e-ISSN 2544-1620

Medical Science Pulse 2023 (17) 4

Original papers DOI: 10.5604/01.3001.0054.3235/

MULTIDIMENSIONAL ATTITUDES SCALE TOWARD PERSONS WITH DISABILITIES: FACTOR AND EXPLORATORY ANALYSIS FOR A UKRAINIAN VERSION (MAS-UA)

Andriej Szpakow[1 A-G]
• ORCID: 0000-0003-4340-5211;

Krystyna Kowalczuk[1 A,B,E-G]
• ORCID: 0000-0001-5680-8859;

Joanna Baj-Korpak[2 A,B,E-G]
• ORCID: 0000-0002-6379-2485;

Dorota Sokołowska[3 A,B,E-G]
• ORCID: 0000-0001-8484-9172

Yuliia Antonova-Rafi[4 B,G]
• ORCID: 0000-0002-9518-4492;

Igor Khudetskyy[4 B,G]
• ORCID: 0000-0003-0815-6950;

Oryna Detsyk[5 A,B,G]
• ORCID: 0000-0003-3975-9455;

Mariia Hryshchuk[5 A,B,G]
• ORCID: 0000-0001-9202-295X;

Olga Fedorciv[6 A,B,F,G]
• ORCID: 0000-0002-2544-1887;

Andriy Bazylevych[7 B,G]
• ORCID: 0000-0001-5053-2548;

Oksana Hdyrya[8 B,G]
• ORCID: 0000-0001-9901-061X

Liudmila Vilchynskaya[9 A,B,E,F]
• ORCID: 0009-0008-1397-1187

[1] Department of Integrated Medical Care, Faculty of Health Sciences, Medical University of Bialystok, Poland

[2] Department of Physiotherapy, Faculty of Health Sciences, John Paul II University of Applied Sciences in Biała Podlaska, Poland

[3] Eastern European University of Applied Sciences in Bialystok, Poland

[4] Department of Biosafety and Human Healthy, Faculty of Biomedical Engineering, National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute», Ukraine

[5] Department of Social Medicine and Public Health, Medical Faculty, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine

[6] Department of Paediatrics, Paediatric Surgery, Ivan Horbachevsky National Medical University of Ternopil, Ternopil, Ukraine

[7] Department of Propedeutics of Internal Medicine, Danylo Halytsky Lviv National Medical University, Lviv, Ukraine

[8] Center for Rehabilitation of Acute Conditions and Restorative Treatment of Children Lviv Regional Children's Clinical Hospital "Okhmatdyt", Lviv, Ukraine

[9] NZOZ Przychodnia Zdrowia Rodziny (NZOZ Family Health Clinical), Cracow, Poland

A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: Currently, a topical area of research is the multidimensional approach to both reliable tools and professional interventions aimed at improving the attitudes of Ukrainian society toward people with disabilities in the context of the armed conflict in Ukraine.

Aim of the study: The purpose of this study was to study the factor structure of the Multidimensional Attitudes Scale Toward Persons with Disabilities (MAS) questionnaire on a sample of Ukrainian students to create an adaptation of the original version (MAS-UA).

Material and methods: The main authors of the questionnaire gave their consent for the adaptation. The Ukrainian version of the MAS was developed using the method of back translation from the original language. The proposed multi-factor structure of the MAS-UA was tested in an anonymous online study of 1619 Ukrainian students.

Results: The factor analysis and a parallel exploratory factor analysis resulted in a 5-factor structure for the MAS-UA (the classic domains – cognitive, affective, and behavioral – and two additional domains, negative effects and items concentrated in the factors "Calm" and "Desire to communicate"). These five factors yielded 62.6% of the total variance score.

Conclusions: The MAS-UA was developed and presented as a reliable instrument for examining attitudes toward people with physical disabilities. The instrument can be used for the initial assessment when developing prevention and educational programs in the field of social policy, as well as to evaluate their effectiveness. Studies using the adapted version of the scale (MAS-UA) will allow the comparison of results from other countries where other language versions are used.

KEYWORDS: Ukrainian students, MAS questionnaire, multidimensional attitudes, disability, measurement scale, factor analysis

Background

The humanization of social relations intensified the interest in the problems of people in disadvantaged social situations [1]. A major trend of this process in recent years has been the pursuit of the socio-psychological integration of people with physical disabilities. The UN Convention on the Rights of Persons with Disabilities (CRPD) fully reflects the social model of this phenomenon [2]. In this approach, a person with a disability is a subject and fully fledged human being, not an object of care.

The disability rate in the world is currently 15%, meaning that there are about one billion registered individuals [3]. In Ukraine, this rate is also about 15%, which means that over 2.8 million people have a disability certificate (6.1% of the total population) [4]. There is a high (more than 6%) percentage of people with mobility impairments using wheelchairs [5,6]. Developing positive attitudes in society is an important aspect of perceiving this social group in a way that leads to the mutual complementation of social roles [5].

From the perspective of our research, it seems important to focus on the issue of attitude. Attitude is a multidimensional and complex concept that strengthens or restricts the main aspects of human life [7]. Attitude is defined as a structure consisting of three components: affective/emotional (i.e., feelings or emotions related to the object of the attitude), cognitive (thoughts, knowledge, and beliefs), and behavioral (motivational with a declaration or intention of behavior or actions toward the object) [8]. Unfortunately, negative attitudes toward people with disabilities are still a problem in countries of the former USSR, even after the introduction of integration policy and law [9].

Contemporary research indicates a need for education dedicated to various social groups (teachers, employers, doctors, and other specialists working with people), especially in the field of "disability awareness training," which can improve attitudes toward people with physical disabilities [10]. This is particularly important due to the armed conflict in Ukraine, which is potentially increasing the number of people with disabilities as many young people acquire physical and psychosocial dysfunctions caused by the war [11]. The conflict between Russia and Ukraine has been ongoing since 2014, with initial hostilities in the Donbas region, followed by a wider Russian invasion in February 2022. The long-term effects of armed conflicts are significant, and the likelihood of war-related disabilities increases with the large number of young people being involved in the conflict [12, 13]. Nowadays, studying attitudes toward people with physical disabilities should be considered in a new paradigm, taking into account the state of war, sociocultural changes, and the change in the perception of this social group.

The new tool, the adaptation of which we present, responds to the challenges of this modern research paradigm. A multidimensional approach to both reliable tools and professional interventions aimed at changing attitudes toward people with disabilities is the main element of the social vision concerning the current situation in Ukraine. A topical theme nowadays is promoting a social, legal, and political environment that would facilitate the inclusion of people with disabilities in humanitarian activities and provide them with protection and safety [14]. So far, no research has been conducted in Ukraine on any standardized scale to assess attitudes toward people with physical disabilities – a scale that would be recognized and used in international research and thus would present an opportunity to compare results. The Multidimensional Attitudes Scale Toward Persons with Disabilities (MAS), developed by Findler, Vilchinska, and Werner [8, 15], is a globally recognized, multifaceted tool used in the design of support instruments and educational initiatives for improving attitudes toward persons with various types of disabilities [16, 17]. Having identified the need for tools in a multidimensional study of attitudes toward people with disabilities in Ukraine, the MAS was cho-

sen as the most appropriate questionnaire. The scale refers to the classic model of attitudes, which was designed to measure the affective, cognitive, and behavioral components. This tool has good overall utility due to its excellent internal consistency and good accuracy [18,19].

Aim of the study

Our goal was to study the factor structure of the MAS on a sample of Ukrainian students and to compare the Ukrainian version of the MAS with the original scale using statistical psychometric analysis to create an adapted version for research (MAS-UA) on Ukrainian respondents.

Material and methods

Translation and adaptation of the questionnaire

Before starting the research project, the researchers obtained consent from the main authors of the original questionnaire to proceed with the adaptation, along with the necessary materials. The Ukrainian adaptation was based on the English version of the questionnaire. After obtaining formal consent, the questionnaire was translated from English into Ukrainian by two independent experts. All cultural differences were taken into account during the translation. Both versions were verified and corrected by an expert who is fluent in Ukrainian and has specialized knowledge of disability terminology. Then, the translations were evaluated by a panel of experts consisting of two rehabilitation specialists, a nurse, a psychologist, and a physical therapist. The panel verified the phrasing and meaning of all questions, as well as the comprehensibility and correctness of the answers. The panel of experts compared the Ukrainian translation to the original version. The use of words was discussed in the context of research purposes for maintaining functional equivalence. Alternative versions of some words and phrases were presented, and the panel of experts selected those deemed most appropriate. All decisions were made unanimously. The version chosen by the panel of experts was back-translated into English and approved by the authors of the original English version. The back-translations were compared with the original version to check whether the Ukrainian version adequately conveyed the meaning of the English original. Because the meaning of individual items remained the same as in the original, there were no changes to the text of the questionnaire. The translated questionnaire was used in a pilot study conducted on a sample of 25 Ukrainian psychology students to assess the comprehensibility of the content and the rationality and usefulness of the components.

Because research using this tool shows that the selection of a specific group of people with disabilities can be important for studying attitudes [19, 20], the purpose of the MAS adaptation was to check the psychometric properties of the tool in Ukraine, focusing on a group of people with physical disability (people in wheelchairs).

Participants

The basic psychometric properties of the MAS-UA were tested on a sample of 1619 university students, men (n=399) and women (n=1220) of Ukrainian nationality, aged 20.2±3.06 years (median=19.0; range: 18–35) from the medicine and health sciences department (n=894), the humanities and social sciences department (n=576), and a group of student-athletes (n=149). These students studied at the Universities of Kyiv (n=184), Ternopil (n=282), Ivano-Frankivsk (n=276), Lviv (n=752), and Lutsk (n=125). The study additionally used a short sociodemographic questionnaire, referring to such variables as age, gender, place of residence, marital status, religion, interaction with disabled people in everyday life, and general subjective attitude toward people with physical disabilities. The vast majority of respondents indicated that they had contact with a person with a physical disability (n=1432 [88.4%]). Full sociodemographic characteristics of the group are presented in Table 1.

Table 1. Sociodemographic characteristics of the sample (N=1619)

Variable	M/N	SD/%
Age	20.2	3.06
Gender		
Male	399	24.6
Female	1220	75.4
University major		
Faculty of medicine	894	55.2
Humanities and social sciences	576	35.6
Student-athletes	149	9.2
Year of study		
I	471	29.1
II	345	21.3
III	333	20.6
IV	223	13.8
V	158	9.8
VI	89	5.5
Place of residence		
Rural areas or towns	219	13.5
Urban areas (cities with over 200,000 residents)	1400	86.5

Table 1. contd.

Variable	M/N	SD/%
Marital status		
Married	125	7.7
Single	1494	92.3
Do you deal with people with physical disabilities on a daily basis?	187	11.6
Religion		
Catholic	389	24.0
Greek-Catholic	39	2.4
Protestant	45	2.8
Orthodox	707	43.7
I don't belong to any faith community	419	25.9
General attitude toward people with disabilities (1 – very negative; 9 – very positive)	8.34 (Me=9)	1.2

Note: M – mean; N – number of observations; SD – standard deviation, Me – median

Tool

The structure of the MAS-UA is consistent with the original MAS [8]. The scale consisted of three subscales corresponding to the classic components of attitudes: emotional, cognitive, and behavioral (34 items in total). Each subscale contained a list of emotions (16 items), ideas and beliefs (10 items), and behaviors (8 items). As in the original, there is a vignette and a description of a scenario of an accidental and forced meeting in a cafe between able-bodied people (their names are Mary/Bogdan and a person in a wheelchair). The respondents are asked to evaluate the likelihood that Mary/Bogdan might have different attitudes in this situation. They expressed their own emotions, thoughts, and behaviors in particular circumstances. The responses were given on a 5-point Likert scale, from 1 (meaning "not at all") to 5 (meaning "very much"). When interpreting the results, a key was used in which positive items require reverse coding. As in the original, higher scores meant more negative attitudes toward people with disabilities.

The study was conducted online. Each respondent gave their informed consent to participate in the research (they checked this option before completing the online questionnaire). The ethical approval for original data collection was provided by the Ethics Committee of the Medical University of Białystok (APK 002.233.2023). All aspects of the research were in line with the principles of the Declaration of Helsinki [21].

Statistical analysis

All analyses were conducted using R, Version 3.3.2 (R Core Team, 2016). To assess the structure of the MAS scale, factor analysis of the principal components and varimax rotation with Kaiser normalization was conducted. Next, exploratory factor analysis (EFA) was carried out to clarify the factor structure of the MAS-UA using the promax rotation of the base package and the *fa* function of the psych package. Items to be removed were identified on the basis of low loading (< 0.5) or cross-loading (> 0.3). The EFA was repeated until none of the items were removed. The reliability of the tool and its subscales was assessed for the entire group of respondents using Cronbach's alpha coefficient, both for the individual subscales and for the overall score. Additional statistical analyses were conducted using the Statistica 13.Pl package.

The normality of distributions was verified using the Shapiro–Wilk test. Due to the non-normal distribution, descriptive statistics (arithmetic mean, standard deviation, median, and minimum/maximum) were used for each subscale of the questionnaire. An analysis of selected sociodemographic variables (gender) was conducted using the non-parametric Mann–Whitney test. Statistical significance was set at a *p-value*<0.05.

Results

Because different language versions of the MAS scale have different factor structures, the analysis of the Ukrainian version began with a determination of the number of subscales. The factor analysis, based on the principal component analysis, showed that the MAS-UA has a 5-factor structure (as with the original version) [15], explaining 62.6% of the total variance. The factor analysis was supplemented with varimax rotation with Kaiser normalization for uncorrelated factors. The number of assigned factors was confirmed by randomization and other criteria for the number of factors described in the literature [22–24]. Since the parallel analysis suggested a 5-factor structure, we conducted EFA for the five-factor model (Figure 1).

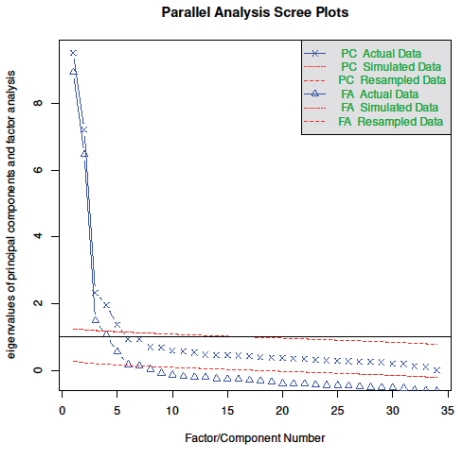

Figure 1. A screen plot yielding the MAS-UA's 5-factor structure

In contrast to the initial version of the tool, which included three classic dimensions of attitudes, the results of the factor analysis justified distinguishing a total of five factors. The first three were scales corresponding to the main factors. The first one is "Cognitions" (C), the second is "Negative affects" (NA), and the third is "Behaviors" (B). The attitude of cognition was provided in items **17** through **26**, while behavior was provided in items **27** through **32**. The attitude of affect was divided into two subscales: negative affects (items **1–5** and **9–16**) and items **6**, **7**, and **8**, which are concentrated in the factor called by the authors of some linguistic adaptations "Calm" (E) [15]. Items **33** and **34** provided the structure for the fifth factor, "Desire to communicate" (P-B, Table 2).

Table 2. Factor loadings in each subscale score using exploratory factor analysis and descriptive statistics

Item	Factors					M±SD	Me (Q_{25}–Q_{75})
	Cognitions (C)	Negative affects (NA)	Calm (E)	Behaviors (B)	Desire to communicate (P–B)		
Tension (1)	0.05	**–0.29**	–0.04	0.05	–0.07	3.7±1.16	4.0 (3–5)
Stress (2)	0.07	**–0.24**	0.02	0.02	0.07	4.3±0.99	5.0 (4–5)
Helplessness (emotion 3)	0.06	**–0.27**	–0.03	0.12	0.03	4.0±1.14	4.0 (3–5)
Nervousness (4)	0.08	**–0.24**	0.03	0.01	0.09	1.7±1.0	1.0 (1–2)
Shame (emotion 5)	0.05	**–0.30**	–0.10	0.12	–0.15	2.6±1.22	2.0 (2–3)
Relaxation (6) *	–0.14	0.03	**0.50**	0.20	0.09	2.3±1.21	2.0 (1–3)
Serenity (7) *	–0.12	0.00	**0.53**	0.16	0.09	2.3±1.22	2.0 (1–3)
Calmness (8)*	–0.18	0.09	**0.51**	0.17	–0.01	2.8±1.32	3.0 (2–4)
Depression (9)	0.06	**–0.21**	0.06	0.15	0.10	1.8±1.04	1.0 (1–2)
Fear (10)	0.04	**–0.29**	–0.05	0.18	–0.03	2.2±1.15	2.0 (1–3)
Upset (11)	0.08	**–0.28**	0.01	0.10	0.08	1.9±1.07	1.0 (1–3)
Guilt (emotion 12)	0.04	**–0.26**	0.02	0.16	–0.04	1.9±1.12	1.0 (1–3)
Shyness (13)	0.06	**–0.26**	0.02	0.10	0.06	1.8±1.08	1.0 (1–2)
Pity (emotion 14)	–0.10	**–0.18**	–0.05	0.30	–0.30	3.4±1.28	3.0 (2–5)
Disgust (emotion 15)	0.02	0.01	0.01	–0.01	–0.01	1.4±0.72	1.0 (1–1.5)
Alertness (16)	0.07	**–0.23**	0.05	0.08	0.10	1.8±1.07	1.0 (1–2)
He/she seems to be an interesting guy/girl. (17)*	**–0.27**	–0.07	–0.01	–0.04	0.06	2.3±1.18	2.0 (1–3)
He/she looks like an OK person. (18)*	**–0.27**	–0.07	–0.05	–0.05	0.00	4.1±1.11	4.0 (3–5)
We may get along really well. (19)*	**–0.28**	–0.07	–0.06	–0.07	0.05	1.9±1.10	2.0 (1–3)
He/she looks friendly. (20)*	**–0.27**	–0.08	–0.07	–0.08	0.04	1.9±1.08	2.0 (1–3)
I enjoy meeting new people. (21)*	**–0.29**	–0.08	–0.07	–0.07	0.14	2.1±1.23	2.0 (1–3)
He/she will enjoy getting to know me. (22)*	**–0.28**	–0.08	–0.03	–0.10	0.23	2.4±1.20	2.0 (1–3)
I can always talk with him/her about things that interest both of us. (23)*	**–0.29**	–0.05	–0.02	–0.08	0.07	1.9±1.11	2.0 (1–3)
I can make him/her feel more comfortable. (24)*	**–0.26**	–0.08	–0.08	–0.03	0.02	1.9±1.11	2.0 (1–3)
Why not get to know him/her better? (25)*	**–0.30**	–0.08	–0.07	–0.05	0.11	2.1±1.20	2.0 (1–3)
He/she will appreciate it if I start a conversation. (26)*	**–0.23**	–0.12	–0.11	–0.08	0.22	2.4±1.27	2.0 (1–3)
Move away (27)	0.08	–0.17	0.12	**–0.30**	0.02	1.7±0.96	1.0 (1–2)
Get up and leave (28)	0.08	–0.13	0.15	**–0.30**	0.09	1.5±0.86	1.0 (1–2)
Read the newspaper or talk on a cell phone (29)	0.08	–0.16	0.15	**–0.36**	–0.03	1.8±0.99	2.0 (1–2)

Table 2. contd.

Item	Factors					M±SD	Me (Q_{25}–Q_{75})
	Cognitions (C)	Negative affects (NA)	Calm (E)	Behaviors (B)	Desire to communicate (P–B)		
Continue what he/she was doing (30)	–0.04	–0.10	0.20	**–0.35**	–0.52	2.9±1.23	3.0 (2–4)
Find an excuse to leave (31)	0.10	–0.18	0.16	**–0.35**	–0.03	1.8±1.03	2.0 (1–2)
Move to another table (32)	0.10	–0.13	0.13	**–0.27**	0.12	1.5±0.85	1.0 (1–2)
Initiate a conversation if he/she does not make the first move (33)*	–0.21	–0.06	0.02	–0.02	**–0.50**	2.6±1.24	2.0 (2–3)
Start a conversation (34)*	–0.23	–0.03	–0.03	0.06	**–0.36**	2.3±1.16	2.0 (1–3)

Note: Primary factor loadings are shown in bold. Parentheses show the original item number.

* Reverse-coded items.

The MAS-UA (34 items) was characterized by a very high measurement accuracy (general reliability indicator using Cronbach's α=0.806), which indicates satisfactory reliability. Also, the individual subscales measuring the components of the attitude toward people with disabilities were characterized by high measurement accuracy – each of the scales (except for the subscale Negative affects) had a value exceeding α=0.814. Correlations between factors are presented in Table 3.

Table 3. Correlations between subscale scores

Variables	Cognitions (C)	Negative affects (NA)	Calm (E)	Behaviors (B)
Negative affects	–0.012			
Calm	–0.24*	–0.074*		
Behaviors	0.06*	0.349*	0.371*	
Desire to communicate	0.465*	0.066*	–0.158*	0.269*

* $p<0.001$.

This procedure shows that the internal structures of the MAS-UA subscales are very similar to the original version. A weak negative correlation was found between the subscales of Cognitions and Calm (r=–0.240, $p<0.001$) and a positive correlation between Cognitions and Desire to communicate (r=0.465, $p<0.001$). Average positive correlations were identified between Negative affects and Behaviors (r=0.349, $p<0.001$) and between Behaviors and Calm (r=0.371, $p<0.001$), and a weak correlation between Behaviors and Desire to communicate (r=0.269, $p<0.001$). No correlations were found for the other pairs ($r<0.1$, $p>0.05$). The correlation coefficients indicate that the factors represent characteristic dimensions of the attitude toward people with physical disabilities.

To determine the convergent validity of the MAS-UA, the relationship was analyzed with a self-assessment of attitudes toward people with disabilities. The results indicated that the MAS-UA correlates well with the results of the self-assessment (Table 4).

Table 4. The relationship between the MAS-UA and the self-assessment of attitudes toward people with disabilities (Pearson's correlation coefficient [r], $p<0.01$)

Variable	Cognitions (C)	Negative affects (NA)	Calm (E)	Behaviors (B)	Desire to communicate (P–B)	Global score
Attitude toward people with disabilities (self-assessment)	–0.283	–0.154	0.095	–0.230	–0.151	–0.311

Given the above, we can conclude that the questionnaire is an independent and specific tool for measuring the complex phenomenon of attitudes toward people with physical disabilities.

The final stage of the analysis was to check the MAS-UA's results in the context of selected sociodemographic variables (i.e., age and gender). Age had no significant influence on the global score or individual subscales of the MAS-UA. The average number of points obtained by the students in the global MAS-UA score was 79.3±11.96 (Table 5).

The analysis of gender revealed statistically significant differences between the cognitive, behavioral, and global scores. This means that women had a more positive attitude toward people with physical disabilities. Men scored significantly higher, which indicates more negative attitudes (apart from both emotional factors) toward people with physical disabilities.

Table 5. Basic distribution of MAS-UA scores in the survey (N=1619)

MAS-UA	M±SD	Me	Standardized mean	Me	Q_{25}–Q_{75}	Min–Max	Male (N=399)	Female (N=1220)	Mann–Whitney test	
							M±SD (Me)		Z	*p*
Cognitions (C)	23.2±7.78	22.0	2.32	22.0	17–29	10–48	25.4±7.84 24.0	22.5±7.62 21.0	–6.948	<0.001
Negative affects (NA)	32.5±5.31	32.0	2.50	32.0	28–36	21–54	32.4±5.13 31.0	32.5±5.37 32.0	0.117	0.91
Calm (E)	7.4±3.19	7.0	2.48	7.0	5–9	3–15	7.2±2.98 7.0	7.5±3.26 7.0	1.366	0.17
Behaviors (B)	11.3±4.33	10.0	1.88	10.0	8–14	6–30	12.1±4.41 11.0	11.0±4.27 10.0	–4.555	<0.001
Desire to communicate (P–B)	4.9±2.21	4.0	2.43	4.0	3–6	2–10	5.4±2.09 6.0	4.7±2.22 4.0	–5.704	<0.001
Global score	79.3±11.96	78.0	2.33	78.0	70–87	51–124	82.4±11.43 83.0	78.2±12.0 77.0	–6.425	<0.001

Note: M – mean; SD – standard deviation; Me – median; Q_{25}–Q_{75} – interquartile range.

Discussion

The exclusion from social interactions of people with disabilities increases social distance, a sense of shame, and even fear of direct contact with such people. For the inhabitants of Ukraine, this topic is particularly important due to the current military operations, which increase the risk of disability [25]. Therefore, the authors recommend initiating activities, projects, and ventures aimed at raising awareness in society of the problems of people with disabilities [20]. This study aimed to develop and adapt the MAS-UA questionnaire as a useful tool for studying the attitudes of Ukrainian students toward people with physical disabilities in wheelchairs. After the back-translation of the original English version of the MAS [26] into Ukrainian, factor analysis and EFA were conducted to examine the factor structure and reliability of the tool using a sample of 1619 students from five Ukrainian cities. Due to the minimal number of respondents with similar answers, none of the respondents was excluded from the analysis. In a similar study, Japanese authors excluded 118 out of 670 subjects who had given the same answers to all J-MAS questions [27]. This phenomenon was not observed in our study.

So far, several attempts have been made to adapt the MAS to measure attitudes toward specific disabilities. In most population studies, the language versions showed a three- or four-factor structure [19]. At first glance, the structure of our MAS-UA seems to differ from the original version of the MAS developed [8]. When the questionnaire was verified, however, the five-factor structure was confirmed to comply with the original version [18]. Later, the authors of the original version also proposed a 5-factor model [8]. On the other hand, some studies suggested a different approach to the MAS domains, e.g., four factors or dividing the emotional aspect into positive and negative affects [28]. In the research of Serbian scientists, each of the three classic scales was additionally divided into two subscales, called "Negative affects 1" and "Negative affects 2" in the affect subscale, "Positive cognitions" and "Disturbing cognitions" in the cognition subscale, and "Approaching behaviors" and "Avoidant behaviors" in the behavior subscale. In a French study, the 4-factor model for measuring attitudes toward people with autism showed satisfactory internal consistency for the entire scale (α=0.79). In a Polish study [20], an attempt was made to use a 3-factor model to assess general attitudes toward people with disabilities and people with motor, intellectual, and sensory disabilities. Recently, scientists from Germany, South Korea, and Japan used factor analysis to show a better fit of a 4-factor model [26,27,29]. The study of the MAS-UA in terms of selected socio-geographical variables confirmed that the questionnaire is a fairly good tool that can be applied to the Ukrainian population. This allows for a comparison of the results with the outcomes of international studies using the MAS scale [30–32].

Higher MAS scores reflect more negative attitudes. The authors of the original version found that the most negative attitudes toward people with disabilities concerned the cognitive component, and the least negative were in the behavioral component. In our study, the highest values were achieved for the emotional dimension (Negative affects and Calm), followed by the subscales Desire to communicate, Cognitions, and Behaviors. Similar results were reported in the Greek version of the scale [33] and in other European studies. The MAS-UA adaptation aimed to study attitudes toward people with disabilities in wheelchairs.

Research into the MAS, including the original version, did not study the level of public reception. For instance, the MAS scale was used to examine "how

students perceive the effects of volunteering with adults with developmental disabilities." The study results showed significant positive changes in the students' attitudes [34]. The MAS's structure uses the mechanism of projection to avoid dishonest answers: the respondent is asked to assess how an abstract character (and not him-/herself) feels, thinks, and behaves in contact with people with disabilities, thus projecting his/her own mental states [34]. We hope that the results of our research, together with the outcomes of the MAS adaptation from other countries, will encourage researchers to further modify the tool using data collected in other social groups. This may help promote the rights of people with disabilities around the world [32]. The results reveal a need to plan and undertake educational activities to familiarize young people with various aspects of disabled persons' functioning, which may contribute to changing attitudes toward this social group [35]. The adapted version of the scale (MAS-UA) was well received by the students because the questions were understandable and short, and the average time required to complete the scale was 15–20 minutes. The results obtained in the subscales were easy to interpret, and therefore, this was a useful tool for assessing attitudes toward people with physical disabilities. It is very difficult to change the attitudes of mature people, but if the modification is continuous and begins at an early age, positive attitudes will prevail. Students can contribute to the elimination of harmful stereotypes in society, creating equal opportunities for all.

Limitations

The tool was tested on university students. The original version and most other adaptations were also evaluated on samples of students. However, the specificity of this population should be taken into account; there is a need to conduct comparative research among other social groups. The sample of respondents was dominated by women and medical students. In the future, the impact of the respondent's gender and field of study on their attitudes toward people with disabilities would be worth studying more thoroughly. The strength of the study was that a summary of key findings was presented to the staff of the universities involved in the research.

Conclusions

To sum up, the adaptation of the MAS and the determination of psychometric properties of the Ukrainian version of the tool (MAS-UA) revealed that the parameters of the instrument are satisfactory for the assessment of a student's attitudes toward people with disabilities in wheelchairs.

The results of the EFA described the MAS-UA model, which consisted of five subscales (dimensions of the attitude) Positive Cognitions, Negative Affects, Behaviors, Calm, and Desire to communicate. It was also possible to determine the overall score, which was the sum of the individual scores.

Regardless of the limitations discussed above, the MAS-UA questionnaire can be used for the initial analysis of individual and group attitudes toward people with physical disabilities. The MAS-UA provides the opportunity to conduct an in-depth analysis that takes into account a number of additional factors related to the structure and functions of the tool and associates them with the specificity of attitudes toward people with disabilities (Appendix). The use of the MAS-UA will help to understand how attitudes are created and maintained and how they can be modified. The scale can be applied as an initial assessment tool when developing educational programs, including training and social policy projects, and in evaluating the effectiveness of these programs.

Appendix [8]

Multidimensional Attitudes Scale Toward Persons with Disabilities (MAS)

***Vignette*:**

"Imagine the following situation. Joseph/Michelle went out for lunch with some friends to a coffee shop. A man/woman in a wheelchair, with whom Joseph/Michelle is not acquainted, enters the coffee shop and joins the group.

Joseph/Michelle is introduced to this person, and shortly thereafter, everyone else leaves, with only Joseph/Michelle and the man/woman in the wheelchair remaining alone together at the table. Joseph/Michelle has 15 minutes to wait for his/her ride. Try to imagine the situation."

People experience a variety of emotions when they are involved in such a situation. In the next column is a list of possible emotions, which may arise before, during, and/or after such a situation. Please rate on each line the likelihood that this emotion might arise in Joseph/Michelle.

Affect	**Degree of likelihood**				
	Not at all				**Very much**
1. Tension	1	2	3	4	5
2. Stress	1	2	3	4	5
3. Helplessness	1	2	3	4	5
4. Nervousness	1	2	3	4	5
5. Shame	1	2	3	4	5
6. Relaxation	1	2	3	4	5
7. Serenity	1	2	3	4	5
8. Calmness	1	2	3	4	5
9. Depression	1	2	3	4	5
10. Fear	1	2	3	4	5
11. Upset	1	2	3	4	5
12. Guilt	1	2	3	4	5
13. Shyness	1	2	3	4	5
14. Pity	1	2	3	4	5
15. Disgust	1	2	3	4	5
16. Alertness	1	2	3	4	5

People experience a variety of cognitions when they are involved in such a situation. Following is a list of possible thoughts that may arise before, during, and/or after such a situation. Please rate on each line the likelihood that this cognition might arise in Joseph/Michelle:

Cognition	**Degree of likelihood**				
	Not at all				**Very much**
1. He/she seems to be an interesting guy/girl.	1	2	3	4	5
2. He/she looks like an OK person.	1	2	3	4	5
3. We may get along really well.	1	2	3	4	5
4. He/she looks friendly.	1	2	3	4	5
5. I enjoy meeting new people.	1	2	3	4	5
6. He/she will enjoy getting to know me.	1	2	3	4	5
7. I can always talk with him/her about things that interest both of us.	1	2	3	4	5
8. I can make him/her feel more comfortable.	1	2	3	4	5
9. Why not get to know him/her better?	1	2	3	4	5
10. He/she will appreciate it if I start a conversation.	1	2	3	4	5

People experience a variety of behaviors when they are involved in such a situation. Following is a list of possible behaviors that may arise before, during, and/or after such a situation. Please rate on each line the likelihood that Joseph/Michelle would behave in the following manner:

Behavior	**Not at all**				**Very much**
1. Move away	1	2	3	4	5
2. Get up and leave	1	2	3	4	5
3. Read the newspaper or talk on a cell phone	1	2	3	4	5
4. Continue what he/she was doing	1	2	3	4	5
5. Find an excuse to leave	1	2	3	4	5
6. Move to another table	1	2	3	4	5
7. Initiate a conversation if he/she doesn't make the first move	1	2	3	4	5
8. Start a conversation	1	2	3	4	5

References

1. Skuban-Eiseler T, Orzechowski M, Steger F. Access to healthcare for disabled individuals: an analysis of judgments of the European Court of Human Rights from an ethical perspective. Front Public Health 2023; 10: 1015401. Doi: 10.3389/fpubh.2022.1015401.
2. United Nations General Assembly. Resolution 61/106. Convention on the Rights of Persons with Disabilities [online] 2006 Dec [cited 03.06.2023]. Available from URL: https://www.un.org/disabilities/documents/convention/convention_accessible_pdf.pdf.
3. World Health Organization and The World Bank. World Report on Disability [online] 2011 Dec [cited 05.2023]. Available from URL: https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/world-report-on-disability.
4. Myronyuk IS, Slabkiy GO, Kabatsiy NO, Levko LV. Dynamics of the number of persons with special needs living in zakarpattia oblast, Ukraine. Wiad Lek 2020; 73(6): 1261–1263.
5. Golyk V, Syvak O, Grabljevec K, Tederko P, Gutenbrunner C, Nugraha B. Five years after development of the national disability, health and rehabilitation plan for Ukraine: achievements and challenges. J Rehabil Med 2021; 53(3): 00160.
6. Kyrychenko A, Tomakh N, Khanyukova I, Sanina N. Analysis of disability and rehabilitation needs of the anti-terrorist operation/joint forces operation participants in Ukraine. Georgian Med News 2022; 333: 77–85.
7. Alahmari KA, Rengaramanujam K, Reddy RS, et al. Effect of disability-specific education on student attitudes toward people with disabilities. Health Educ Behav 2021; 48(4): 532–539.
8. Findler L, Vilchinsky N, Werner S. The multidimensional attitudes scale toward persons with disabilities (MAS) construction and validation. Rehabil Couns Bull 2007; 50(3): 166–176.
9. Stickley A, Kondo N, Roberts B, et al. Disability and psychological distress in nine countries of the former Soviet Union. Journal Aff Dis 2021; 292: 782–787.
10. Satchidanand N, Gunukula SK, Lam WY, et al. Attitudes of healthcare students and professionals toward patients with physical disability: a systematic review. Am J Psych Med Rehabil 2012; 91(6): 533–545.
11. Kang TS, Goodwin R, Hamama-Raz Y, Leshem E, Ben-Ezra M. Disability and post-traumatic stress symptoms in the Ukrainian general population during the 2022 Russian invasion. Epidemiol Psychiatr Sci 2023; 32: e21.
12. Clarke PM, Gregory R, Salomon JA. Long-term disability associated with war-related experience among Vietnam veterans: retrospective cohort study. Med Care 2015; 53(5): 401–408.
13. Summers A, Leidman E, Pereira Figueira Periquito IM, Bilukha OO. Serious psychological distress and disability among older persons living in conflict affected areas in eastern Ukraine: a cluster-randomized cross-sectional household survey. Conf and Health 2019; 13: 10.
14. Mardini R. Persons with disabilities in armed conflicts: from invisibility to visibility. Intern Rev of the Red Cross 2023; 105 (922): 1-4.
15. Vilchinsky N, Findler L, Werner S. Attitudes toward people with disabilities: the perspective of attachment theory. Rehab Psych 2010; 55(3): 298–306.
16. Tomczyszyn D, Pańczuk A, Szepeluk A. Attitudes of students of social sciences and humanities towards people with physical disabilities (MAS-PL). Int J Env Res and Publ Health 2022; 19(3): 1544.
17. Rodríguez Martín A, Álvarez Arregui E. Development and validation of a scale to identify attitudes towards disability in higher education. Psicothema 2013; 25(3): 370–376.
18. Lu MH, Pang FF, Luo J. Chinese validation of the multidimensional attitude scale toward persons with disabilities (MAS): attitudes toward autism spectrum disorders. J Autism and Devel Dis 2020; 50(10): 3777–3789.
19. Dachez J, Ndobo A, Ameline A. French validation of the multidimensional attitude scale toward persons with disabilities (MAS): the case of attitudes toward autism and their moderating factors. J Aautism and Devel Dis 2015; 45(8): 2508–2518.
20. Domagała-Zyśk E, Byra S. Multidimensional scale of attitudes towards people with disabilities - testing the psychometric properties of the Polish version. Studies on the Theory of Education 2022; 13(3(40)): 219-238.
21. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA 2013; 310(20): 2191-2194.
22. Horn JL. A rationale and test for the number of factors in factor analysis. Psychometr 1965; 30: 179-185.
23. Humphreys LG, Montanelli RG. An investigation of the parallel analysis criterion for determining the number of common factors. Mult Behav Res 1975; 10: 193-205.
24. Revelle W, Rocklin T. Very simple structure: an alternative procedure for estimating the optimal number of interpretable factors. Multivariate Behav Res 1979; 14(4): 403–414.
25. Javanbakht A. Addressing war trauma in Ukrainian refugees before it is too late. Eur J Psychotraumatol 2022; 13(2): 2104009.
26. Lu J, Kim KH. Understanding self-report multidimensional attitudes scale toward people with disabilities: an exploratory analysis. Reha Psychol 2017; 62(2): 110–118.
27. Tsujita M, Ban M, Kumagaya S. The Japanese multidimensional attitudes scale toward persons with autism spectrum disorders. Japanese Psychol Res 2020; 63 (3): 129–139.
28. Dragojević N, Milaĉić-Vidojević I, Hanak N. Structure and attitude correlates of social attitudes toward people with physical impairments. Book of Summaries of First International Conference „Special Education and Rehabilitation – Science and/or Practice". Novi Sad: Society of Special Educators and Rehabilitators of Vojvodina; 2010.
29. Wöhrle J, Franke S, Kissgen R. The German multidimensional attitude scale toward persons with disabilities (G-MAS):

a factor analytical study among high-school students. Reha Psychol 2018; 63(1): 83–91.
30. Yelpaze İ, Türküm AS. Adaptation and validation of Turkey version of multidimensional attitudes toward persons with disabilities. OPUS-Internat J of Soc Res 2018; 8(14): 167–187.
31. Stevens LF, Getachew MA, Perrin PB, Rivera D, Olivera Plaza SL, Arango-Lasprilla JC. Factor analysis of the Spanish multidimensional attitudes scale toward persons with disabilities. Rehab Psychol 2013; 58(4): 396–404.
32. Radlińska I, Starkowska A, Kożybska M, Flaga-Gieruszyńska K, Karakiewicz B. The multidimensional attitudes scale towards persons with disabilities (MAS) - a Polish adaptation (MAS-PL). An Agri Env Med 2020; 27(4): 613–620.
33. Govina O, Polikandrioti M, Vasilopoulos G, et al. Validation with nursing students of the Greek version of the multidimensional attitudes scale (MAS) towards people with disabilities. Archives of Hellenic Medicine/Arheia Ellenikes Iatrikes 2020; 37.
34. Kropp JJ, Wolfe BD. College students' perceptions on effects of volunteering with adults with developmental disabilities. J Hig Educ Outr Engag 2018; 22(3): 93–118.
35. Chimicz D. Postrzeganie osób z niepełnosprawnością przez uczniów szkoły podstawowej. Przemiany w rezultacie oddziaływań edukacyjnych. [The perception of people with disabilities by elementary school students. Transformation as a result of educational activities]. Lubelski Rocznik Pedagogiczny 2017; 36 (2): 149-169. (In Polish).

Word count: 5041 • Tables: 5 • Figures: 1 • References: 35

Sources of funding:
The research was funded by the authors.

Conflicts of interests:
The authors report that there were no conflicts of interest.

Cite this article as:
Szpakow A, Kowalczuk K, Baj-Korpak J, Sokołowska D, Antonova-Rafi Y, Khudetskyy I, Detsyk O, Hryshchuk M, Fedorciv O, Bazylevych A, Hdyrya O, Vilchynskaya L.
Multidimensional attitudes scale toward persons with disabilities: factor and exploratory analysis for a Ukrainian version (MAS-UA)
Med Sci Pulse 2023;17(4):56–66. DOI: 10.5604/01.3001.0054.3235.

Corresponding author:
Andriej Szpakow
Email: shpakofff@tut.by
Department of Integrated Medical Care,
Faculty of Health Sciences,
Medical University of Bialystok,
Jana Kilińskiego 1, 15-089 Białystok, Poland

Other authors/contact:
Krystyna Kowalczuk
Email: krystyna.kowalczuk@umb.edu.pl

Yuliya Antonova-Rafi
Email: antonova-rafi@ukr.net

Joanna Baj-Korpak
Email: j.baj-korpak@dyd.akademiabialska.pl

Dorota Sokołowska
Email: dorota.sokolowska@wsfiz.edu.pl

Igor Khudetskyy
Email: igorkhudetskyy@gmail.com

Oryna Detsyk
Email: oryna.detsyk@gmail.com

Mariia Hryshchuk
Email: oryna.detsyk@gmail.com

Olga Fedortsiv
Email: fedortsivolga@gmail.com

Andriy Bazylevych
Email: ohdyrya@ukr.net

Oksana Hdyrya
Email: ohdyrya@ukr.net

Liudmila Vilchynskaya
Email: liudmila.vilchynskaya@gmail.com

Received: 24 November 2023
Reviewed: 24 January 2024
Accepted: 30 January 2024