomon, Chuan Zhao, Sheryl Catz, and Diane Martin. 2011. Validity and reliability of a survey to identify vaccine-hesitant parents. *Vaccine*, *29* (38), 6598-6605.

[14] Ratanasiripong, Nop T., Sri-Umporn, Sirinat., Kathalae, Duangrat., Hanklang, Suda., & Ratanasiripong, Paul. (2018). Human papillomavirus (HPV) vaccination and factors related to intention to obtain the vaccine among young college women in Thailand. *Journal of Health Research*.

[15] Squeri, R., Genovese, C., Trimarchi, G., Palamara, M. A. R., & La Fauci, V. (2017). An evaluation of attitude toward vaccines among healthcare workers of a University Hospital in Southern Italy. *Ann Ig*, *29* (6), 595-606.

[16] Ware Jr, John E., Cathy Donald Sherbourne. 1992. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care*, *30* (6), 473-483.