Journal of Multidisciplinary Healthcare

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

A Psychometric Analysis of the Polish Online Version of the Aging Semantic Differential Scale (ASD)

Grażyna Puto[1], Anna Wadelska-Kaczmarek[2], Marta Muszalik[3]

[1]Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Krakow, Poland; [2]Master of Psychology, SWPS University of Social Sciences and Humanities, Warsaw, Poland; [3]Department of Geriatrics, Faculty of Health Sciences, Nicolaus Copernicus University in Torun, Collegium Medicum in Bydgoszcz, Bydgoszcz, Poland

Correspondence: Grażyna Puto, Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Kopernika 25 Street, Krakow, 31-501, Poland, Tel +48 12 422 5209, Email grazyna.puto@uj.edu.pl

Background: Nursing students will become professionals providing direct care to an aging population in the future. Given that students' attitudes evolve during their studies, an important element of medical education should be addressing the issue of ageism, verifying false beliefs, promoting the subjectivity as well as individuality of older people in the education process. The aim of the study was to analyse the psychometrics of the Polish online version of the Aging Semantic Differential Scale (ASD).

Methods: The study was conducted among 384 students of bachelor's and master's degree studies in nursing (94.3%) and other medical disciplines: midwifery and emergency medical services (5.7%). Theoretical validity of the scale was assessed using principal component analysis (PCA) with Oblimin rotation with delta parameter equal to 0 and Kaiser normalization. Discriminant validity of the obtained factors was calculated using the AVE (Average Shared Squared Variance) and MSV (Maximum Shared Squared Variance) parameters. Reliability of the scale was assessed by determining the internal consistency using Cronbach's Alpha coefficient.

Results: A four-factor model was extracted from the analysis. The validity of the analysis was confirmed by the KMO value = 0.88 and a significant statistical result for Bartlett's sphericity test: $\chi^2(171) = 2601.34$; $p < 0.001$. The model explained 56.20% of the variance in total. The reliability level of each factor reached a satisfactory level ($\alpha > 0.7$). Factor loadings ranged from 0.57–0.81 for the first factor (Independence), 0.50–0.76 for the second factor (Consistency), −0.54 to −0.77 for the third factor (Attitude towards others), and −0.66 to 0.80 for the fourth factor (Charisma).

Conclusion: The study contributes to the cross-cultural validation of the ASD scale. We obtained a shorter version than the original ASD scale through statistical calculations. The shorter version of the ASD scale is easier and faster to administer. The scale can be reliably used by researchers and practitioners in disciplines other than nursing.

Keywords: ageist attitudes, psychometric properties, validity, reliability, nursing students

Introduction

The process of aging of society both in Poland and worldwide poses new challenges for nursing students, not only in terms of organization and care management, but also in shaping the right attitudes towards older people. An attitude is a relatively permanent tendency of a person to evaluate something positively or negatively, where the evaluation may refer to the emotion, assessment, or reaction aroused by a given thing.[1] People's attitudes are formed on the basis of knowledge and life and professional experience gained during education and later professional work. They influence their behaviour and reactions.[2] It is crucial for professionals providing geriatric care to have professional knowledge and skills as well as to be compassionate, patient and reliable.[3,4] Stereotypical assumptions are made about the physical or mental characteristics of older people. These assumptions are usually negative. Ageism exists in the consciousness and attitudes of society. Perceptions of the ageing process, including reduced vitality and other increasing losses, influence the

Received: 15 September 2024
Accepted: 20 January 2025
Published: 31 January 2025

stereotypical perceptions of older people.[1,5] Older people are often perceived as sick, with impaired cognitive functions.[1–5]

The attitudes of healthcare workers towards older people have a substantial impact on the quality of care they provide.[6] Nurses play a crucial role in the care of older people and thus influence the quality of care.[2] Current nursing students will become professionals providing direct care to an aging society in the future. Given that students' attitudes evolve during their studies an important element of health professions education should be addressing the issue of ageism, recognizing false beliefs, and promoting the subjectivity of older people in the education process. Lack of proper preparation can lead to the development of negative attitudes and reluctance to work with this group. During the education process it is worth assessing the level of compassion and predisposition to give medical care.[1,7–11] Studies on the attitudes of students, including nursing students, towards older people, conducted, among others, in Sweden,[12] Austria,[8] Croatia and Slovenia,[13] Turkey,[2] China[14] show varied and inconsistent attitudes towards older people.[15,16] In the Polish scientific literature, there are few reports on the assessment of nursing students' attitudes towards older people, which may be due to the lack of research tools in Polish.[1] The Aging Semantic Differential (ASD) scale is one of the most used scales to assess attitudes toward older people. Most studies of the psychometric evaluation of the ASD scale have been conducted in English-speaking countries, which indicates the need for cross-cultural adaptation[1,17] and a Polish version is required. The aim of the study was to analyse the psychometrics of the Polish online version of the Aging Semantic Differential Scale (ASD).

Materials and Methods

Data Collection

The study was conducted from February 2022 to October 2023 in the group of among 384 nursing, midwifery and paramedic students. Due to the epidemiological the SARS-CoV-2 virus pandemic situation during this period, the link to the survey was placed on social media pages, ie "Facebook", "Messenger" and "WhatsApp" available to students. The survey was developed in Polish using the Google Forms website. The study used the Computer Assisted Web Interview (CAWI) research technique. This technique allows for dissemination of the questionnaire via a link to the website, maintaining full anonymity of the respondents, the ability to answer questions at a convenient time, and the collection of reliable data.[18]

At the beginning of the survey there was an introduction explaining the purpose of the study, instructions for completing it, and the e-mail address of the research director in case of questions or doubts. The survey also contained information that the collected data would be used for scientific purposes. The survey contained questions about the socio-demographic characteristics of students (gender, age, marital status, place of residence, field of study, and year of study) and questions about relationships with older people. The survey was anonymous and the respondent had the option to discontinue the study at any time without giving a reason. Students were able to start completing the survey when they had expressed informed consent to participate.

Ethics Statement

The study was conducted after obtaining the consent of the Bioethics Committee of the Jagiellonian University (No. 1072.6120.34.2022 of February 23, 2022).

Measurement Instrument

The Aging Semantic Differential (ASD) scale by H. A. Rosencranz and T. E. McNein was developed in 1969 in the United States to assess attitudes (especially among medical students) towards older people. The scale consists of 32 pairs of adjectives (with opposite meanings) defining attitudes towards older people. The task of the respondent is to indicate the features that, in their opinion, best characterize older people. The scale allows for the assessment of older people in terms of health, vitality, and activity (instrumentality subscale), autonomy and independence (autonomy subscale), friendliness and involvement in social situations (acceptability subscale), optimism and satisfaction (integrity subscale). The answers are based on a 7-point scale (1 – definitely yes, 7 – definitely no). A higher score indicates a negative

attitude towards older people. The lower the obtained results, the more positive the perception of older people (min 32–max 224 points).[19,20]

The Polish version of the Aging Semantic Differential (ASD) scale was created as part of the international project "Attitudes toward Age and Ageing" carried out in cooperation with the Medical University of Graz, Universidad CES, Colombia, the Jagiellonian University Medical College, the Nicolaus Copernicus University in Toruń, and L. Rydygier Medical College in Bydgoszcz.

The equivalence of the Polish version of the ASD with the original version was assessed in five aspects: translation (question content, degree of difficulty in formulating questions), visual (the Polish language version had the same graphic design, ie the appearance of the text, instructions, methods of calculating results), functional (suitability for the same purposes), reconstruction (methods of checking reliability and validity, types of norms) and psychometrics.

The process of translating the original version of the questionnaire from English into Polish was carried out by two independent translators – English philologists with experience in translating scientific papers. The received versions were compared in terms of content and meaning, making necessary corrections in the Polish translation to reflect the authors' intentions and the content of individual items (adjectives). The next step was to translate the newly obtained version of the Polish scale back into English (back translation) by two English translators and compare the obtained results with the original version. Comparison of the original version of the questionnaire with the back translation showed a high degree of agreement between all translations in terms of words and content.

Statistical Analysis

Categorical variables were described using frequency (N) and percentage (%). The average age values were described using the mean and standard deviation (SD). Descriptive statistics were performed for quantitative variables. Initially, CFA (confirmatory factor analysis) was performed, but due to the lack of confirmation of the model, EFA (exploratory factor analysis) was performed. To check whether the model on which the ASD scale is based is appropriately adapted to Polish cultural conditions, a second-order confirmatory factor analysis (CFA) was performed. Initially, the fit of items to individual subscales was checked: instrumentality, autonomy, acceptability, integrity. In the second step, the model was adjusted taking into account modification indices. Next, a second-order confirmatory factor analysis was performed to determine the structure of ASD as a general result (Table 1).

In the next part of the analysis, it was checked whether the model selected from the exploratory factor analysis was appropriately fitted. Moreover, due to two factors negatively loading the observed items, it was decided to check whether the selected factors do not create subscales of two general scales.

The discriminant validity of the obtained factors was checked by calculating the parameters AVE (Average Shared Squared Variance) and MSV (Maximum Shared Squared Variance). The reliability of the scale was assessed by

Table 1 Results of Second-Order Confirmatory Factor Analysis (CFA)

Models	χ^2	df	p	CMIN/df	AGFI	TLI	RMSEA	SRMR
First order								
Model 1	899.52	293	<0.001	3.07	0.804	0.817	0.074	0.070
Model 2	734.97	286	<0.001	2.57	0.839	0.861	0.064	0.066
Second order	753.16	288	<0.001	2.62	0.834	0.857	0.065	0.065
Difference	28.19	2	<0.001					

Notes: Model 2 includes changes based on modification indices. Model fit indices: p > 0.05; CMIN/df > 3 as good fit, a > 5 as acceptable value; AGFI > 0.90; TLI > 0.90, RMSEA < 0.08; SRMSR > 0.08. The difference in models is based on a comparison of the chi-square values between the second- and first-order models. The difference tests null hypothesis that the second-order factor model does not fit significantly worse than the first-order model.
Abbreviations: χ^2, chi squared; df, degrees of freedom; p, significance level; CMIN/df, χ^2 divided by its df; AGFI, Adjusted Goodness of Fit Index; TLI, Tucker-Lewis Index; RMSEA, root mean square error of approximation; SRMR, Standardized Root Mean Square Residual.

determining the internal consistency using the Cronbach's Alpha coefficient. In the next steps, Pearson correlation coefficient analyses were performed along with two-point serial correlations and linear regression analysis.

To check the differences in the attitudes of nursing students towards older people depending on the variables: age, gender, field of study and year of study and questions regarding relationships with older people, the Student's *t*-test for independent samples was performed. In the group with a small number of students (men, students of other fields of study), the nonparametric Mann–Whitney *U*-test was performed in parallel. Additionally, Spearman rank correlation analysis was performed between the year of study and attitudes. The classic significance level threshold ($\alpha = 0.05$) was established in the analyses. The analyses were performed using the IBM SPSS Statistics package and AMOS version 29.

In the process of evaluating the psychometric properties of the translated questionnaire, the theoretical validity of the scale was assessed using principal component analysis (PCA) with Oblimin rotation, delta parameter equal to 0, and Kaiser normalization. The criterion for the number of extracted components was the eigenvalue criterion >1 and the interpretation of components.

Results

Socio-Demographic Characteristics of the Study Group

The analysis covered a group of 384 students of bachelor's and master's degree studies in nursing (94.3%) and emergency medicine (5.7%) (Table 2). The largest group consisted of second-year students of bachelor's degree studies in nursing (70.6%), and most were women (90.6%). The average age was 21.40 (± 2.78) years, the youngest person was 18 years old, and the oldest 49 years old. Single people (58.3%) and those in an informal relationship (39.1%) dominated. More than half of the students met older people during classes (53.6%) and nearly two-thirds had

Table 2 Socio-Demographic Characteristics of the Study Group (N = 384)

Variables		**N**	**%**
Sex	Woman	348	90.6
	Man	36	9.4
Age	M (SD)	21.40 (2.78)	
	Me (IQR)	21.00 (2.00)	
	Min. – Max.	18–49	
	<21	158	45.4
	≥21	226	64.9
Marital status		N	%
	Single	224	58.3
	Married	10	2.6
	Informal relationship	150	39.1
Place of residence	Countryside	135	35.2
	City	249	64.8
Student	Nursing	362	94.3
	Other	22	5.7

(*Continued*)

Table 2 (Continued).

Variables		N	%
Year of studies	I	18	4.7
	II	271	70.6
	III	78	20.3
	IV	11	2.9
	V	6	1.6
How often do you have contact with older people (over 80) in your work?	Never	28	7.3
	Occasionally	206	53.6
	Weekly	46	12.0
	Daily	104	27.1
Older person lives with the family	Yes	251	65.4
	No	133	34.6
Ability to talk with an older person about personal affairs	I can discuss any personal topics	56	22.3
	I can discuss nearly all personal topics	31	12.4
	I can discuss many personal topics	72	28.7
	I can discuss some personal topics	34	13.5
	I can discuss only certain personal topics	39	15.5
	I cannot discuss personal topics	19	7.6

Abbreviations: M, mean; SD, standard deviation; Me, median; IQR, interquartile range; Min, minimum; Max, maximum; Year of studies, due to rounding all percentage-totals do not add to 100.0%.

an older person aged over 80 living with the family (65.4%). Among the respondents, over one-quarter (28.7%) claimed that they could talk to an older person about many personal topics, while over one-fifth (22.3%) could do so about any personal topic.

Compliance of the primary structure of the ASD based on the CFA. Analysis showed poor model fit to the data for models 1 and 2 in the first-order confirmatory factor analysis (Table 2 and Figure 1). In both cases, the fit measures were statistically significant. For model 1, CMIN/df ranges from 3–5, while in the second model this value is less than 3. AGFI and TLI indices do not show adequate model fit (>0.90). However, the RMSEA (root mean square error of approximation) value is lower than 0.7, which indicates good model fit. Similarly, SRMR (standardized root mean square residual) does not exceed the acceptable value of 0.8. It follows that some indices indicate good model fit (both for first- and second-order factor analysis).

The differences between the first- and second-order factor analysis models were statistically significant, which indicates a worse fit of the second-order model compared with the first-order model. The first-order confirmatory factor analysis model is presented in Figure 1.

Exploratory Factor Analysis of ASD

Exploratory factor analysis (to find an appropriate structure for the tool, using the principal components method with Oblimin rotation, Delta = 0) excluded [thirteen] items. Exclusion was based on the factor loading value (<0.4), items loading two factors simultaneously (cross-loading), and items for which the communalities were lower than 0.3, and one

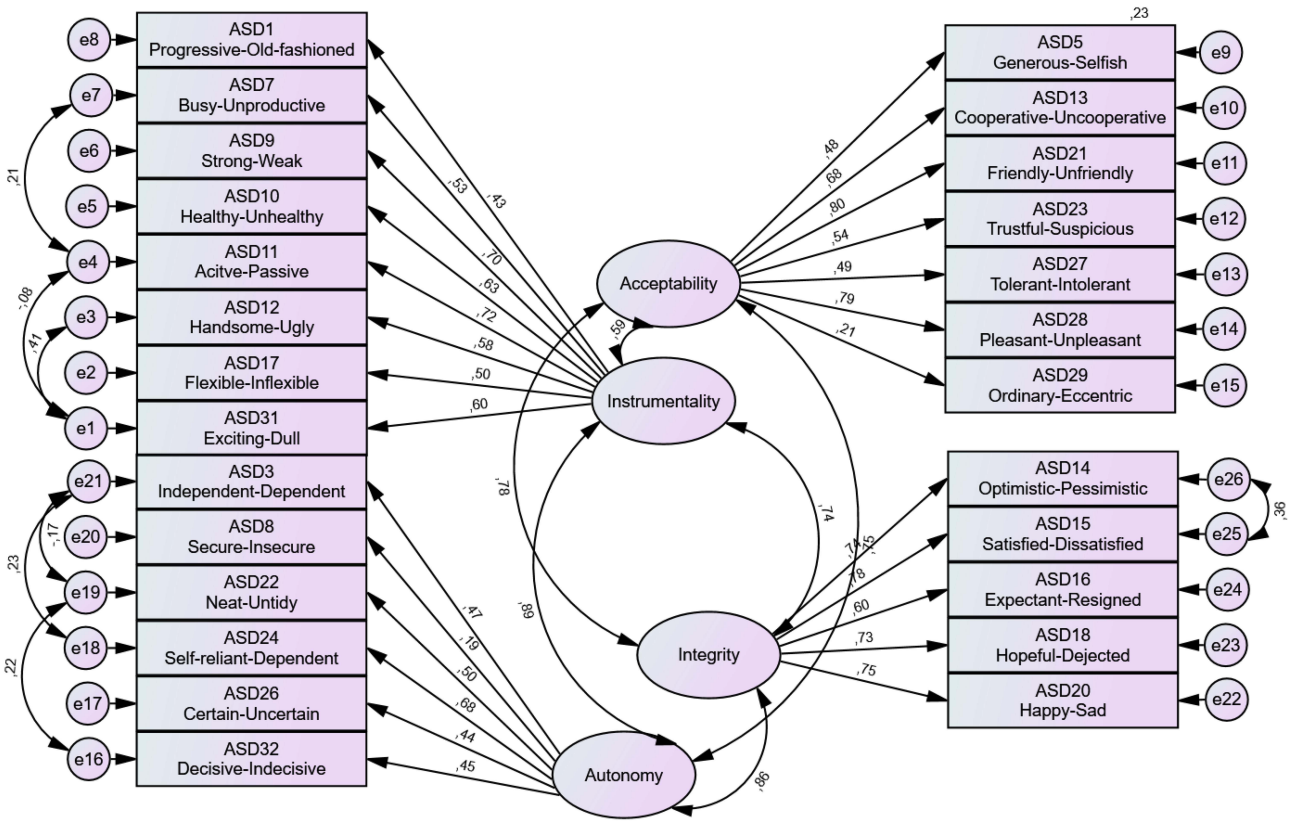

Figure 1 Standardized regression coefficients in the first-order factor model.

item (secure-insecure) loaded one factor by itself. In addition, secure-insecure was also excluded from the analysis because it formed a separate factor with one item.

A four-factor model was derived from the analysis. The validity of the analysis was confirmed by the KMO value = 0.88 and a significant statistical result for Bartlett's sphericity test: $\chi^2(171) = 2601.34$; $p < 0.001$. The model explained 56.20% of the variance in total. The reliability level of each factor was satisfactory ($\alpha > 0.7$). Factor loadings ranged from 0.57–0.81 for the first factor, 0.50–0.76 for the second factor, −0.54 to −0.77 for the third factor and −0.66 to −0.80 for the fourth factor. It is worth noting the negative sign of loadings for the third and fourth factors. It can therefore be assumed that the first and second factors refer to the general construct measuring the perception of physical characteristics, while the third and fourth factors refer to psychological characteristics (Table 3).

Table 3 Results of Exploratory Factor Analysis Using the Principal Components Method with Oblimin Rotation for ASD

Items	Factor			
	Factor 1	Factor 2	Factor 3	Factor 4
ASD3 (Aut)	0.806	0.067	0.003	0.168
ASD10 (Ins)	0.708	−0.103	−0.011	−0.129
ASD24 (Aut)	0.689	0.119	−0.144	−0.036
ASD9 (Ins)	0.601	0.140	0.104	−0.293

(*Continued*)

Table 3 (Continued).

Items	Factor			
	Factor 1	Factor 2	Factor 3	Factor 4
ASD11 (Ins)	0.565	0.113	−0.068	−0.214
ASD2 (Aut)	0.052	0.759	0.058	0.061
ASD19 (Aut)	0.025	0.703	−0.063	−0.149
ASD32 (Aut)	0.213	0.643	−0.111	0.059
ASD22 (Aut)	−0.170	0.503	−0.221	−0.348
ASD21 (Acc)	−0.047	0.128	−0.774	−0.006
ASD5 (Acc)	−0.124	0.070	−0.690	0.088
ASD23 (Acc)	−0.063	0.114	−0.624	−0.002
ASD15 (Ins)	0.241	−0.014	−0.608	−0.151
ASD14 (Ins)	0.289	−0.115	−0.583	−0.142
ASD27 (Acc)	0.232	−0.212	−0.538	−0.090
ASD31 (Ins)	0.093	−0.079	0.063	−0.795
ASD12 (Ins)	−0.022	0.017	−0.071	−0.769
ASD17 (Ins)	0.017	−0.015	0.022	−0.678
ASD16 (Ins)	−0.007	0.175	−0.100	−0.657
Eigenvalue	6.28	1.94	1.26	1.19
Explained variance	33.05%	10.22%	6.65%	6.28%
Cronbach's Alpha	0.805	0.710	0.778	0.756

Notes: ASD1 progressive – old fashioned; ASD3 independent – dependent; ASD5 generous – selfish; ASD7 busy – idle; ASD8 secure – insecure; ASD9 strong – weak; ASD10 healthy – unhealthy; ASD11 active – passive; ASD12 handsome – ugly; ASD13 cooperative – uncooperative; ASD14 optimistic – pessimistic; ASD15 satisfied – dissatisfied; ASD16 expectant – resigned; ASD17 flexibel – inflexible; ASD18 hopeful – dejected; ASD20 happy – sad; ASD21 friendly – unfriendly; ASD22 neat – untidy; ASD23 trustful – suspicious; ASD24 self-reliant – dependent; ASD26 certain – uncertain; ASD27 tolerant – intolerant; ASD28 pleasant – unpleasant; ASD29 ordinary – eccentric; ASD31 exciting – dull; ASD32 decisive – indecisive. Acc = Acceptability; Aut = Autonomy; Ins = Instrumentality; Factor 1 – independence; Factor 2 – consistency; Factor 3 – attitude towards others; Factor 4 – charisma.

Second-Order Confirmatory Factor Analysis (New Model)

For the repeated confirmatory factor analysis, there was an adequate fit of (Table 4 and Figure 2).

The results showed an adequate fit of the four-factor model. The second-order CFA also showed an adequate fit (Figure 2), and the difference between the models Second ordered a First ordered (with modification indicators) indicates the validity of the second-order model. However, in the second-order model, the factor loading value falls below an acceptable level (generous-selfish; $\beta = 0.39$). The four-factor model does not have this problem (Figure 2).

Construct Validity

The AVE level does not exceed the conventional threshold of 0.50; moreover, MSV is greater than AVE, which indicates a greater part of the shared variance with other constructs than that explained by the factor itself. Additionally, the square

Table 4 Results of Second-Order Confirmatory Factor Analysis for ASD

Models	χ^2	*df*	*p*	CMIN/*df*	CFI	TLI	RMSEA	SRMR
First order								
Model 1	444.05	146	<0.001	3.04	0.880	0.859	0.073	0.062
Model 2	310.27	139	<0.001	2.32	0.931	0.915	0.057	0.053
Second order	311.29	140	<0.001	2.22	0.931	0.916	0.057	0.054
Difference	1.29	1	0.256					

Notes: Model 2 includes changes based on modification indices. Model fit indices: p > 0.05; CMIN/df > 3 as good fit, a > 5 as acceptable value; AGFI > 0.90; TLI > 0.90, RMSEA < 0.08; SRMSR > 0.08. The difference in models is based on a comparison of the chi-square values between the second- and first-order models. The difference tests null hypothesis that the second-order factor model does not fit significantly worse than the first-order model.
Abbreviations: χ2, chi squared; df, degrees of freedom; p, significance level; CMIN/df, χ2 divided by its df; AGFI, Adjusted Goodness of Fit Index; TLI, Tucker-Lewis Index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

root of AVE is lower than the intrafactor correlations, which again indicates problems with discriminant validity. This indicates that the tool is characterized by a low level of discriminant validity (Table 5).

Item Score Distributions

Lowest mean scores (more positive perceptions) were as follows: ASD21 (Friendly-Unfriendly), ASD5 (Generous-Selfish), and ASD22 (Neat-Untidy) (Table 6). Highest mean scores (more negative perceptions) were: ASD24 (Self-reliant-Dependent), ASD9 (Strong-Weak), and ASD10 (Healthy-Unhealthy). Skewness and kurtosis were acceptable (Annex). There was no evidence of a floor effect.

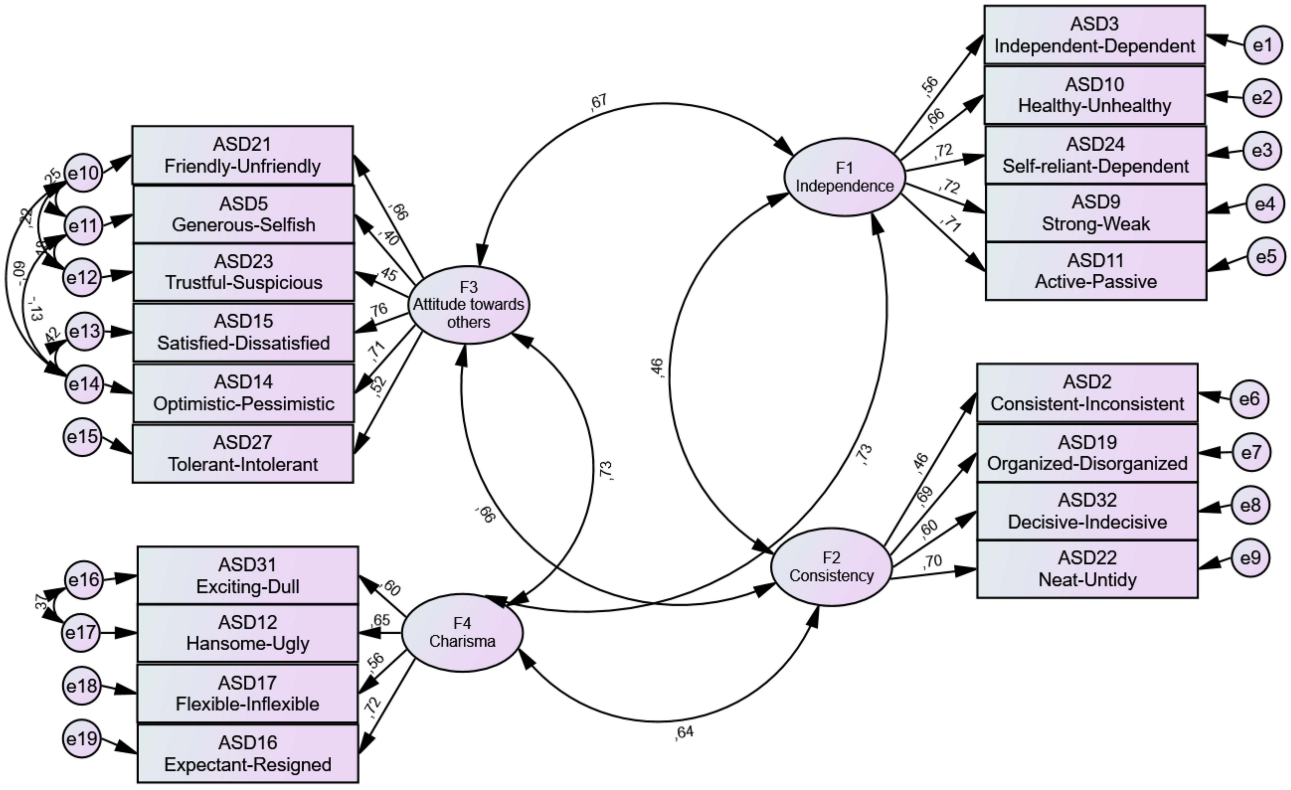

Figure 2 CFA for the model of attitudes towards older people based on EFA.

Table 5 The Values of Discriminant Validity Parameters and Correlations Between Factors

Factors	CR	AVE	MSV	F1	F2	F3	F4
F1	0.809	0.461	0.534	0.679			
F2	0.710	0.385	0.438	0.457	0.621		
F3	0.761	0.358	0.539	0.672	0.662	0.599	
F4	0.728	0.403	0.539	0.731	0.640	0.734	0.635

Abbreviations: F1, independence; F2, consistency; F3, attitude towards others; F4, charisma. CR, composite reliability; AVE, average variance extracted; MSV, maximum share variance.

Among the analyzed variables, the association of the age of the respondents was statistically significant in all factors of attitudes towards older people. Younger people (under 21 years of age) assessed older people more positively than those aged 21 and above. There was also a statistically significant difference for F2 (consistency) based on having experience with older people. Students with this experience had a lower score on the F2 scale than students without such experience. Students with no previous experience with older people assessed older people better than those with experience with older people. Statistically significant differences were also found between nursing students of bachelor's

Table 6 Item Distribution Scores for the Validated Four-Factor Structure (19 Items)

Dependent Variable	M (SD)	Me	Floor	Ceiling	Sk.	Kurt.	D
ASD2	3.04 (1.38)	3.00	10.7%	1.0%	0.58	−0.22	0.18
ASD3	4.82 (1.40)	5.00	2.3%	8.1%	−0.67	0.03	0.21
ASD5	3.05 (1.31)	3.00	11.2%	1.0%	0.42	−0.14	0.17
ASD9	4.96 (1.26)	5.00	1.3%	7.8%	−0.72	0.53	0.22
ASD10	5.31 (1.08)	5.00	0.3%	11.7%	−0.68	0.82	0.21
ASD11	4.67 (1.20)	5.00	1.0%	3.4%	−0.48	−0.05	0.23
ASD12	3.56 (1.49)	4.00	14.3%	3.4%	−0.09	−0.22	0.24
ASD14	4.21 (1.34)	4.00	1.6%	3.4%	−0.08	−0.48	0.16
ASD15	4.15 (1.30)	4.00	1.8%	2.9%	−0.11	−0.35	0.16
ASD16	4.11 (1.40)	4.00	2.9%	4.4%	0.01	−0.42	0.16
ASD17	4.80 (1.40)	5.00	1.8%	10.4%	−0.43	−0.21	0.16
ASD19	3.54 (1.36)	3.00	5.2%	2.3%	0.29	−0.28	0.17
ASD21	2.98 (1.33)	3.00	14.1%	2.1%	0.57	0.48	0.17
ASD22	3.45 (1.35)	3.00	7.8%	2.6%	0.28	0.02	0.17
ASD23	3.49 (1.54)	3.00	6.8%	2.9%	0.38	−0.70	0.17
ASD24	4.92 (1.23)	5.00	1.3%	6.8%	−0.70	0.54	0.24
ASD27	4.80 (1.34)	5.00	1.6%	10.2%	−0.39	−0.03	0.17
ASD31	4.53 (1.38)	4.00	2.9%	10.4%	−0.07	0.09	0.23
ASD32	3.95 (1.39)	4.00	2.9%	3.1%	0.04	−0.53	0.15

Abbreviations: M, mean; SD, standard deviation; Sk, skewness; Kurt, kurtosis; D, Kolmogorow-Smirnov test with p value < 0.001 for every item. The range: 1–7.

https://doi.org/10.2147/JMDH.S495728

and master's degrees and students of other medical fields in terms of F3 (attitude towards others). Students of other medical fields showed more positive attitudes compared to nursing students of bachelor's and master's degrees. Each of the observed effects – based on the Cohen's d value – is a weak effect. The results of the nonparametric test confirmed the results of the Student's *t*-test for independent samples for gender. However, in the case of students of different fields, different results were noted for F3, although the p value was relatively close to the 0.05 threshold. This difference should be interpreted with caution. The correlation analysis between the year of study and attitudes towards older people showed a significant relationship in terms of F1 ($r_s = 0.16$; $p = 0.002$) and F4 ($r_s = 0.15$; $p = 0.004$), which confirms that with each year of study the assessment of older people worsens (Table 7).

Discussion

The paper presents the results of the first study aimed at adapting ASD to Polish cultural conditions. Principal component analysis conducted among Polish students of bachelor's and master's degree studies in nursing and other medical fields showed, as in the original version of the ASD scale, a four-factor structure (instrumentality, autonomy, acceptability, integrity). The study confirmed 19 items out of the original 32. The presented results of the Polish version of the scale also show acceptable internal reliability, scale validity and construct validity. The four-factor structure of the ASD scale with 26 items was confirmed in a study conducted in Austria among students of nursing, medicine and humanities.[8] A study conducted in Sweden among nursing students (bachelor's and master's degree) also confirmed a four-factor structure with 26 items.[12] The four-factor structure was again confirmed by a study among medical students in the USA with 26 items on the scale.[20] In a Turkish study among students of social sciences and other fields, the version with 25

Table 7 Differences in Attitude Factors Towards Older People Depending on Sociodemographic Variables

Age	Statistics	Total (N = 384)	Age < 21 (N = 158)	Age ≥ 21 (N = 226)	p-value	Mean Differences (95% CI)	Effect Size
F1	M (SD) Me (Q1, Q3)	4.99 (0.84) 5.00 (4.40; 5.60)	4.82 (0.79) 5.00 (4.40; 5.35)	5.11 (0.86) 5.20 (4.60; 5.60)	<0.001	−0.30 [−0.47; −0.13]	0.36
F2	M (SD) Me (Q1, Q3)	3.47 (0.96) 3.50 (2.75; 4.13)	3.30 (0.96) 3.25 (2.50; 4.00)	3.59 (0.95) 3.50 (3.00; 4.25)	0.003	−0.29 [−0.49; −0.10]	0.31
F3	M (SD) Me (Q1, Q3)	3.75 (0.89) 3.83 (3.17; 4.33)	3.58 (0.91) 3.67 (3.00; 4.17)	3.87 (0.86) 3.83 (3.33; 4.33)	0.002	−0.29 [−0.47; −0.11]	0.33
F4	M (SD) Me (Q1, Q3)	4.25 (1.08) 4.25 (3.50; 5.00)	4.02 (1.05) 4.00 (2.25; 4.75)	4.41 (1.07) 4.25 (3.75; 5.00)	<0.001	−0.39 [−0.60; −0.17]	0.36
Sex		**Total (N = 384)**	**Female (N = 348)**	**Male (N = 36)**	**p-value**	**Mean differences (95% CI)**	**Effect Size**
F1	M (SD) Me (Q1, Q3)	4.99 (0.84) 5.00 (4.40; 5.60)	5.00 (0.84) 5.00 (4.40; 5.60)	4.93 (0.81) 5.00 (4.40; 5.40)	0.649	0.07 [−0.23; 0.36]	0.08
F2	M (SD) Me (Q1, Q3)	3.47 (0.96) 3.50 (2.75; 4.13)	3.47 (0.96) 3.50 (2.75; 4.13)	3.44 (0.96) 3.25 (2.75; 4.19)	0.875	0.03 [−0.30; 0.37]	0.03
F3	M (SD) Me (Q1, Q3)	3.75 (0.89) 3.83 (3.17; 4.33)	3.75 (0.89) 3.83 (3.17; 4.33)	3.71 (0.88) 3.83 (3.33; 4.29)	0.795	0.16 [−0.27; 0.35]	0.05
F4	M (SD) Me (Q1, Q3)	4.25 (1.08) 4.25 (3.50; 5.00)	4.23 (1.07) 4.25 (3.50; 5.00)	4.44 (1.10) 4.50 (4.00; 5.00)	0.276	0.19 [−0.57; 0.17]	0.9
Previous Experiences		**Total (N = 384)**	**Yes (N = 65)**	**No (N = 319)**	**p-value**	**Mean differences (95% CI)**	**Effect Size**
F1	M (SD) Me (Q1, Q3)	4.99 (0.84) 5.00 (4.40; 5.60)	5.14 (0.94) 5.20 (4.80; 5.80)	4.96 (0.82) 5.00 (4.40; 5.40)	0.132	0.17 [−0.05; 0.40]	0.21
F2	M (SD) Me (Q1, Q3)	3.47 (0.96) 3.50 (2.75; 4.13)	3.69 (1.03) 3.50 (3.00; 4.25)	3.42 (0.94) 3.50 (2.75; 4.00)	0.046	0.26 [0.005; 0.521]	0.27
F3	M (SD) Me (Q1, Q3)	3.75 (0.89) 3.83 (3.17; 4.33)	3.86 (0.89) 3.83 (3.33; 4.33)	3.73 (0.89) 3.83 (3.17; 4.33)	0.281	0.13 [−0.11; 0.37]	0.12
F4	M (SD) Me (Q1, Q3)	4.25 (1.08) 4.25 (3.50; 5.00)	4.36 (1.15) 4.25 (3.75; 5.00)	4.23 (1.06) 4.25 (3.50; 5.00)	0.383	0.13 [−0.16; 0.42]	0.15

(*Continued*)

Table 7 (Continued).

Course of studies		Total (N = 384)	Nursing (N = 355)	Other (N = 22)	p-value	Mean differences (95% CI)	Effect size
F1	M (SD) Me (Q1, Q3)	4.99 (0.84) 5.00 (4.40; 5.60)	5.01 (0.84) 5.00 (4.40; 5.60)	4.87 (0.86) 4.80 (4.20; 5.40)	0.490	0.13 [−0.24; 0.49]	0.15
F2	M (SD) Me (Q1, Q3)	3.47 (0.96) 3.50 (2.75; 4.13)	3.47 (0.95) 3.50 (2.75; 4.25)	3.55 (1.13) 3.63 (2.75; 4.00)	0.700	−0.08 [−0.50; 0.33]	0.09
F3	M (SD) Me (Q1, Q3)	3.75 (0.89) 3.83 (3.17; 4.33)	3.76 (0.90) 3.83 (3.17; 4.33)	3.50 (0.51) 3.50 (3.00; 4.00)	0.035[a]	0.26 [0.02; 0.51]	0.30
F4	M (SD) Me (Q1, Q3)	4.25 (1.08) 4.25 (3.50; 5.00)	4.25 (1.08) 4.25 (3.50; 5.00)	4.24 (1.01) 4.00 (3.86; 5.06)	0.952	0.01 [−0.46; 0.47]	0.01
Personal Relationship		**Total (N = 384)**	**Yes (N = 251)**	**No (N = 133)**	**p-value**	**Mean differences (95% CI)**	**Effect size**
F1	M (SD) Me (Q1, Q3)	4.99 (0.84) 5.00 (4.40; 5.60)	4.95 (0.83) 5.00 (4.40; 5.55)	5.06 (0.86) 5.00 (4.60)	0.223	−0.11 [0.29; 0.07]	0.13
F2	M (SD) Me (Q1, Q3)	3.47 (0.96) 3.50 (2.75; 4.13)	3.40 (0.98) 3.25 (2.75; 4.00)	3.59 (0.92) 3.50 (3.00; 4.25)	0.066	−0.19 [−0.39; 0.01]	0.20
F3	M (SD) Me (Q1, Q3)	3.75 (0.89) 3.83 (3.17; 4.33)	3.72 (0.90) 3.83 (3.17; 4.33)	3.81 (0.86) 3.83 (3.33; 4.33)	0.300	−0.10 [−0.29 [0.09]	0.11
F4	M (SD) Me (Q1, Q3)	4.25 (1.08) 4.25 (3.50; 5.00)	4.17 (1.11) 4.25 (3.50; 4.75)	4.39 (1.01) 4.25 (3.75; 5.00)	0.064	−0.21 [−0.44; 0.01]	0.20

Notes: For gender and course of studies, the Mann Whitney *U*-test was performed in parallel due to the extremely low numbers of the compared groups. The results of the nonparametric test mostly confirmed the results obtained with the Student's *t*-test for independent samples. Nonparametric test showed insignificant results $p = 0.068$. Differences associated with the discrepancy in whole group size vs "course of studies" subgroups in individual variables are due to deleted observations (>|3|SD) within factors: N = 7 for F1; N = 3 for F2; N = 4 for F3. No outlier observations were noted within F4, F1 – independence; F2 – consistency; F3 – attitude towards others; F4 – charisma.

items was confirmed,[21] similarly in a study conducted among general German society.[22] The four-factor structure of the ASD scale was not confirmed in the Mandarin version of the ASD scale among individuals from different cultural backgrounds (ie, Chinese and Western), which was tested in Shanghai, China. This study found a three-factor structure (personality and mental health, social participation, and physical condition). This study found that the four-factor structure was not appropriate for individuals from different cultural backgrounds.[23]

The Polish version of the ASD scale with 19 items, like the Swedish one, confirms that concise research instruments are less burdensome for respondents.[12] In the Polish study (19 items) 13 items/adjectives were excluded. The Swedish version of ASD (26 items) similarly to the Austrian one, excluded 6 items.[12] In both the Polish and Swedish studies, adjectives assessing older people in terms of: health, vitality and activity (productive/unproductive, aggressive/defensive), autonomy and independence (rich/poor), and kindness and involvement in social situations (liberal/conservative) were excluded. The remaining excluded adjectives in the Polish study concerned, among others, feelings (happy/sad, hopeful/dejected), views (progressive/old fashioned), and involvement of older people (busy/idle). This can be interpreted as meaning that older people are perceived positively in society as active and vital people. In the Polish study, items concerning the dependency of older people obtained the highest averages. High averages in the dependency of older people were also obtained in the Austrian[8] and Swedish studies,[12] which confirmed that older people are perceived as dependent.[24] Moreover, in the Polish study, high averages were also obtained for adjectives assessing the health of older people.

In the Polish study, as in Sweden, it was shown that age may be one of the most consistent demographic variables that predict attitudes related to aging. This strengthens the importance of age as a variable used to assess the validity of constructs in questionnaires.[12] In addition, a study conducted in Sweden showed that students from the younger age group analyzed (<25 years of age) showed more positive attitudes in terms of instrumentality, autonomy, acceptability and integrity towards older people than the older age group (>25 years of age). In addition, this study showed that women, people with previous experience in caring for older people, master's students and people who had personal contact with older people showed more positive attitudes.[12] Also in the Polish study, people from the younger age group (<21 years of age) showed more positive attitudes towards older people than those from the older age group (≥21 years of age). In contrast, in the study conducted in Germany, more negative attitudes towards older people were shown among

people from the younger age group analyzed (18–31 years of age) than in the older age group (68–81 years of age).[22] Similarly in the study conducted in Great Britain, age, gender, education, professional practice, studying nursing and contact with older people influenced the overall score of attitudes of older people.[25]

It should be emphasized that the presented study has certain limitations. First, it was cross-sectional, which has limited possibilities of monitoring dynamic changes in attitudes towards older people, hence further research is needed among students of various medical fields to deepen the knowledge. Second, research on the influence of various social and psychological conditions on the attitudes of young people towards an aging society may bring a new perspective on the problem of age discrimination. The factors determining attitudes towards older people are complex and still undiscovered, therefore further research is recommended.

The strength of the study is that it supports the international development of ASD through translation into Polish. The results presented in this study contribute to the results of other international psychometric studies on ASD. The ASD scale has been translated into English, German, Swedish, Mandarin (Chinese), and Turkish and used in similar groups of respondents. By assessing attitudes in a group of students, early educational interventions can be developed. Based on the statistical analysis of the study results, we assume that providing a shorter version of the ASD scale for future respondents will be more encouraging to participate in the study. In addition, the Computer Assisted Web Interview (CAWI) technique used in the study allows for full anonymity of the respondents, the ability to answer questions at a convenient time, and the collection of reliable data.

Conclusion

The study contributes to the cross-cultural validation of the ASD scale. We obtained a shorter version than the original ASD scale through statistical calculations. The shorter version of the ASD scale is easier and faster to administer The scale can be reliably used by researchers and practitioners in disciplines other than nursing.

Data Sharing Statement

The raw data supporting the conclusions of this article will be made available from the corresponding author upon request.

Informed Consent Statement

Informed consent was obtained from all participants involved in the study. The study was conducted after obtaining the consent of the Bioethics Committee of the Jagiellonian University (No. 1072.6120.34.2022 of February 23, 2022).

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Disclosure

The author(s) report no conflicts of interest in this work.

References

1. Ayalon L, Dolberg P, Mikulionienė S, et al. A systematic review of existing ageism scales. *Ageing Res Rev*. 2019;54:100919. doi:10.1016/j.arr.2019.100919
2. Birimoglu Okuyan C, Bilgili N, Mutlu A. Factors affecting nursing students' intention to work as a geriatric nurse with older adults in Turkey: a cross-sectional study. *Nurse Educ Today*. 2020;95(104563):104563. doi:10.1016/j.nedt.2020.104563

3. López-Hernández L, Martínez-Arnau FM, Castellano-Rioja E, Botella-Navas M, Pérez-Ros P. Factors affecting attitudes towards older people in undergraduate nursing students. *Healthcare*. 2021;9(9):1231. doi:10.3390/healthcare9091231
4. Özdemir Ö, Bilgili N. Attitudes of Turkish nursing students related to ageism. *J Nurs Res*. 2016;24(3):211–216. doi:10.1097/jnr.0000000000000131
5. Burnes D, Sheppard C, Henderson CR, et al. Interventions to reduce ageism against older adults: a systematic review and meta-analysis. *Am J Public Health*. 2019;109(8):E1–E9. doi:10.2105/AJPH.2019.305123
6. Chang ES, Kannoth S, Levy S, Wang SY, Lee JE, Levy BR. Global reach of ageism on older persons' health: a systematic review. *PLoS One*. 2020;15(1):e0220857. doi:10.1371/journal.pone.0220857
7. Che CC, Chong MC, Hairi NN. What influences student nurses' intention to work with older people? A cross-sectional study. *J Nurs Stud*. 2018;85:61–67. doi:10.1016/j.ijnurstu.2018.05.007
8. Schüttengruber G, Stolz E, Lohrmann C, Kriebernegg U, Halfens R, Großschädl F. Attitudes towards older adults (80 years and older): a measurement with the ageing semantic differential – a cross-sectional study of Austrian students. *Int J Older People Nurs*. 2022;17(3):e12430. doi:10.1111/opn.12430
9. Gherman MA, Arhiri L, Holman AC. Ageism, moral sensitivity and nursing students' intentions to work with older people – a cross-sectional study. *Nurse Educ Today*. 2022;113:105372. doi:10.1016/j.nedt.2022.105372
10. Dai F, Liu Y, Ju M, Yang Y. Nursing students' willingness to work in geriatric care: an integrative review. *Nurs Open*. 2021;8(5):2061–2077. doi:10.1002/nop2.726
11. Hovey S, Dyck MJ, Reese C, Kim M. Nursing students' attitudes toward persons who are aged: an integrative review. *Nurse Educ Today*. 2017;49:145–152. doi:10.1016/j.edt.2016.11.018
12. Holmberg C, Wolf A, Eide C, et al. Classic tool, new opportunities: a psychometric analysis of a Swedish online version of the aging semantic differential scale. *Res Aging*. 2021;43(9–10):378–387. doi:10.1177/0164027520963618
13. Veronek J, Bajs Janović M, Janović Š, Barić H, Zurc J, Gvozdanović Z. Attitudes towards older people in Croatian and Slovenian nursing students. *Psychiatry Danub*. 2020;32(Suppl 4):484–490.
14. Hsu MHK, Ling MH, Lui TL. Relationship between gerontological nursing education and attitude toward older people. *Nurse Educ Today*. 2019;74:85–90. doi:10.1016/j.nedt.2018.12.007
15. Fhon JRS, Alves N, Santos Neto APD, Djinan ARFS, Laurenti AV, Lima EFC. Attitudes and perceptions about ageism among nursing students: a scoping review. *Rev Lat Am Enfermagem*. 2024;32:e4116. doi:10.1590/1518-8345.6851.4116
16. Venables H, Wells Y, Fetherstonhaugh D, Wallace H. Factors associated with nursing students' attitudes toward older people: a scoping review. *Gerontol Geriatr Educ*. 2023;44(1):131–150. doi:10.1080/02701960.2021.2012466
17. Wilson MAG, Kurrle S, Wilson I. Medical student attitudes towards older people: a critical review of quantitative measures. *BMC Res Notes*. 2018;11(1):71. doi:10.1186/s13104-018-3186-z
18. SurvGo [homepage on the Internet]. Metodologia CAWI – najbardziej ekonomiczna technika badawcza; 2023. Available from: https://www.survgo.com/blog/metodologia-cawi-technika-badawcza. Accessed September 3, 2024.
19. Rosencranz HA, McNevin TE. A factor analysis of attitudes toward the aged. *Gerontologist*. 1969;9(1):55–59. doi:10.1093/geront/9.1.55
20. Intrieri RC, von Eye A, Kelly JA. The aging semantic differential: a confirmatory factor analysis. *Gerontologist*. 1995;35(5):616–621. doi:10.1093/geront/35.5.616
21. Eger Aydogmus M. Adaptation of the aging semantic differential scale into Turkish. *Turk Geriatri Derg*. 2021;24(2):255–263. doi:10.31086/tjgeri.2021.222
22. Gluth S, Ebner NC, Schmiedek F. Attitudes toward younger and older adults: the German aging semantic differential. *Int J Behav Dev*. 2010;34(2):147–158. doi:10.1177/016502540935094
23. Gonzales E, Marchiondo LA, Tan J, Wang Y, Chen H. The aging semantic differential in Mandarin Chinese: measuring attitudes toward older adults in China. *J Gerontol Soc Work*. 2017;60(3):245–254. doi:10.1080/01634372.2017.1295122
24. Heckemann B, Schüttengruber G, Wolf A, Großschädl F, Holmberg C. Attitudes towards oldest-old adults (age ≥80 years): a survey and international comparison between Swedish and Austrian nursing students. *Scand J Caring Sci*. 2022;36(4):1083–1093. doi:10.1111/scs.13005
25. Ridgway V, Mason-Whitehead E, McIntosh-Scott A. Visual perceptions of ageing; A longitudinal mixed methods study of UK undergraduate student nurses' attitudes and perceptions towards older people. *Nurse Educ Pract*. 2018;33:63–69. doi:10.1016/j.nepr.2018.08.005