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ORIGINAL ARTICLE

Sociodemographic Determinants of University Students' Attitudes Toward Wheelchair Users: A Cross-Sectional Study in Nine Eastern European Countries

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Abstract

Background Public attitudes toward people with disabilities (PwD) shape inclusion, healthcare access, and social participation. Although attitudes have improved, stereotypes and implicit biases persist. Intergroup contact is linked to more positive attitudes, yet its frequency and quality vary. In Eastern Europe, the ongoing war in Ukraine may directly or indirectly influence disability-related attitudes, as mobility impairments increase and societal exposure to disability changes.

Methods We conducted a multi-country cross-sectional study of 8593 university students from nine Eastern European countries using the Multidimensional Attitudes Scale toward Persons with Disabilities (MAS). We assessed cognitive, affective, and behavioral components of attitudes, alongside sociodemographic factors and contact with wheelchair users. Nonparametric tests and Spearman's ρ were used to examine between-country differences and correlates. Higher MAS scores indicate more negative attitudes.

Results MAS global and subscale scores differed significantly across countries. More frequent and higher-quality contact with wheelchair users was associated with less negative attitudes, though effect sizes were generally small. Several sociodemographic variables (e.g., gender, place of upbringing, field of study, religiosity) showed significant, albeit modest, associations with MAS subscales. Cross-national variation was pronounced: global MAS means ranged from 74.3±18.2 (Ukraine) to 92.3±16.6 (Serbia), with a significant between-country effect (Kruskal–Wallis $H = 650$, $p < 0.001$).

Conclusions Cross-national differences in students' attitudes toward wheelchair users are substantial and broadly consistent with intergroup contact theory. In conflict-affected settings (e.g., Ukraine), rising visibility of disability and shifting contact patterns may further influence attitudes. Interventions that foster meaningful, high-quality contact and inclusive practices in educational environments may help mitigate negative attitudes and promote social inclusion.

Keywords University students · Wheelchair users · Disability attitudes · Social inclusion · Eastern Europe · Cross-sectional study

Abbreviations

MAS	The Multidimensional Attitudes Scale toward Persons with Disabilities
BY	Belarus
LT	Lithuania
ME	Montenegro
PL	Poland
RS	Serbia
SK	Slovakia
TR	Turkey
UA	Ukraine
CZ	Czech Republic

Background

The integration of individuals with disabilities, particularly wheelchair users into society is an increasingly significant issue in light of current regional and global challenges

Extended author information available on the last page of the article

(Smith et al. 2016; Saia et al. 2024). As societies navigate crises such as climate change, pandemics, and armed conflicts ensuring access to basic services and public spaces for people with disabilities has become a priority (Pineda and Corburn 2020; Zaviršek and Cox 2024). Public perceptions of this group significantly influence their quality of life, including access to education, employment, and broader societal participation (Collins et al. 2021). According to Eurostat Statistics Explained. Disability (activity limitation) statistics for the EU, 27% of the EU population over the age of 16 reports experiencing various forms of disabilities (Eurostat Statistics Explained 2024), underscoring the need to address their social integration. Alarmingly, in 2019, 44% of EU citizens reported prevalent discrimination against people with disabilities within their countries (European Commission 2021). Assessing social attitudes toward individuals with limited mobility who use wheelchairs is a complex challenge requiring ongoing monitoring and analysis. A holistic approach is necessary, incorporating inclusive education and enhanced access to rehabilitation, healthcare, and social services (Jain 2024).

Research indicates that attitudes toward wheelchair users vary across cultural and social contexts (Babik and Gardner 2021). While some nations have made significant progress in integration, others continue to struggle with stereotypes and prejudice. Western European countries have historically prioritized facilitating the inclusion of people with disabilities, whereas Eastern Europe remains relatively behind in these efforts (Papuda-Dolińska 2012; Barlak and Czekalski 2014).

Understanding and addressing the mechanisms that shape social attitudes are critical tasks for researchers and policymakers working toward more inclusive societies. As tolerance and societal norms evolve, particularly in Eastern Europe, investigating attitudes toward people with disabilities remains a timely area of study (Freer 2021; GUS 2023). This research gains further relevance amid regional and global transformations, such as the ongoing armed conflict in Ukraine (The Lancet 2023). Early reports point to a growing number of people with mobility impairments and changing social exposure to disability in Ukraine, which may influence public attitudes and contact patterns regionally (Patwary et al. 2023; Kienzler et al. 2022). The new paradigm should account both for the socio-cultural specificities of the region and the changing perceptions of people with disabilities as a result of social transformation, as well as the impact of socio-demographic and crisis-related factors (Crawley et al. 2022).

Meeting the needs of people with disabilities requires equipping healthcare, education, and other professionals with targeted knowledge, resources, and skills. This ensures they can address the specific challenges faced by this population (Sargazi et al. 2024). Reviews of disability-related education in healthcare highlight existing training gaps that may negatively impact societal acceptance of people with disabilities (Gréaux 2023). Misconceptions about individuals with disabilities often stem from insufficient information and limited direct interaction (Pettigrew and Tropp 2006; Freer 2021).

Students, as future professionals in fields such as medicine, physiotherapy, and education, play a pivotal role in shaping public opinion on disability inclusion. They often demonstrate more inclusive attitudes toward people with disabilities in comparison to other social groups, driven by their adaptability and openness to reevaluating stereotypical views (Sinha et al. 2024). Negative stereotypes frequently result from a lack of knowledge or interaction, emphasizing the importance of exploring students' perceptions of inaccessible environments and their views of wheelchair users (Han et al. 2023). Social attitudes toward individuals with disabilities serve as a barometer for a society's maturity and humanism (Gazdulska 2008).

Sociocultural and geopolitical realities necessitate adopting new research paradigms that account for the dynamic transformations occurring in global society (Kienzler et al. 2022). In this context, multi-center studies provide valuable insights into the complex issues surrounding societal attitudes toward individuals with disabilities across a variety of countries (Radlińska et al. 2020; Tomczyszyn et al. 2022a). The Multidimensional Attitudes Scale toward Persons with Disabilities (MAS) (Findler et al. 2007; Vilchinsky 2010) has emerged as an effective tool for assessing these attitudes. Comparative analyses of data collected from students in various Eastern European countries can illuminate critical cultural and social differences in perceptions of people with disabilities. The Russian Federation's invasion of Ukraine has increased the number and visibility of people with disabilities, particularly those with mobility impairments, prompting a re-evaluation of integration efforts in the subregion (Patwary et al. 2023; The Lancet 2023).

This research, which examines the attitudes of students from countries of varying proximity to the conflict in Ukraine is crucial for developing strategies to support social inclusion and foster positive perceptions of people with disabilities. Such efforts are integral to promoting social justice and equality in the region (Leahy and Ferri 2023).

This study aims to analyze the attitudes of students in Eastern European countries toward wheelchair users, focusing on emotional, cognitive, and behavioral dimensions through the application of the Multidimensional Attitudes Scale toward Persons with Disabilities (MAS). The research seeks to identify sociodemographic, cultural, and social factors influencing perceptions of physical disabilities and evaluate the impact of awareness-raising initiatives. These factors underscore the importance of the topic, which demands continuous monitoring and analysis to track the evolving dynamics of these attitudes. All the aspects described in the

paper were instrumental in choosing the topic of this study, which is a key reference point for future community initiatives as well (Long and Guo 2023).

Context note: Data were collected during the ongoing war in Ukraine, which has increased the visibility of disability and opportunities for contact. This context may partly explain cross-national differences (e.g., higher daily contact in Ukraine) and should be considered when interpreting contact–attitude associations.

Materials and methodology

Study design and setting

The study, conducted between March and May 2024, focused on university students from nine countries along the eastern boundaries of the European Union: Poland, Lithuania, Belarus, Ukraine, Slovakia, the Czech Republic, Serbia, Montenegro, and Turkey. Universities from diverse regions within these countries were selected to ensure a varied research sample, enabling a comprehensive analysis and comparison of results. By engaging students from various academic disciplines, the study identified social attitudes and their connections to contemporary external challenges (such as armed conflicts, economic instability, or social inequality). Data collection took place amid the ongoing armed conflict in Ukraine, which may shape exposure to disability and the frequency/quality of intergroup contact in the region. The survey results offer valuable insights into perceptions of wheelchair users with disabilities in this region of Europe. A total of 8593 students participated in the survey, including 1131 from Belarus (BY), 694 from Lithuania (LT), 227 from Montenegro (ME), 1016 from Poland (PL), 659 from Serbia (RS), 1022 from Slovakia (SK), 1005 from Turkey (TR), 1035 from Ukraine (UA), and 1804 from the Czech Republic (CZ).

Data collection

The study employed purposive sampling, targeting both medical and nonmedical students (including those studying humanities and pedagogy). Inclusion criteria encompassed adult students enrolled at the selected universities and were contingent upon the completion of the entire questionnaire. Exclusion criteria included minors, incomplete questionnaires, and individuals not enrolled at the participating universities.

Students were invited to participate through announcements posted on institutional websites and social media platforms. In some cases, information sessions were conducted to explain the purpose of the survey and the importance of participation. Informed consent was a prerequisite for inclusion in the study. The survey was conducted online, ensuring anonymity and voluntary participation. Respondents could withdraw at any point during the survey. An international research team supervised the data collection process, and all completed questionnaires underwent statistical analysis. Institutional consent was obtained from all participating universities so that students could complete the questionnaire.

Data sources/measurement

The survey comprised two parts: (1) a proprietary sociodemographic and contextual module and (2) the standardized Multidimensional Attitudes Scale Toward Persons With Disabilities (MAS) (Findler et al. 2007; Vilchinsky 2010). The sociodemographic/contextual module captured sex/gender, age, marital status, level and field of study, religious affiliation, place of upbringing and current residence (urban/rural), as well as the degree and type of contact with wheelchair users (e.g., family member, friend, classmate, none). Where applicable, additional psychosocial variables (e.g., self-esteem) were measured using brief validated indices.

The MAS is a 34-item self-report instrument anchored in a café vignette and rated on a 5-point Likert scale (1 = not at all to 5 = very much). It yields three subscales, affective (emotional), cognitive, and behavioral, and a global score by summation. In line with original scoring, higher MAS scores indicate more negative attitudes toward persons with disabilities (Findler 2007; Radlińska 2020; Tomczyszyn et al. 2022b; Szpakow et al. 2023).

The questionnaire was administered in the national languages of all participating countries. To ensure conceptual equivalence and cultural appropriateness, we followed a standardized forward–back translation workflow consistent with Brislin's model: (a) independent forward translations by native speakers familiar with public health terminology; (b) reconciliation by a bilingual expert panel; (c) blind back-translation to English; (d) comparison with the source to resolve discrepancies; and (e) cognitive review of challenging items. Any culturally sensitive terms were harmonized across versions with item intent preserved.

A multi-country pilot test was conducted among small convenience samples of university students (approximately 10–20 per country). The pilot assessed comprehensibility, relevance, completion time, and technical functionality of the online format. Minor wording adjustments (e.g., clarifying examples or response anchors) were implemented where needed; no structural changes to the MAS were introduced. Completion of all MAS items was required by the survey logic, minimizing missingness on the primary outcome.

Scoring procedures were pre-specified. For descriptive and comparative analyses, we report means and standard deviations for the MAS global index and subscales; lower

values reflect less negativity, and higher values reflect greater negativity toward persons with disabilities.

Statistical analysis

To ensure robust comparative analysis, advanced statistical methods were applied in this study. The data was processed using Statistica v. 13.0 PL software (Tibco Inc., USA), which enabled the implementation of reliable statistical tests and the clear presentation of results. The selection of appropriate statistical tests was guided by assessing the normality of variable distributions using the Shapiro–Wilk test. Descriptive statistics included means (M), standard deviations (SD), medians (Me), minimum and maximum values, interquartile range (IQR), and percentages. Mean values and standard deviations were calculated for each of the three MAS subscales. The internal consistency of the questionnaire's factor structure was assessed by calculating Cronbach's α coefficient, yielding a value of $\alpha = 0.889$, indicating high internal consistency of the research instrument. The reliability of the subscales was also confirmed, with the following Cronbach's α values: emotional subscale $\alpha = 0.872$, cognitive subscale $\alpha = 0.941$, and behavioral subscale $\alpha = 0.790$. These results validate the internal consistency and reliability of the subscales. Group differences based on the selected variables were analyzed using the Mann–Whitney U test. For comparisons involving multiple groups, the Kruskal–Wallis test was employed. Additionally, an analysis of variance was conducted. Qualitative comparisons were evaluated using Pearson's chi-square (χ^2) test, while correlations between variables were determined using the Spearman's ρ coefficient. Statistical significance was set at $p < 0.05$, ensuring rigorous standards for the study's statistical analysis.

Ethical consideration

Ethical approval was granted by the Bioethics Committee of the Medical University of Bialystok (APK 002.233.2023) and the Bioethics Committee of I. Horbachevsky Ternopil National Medical University (Protocol No. 72, January 6, 2023). The study adhered to the principles of the Declaration of Helsinki.

Results

The study obtained 8593 fully completed questionnaires from medical and nonmedical students from nine countries. The distribution of age, gender, and other sociodemographic indicators for each study center is shown in Table 1.

The analysis of participants based on sociodemographic factors highlights notable variations. The majority of respondents were aged between 18 and 25 years, which aligns with the typical age range for students in higher education. A significant proportion of unmarried individuals (65.8%) reflects the young age of participants, which varied across countries. The lowest average age was recorded in Belarus (19.2±1.92 years), while the highest averages were observed in Poland, the Czech Republic, and Slovakia (22–24 years). Partnerships and marriages were most prevalent in the Czech Republic (59.8%) and Poland (53.8%), with an overall rate of 32.2%.

The gender distribution reveals a predominance of women across all groups, with the highest percentage in Lithuania (84.9%). Conversely, Serbia was the only country where men constituted the majority (63.9%). Most participants were undergraduate students, although Montenegro and Slovakia had a higher proportion of graduate-level students. Health sciences and related medical fields were the dominant areas of study, accounting for 70.7% of respondents.

Religious affiliations varied significantly depending on the country. Catholicism was most prevalent in Poland (63.9%), while Orthodox Christianity was dominant in Montenegro (80.2%) and Belarus (45.0%). Ukrainian respondents included notable proportions of Orthodox Christians (36.8%) and Greek Catholics (23.5%). Among Turkish participants, 89.5% identified as Muslim. Religious indifference was most common in the Czech Republic (69.6%), followed by Slovakia (28.3%) and Lithuania (26.2%).

Daily contact with wheelchair users was highest in Ukraine (66.1%) and Turkey (56.6%), indicating a country-specific influence (Table 2). In Ukraine, this likely reflects heightened societal exposure to disability during wartime, consistent with the literature on conflict-affected settings.

The lowest rate of daily contact was found in Belarus (6.8%). Frequent past contact with wheelchair users was highest in Poland (20.2%), while Montenegro reported the lowest rate (10.1%).

Scores indicating positive attitudes toward wheelchair users were highest in Ukraine and the Czech Republic (8.54 each) and in Lithuania (8.21), while the lowest scores were recorded in Montenegro and Serbia (below 8.0, $p<0.05$). A higher value indicates a better result. To avoid confusion, we report the self-assessment index and MAS outcomes separately: the self-assessment index (higher = better) and the MAS subscales/global score (higher = more negative). These results reflect generally favorable attitudes among the respondents.

In examining the relationship between the MAS scale and sociodemographic factors, the self-esteem index is a notable finding, as it exhibits strong negative correlations with the subscale scores (Table 3).

Gender demonstrated a moderate influence on MAS scores, particularly within the cognitive and behavioral subscales. Women generally exhibited more positive attitudes compared to men ($p < 0.05$). In contrast, other

Table 1 Description of the participants from nine countries

Variable		Country, *N* (%) All percentages are row percentages unless otherwise specified									Total, *N* = 8593	Chi^2 (χ^2; *p); K–W test (H, p)*
		BY, *N* = 1131; (13.2)	LT, *N* = 694; (8.1)	ME, *N* = 227; (2.6)	PL, *N* = 1016; (11.8)	RS, *N* = 659; (7.7)	SK, *N* = 1022; (11.9)	TR, *N* = 1005; (11.7)	UA, *N* = 1035; (12.0)	CZ, *N* = 1804; (21.0)		
Age, years, mean±SD; Me (IQR)		19.2±1.92; 19 (18–19)	20.7±2.78; 20 (19–21)	21.9±2.82; 22 (20–23)	24.3±6.15; 22 (20–26)	21.2±2.58; 21 (20–22)	22.6±4.67; 21 (20–23)	21.0±2.58; 21 (20–22)	20.8±3.55; 20 (19–22)	22.9±3.82; 22 (21–24)	21.7±4.07; 21 (19–23)	H=2190; *p* <0.001
Gender	Male	354 (31.3)	105 (15.1)	96 (42.3)	377 (37.1)	421 (63.9)	279 (27.3)	208 (20.7)	249 (24.1)	554 (30.7)	2643 (30.8)	χ^2= 528; *p* <0.001
	Female	777 (68.7)	589 (84.9)	131 (57.7)	639 (62.9)	238 (36.1)	743 (72.7)	797 (79.3)	786 (75.9)	1250 (69.3)	5950 (69.2)	
Studies, cycle	I	1117 (98.8)	499 (71.9)	204 (89.9)	884 (87.0)	633 (96.1)	976 (95.5)	797 (79.3)	699 (67.5)	1665 (92.3)	7474 (87.0)	χ^2= 835; *p* <0.001
	II	14 (1.2)	195 (28.1)	23 (10.1)	132 (13.0)	26 (3.9)	46 (4.5)	208 (20.7)	336 (32.5)	139 (7.7)	1119 (13.0)	
Place of upbringing	Rural area	192 (7.0)	143 (5.2)	58 (2.1)	437 (15.9)	178 (6.5)	460 (16.8)	214 (7.8)	364 (13.3)	695 (25.4)	2741 (31.9)	χ^2= 1527; *p* <0.001
	City < 50 000	235 (12.6)	205 (11.0)	8 (0.4)	259 (13.9)	91 (4.9)	159 (8.5)	91 (4.9)	252 (13.5)	570 (30.5)	1870 (21.8)	
	City 50000-200 000	262 (15.3)	115 (6.7)	131 (7.7)	141 (8.2)	279 (16.3)	292 (17.1)	209 (12.2)	117 (6.8)	165 (9.6)	1711 (19.9)	
	City > 200 000	442 (19.5)	231 (10.2)	30 (1.3)	179 (7.9)	111 (4.9)	111 (4.9)	491 (21.6)	302 (13.3)	374 (16.5)	2271 (26.4)	
Marital status	Single	927 (82.0)	549 (79.1)	202 (89.0)	440 (43.3)	521 (79.1)	581 (56.8)	891 (88.7)	658 (63.6)	884 (49.0)	5653 (65.8)	χ^2= 1218; *p* <0.001
	Civil partnership, not living together	145 (12.8)	14 (2.0)	19 (8.4)	314 (30.9)	78 (11.8)	289 (28.3)	76 (7.6)	189 (18.3)	426 (23.6)	1550 (18.0)	
	Married living together	49 (4.3)	91 (13.1)	4 (1.8)	233 (22.9)	37 (5.6)	133 (13.0)	23 (2.3)	181 (17.5)	473 (26.2)	1224 (14.2)	
	Other	10 (0.9)	40 (5.8)	2 (0.9)	29 (2.9)	23 (3.5)	19 (1.9)	15 (1.5)	7 (0.7)	21 (1.2)	166 (2.0)	
Professional status	Only studying	976 (86.3)	492 (70.9)	159 (70.0)	596 (58.7)	529 (80.3)	665 (65.1)	922 (91.7)	709 (68.5)	1055 (58.5)	6103 (71.0)	χ^2= 599; *p* <0.001
	Studying and working	155 (13.7)	202 (29.1)	68 (30.0)	420 (41.3)	130 (19.7)	357 (34.9)	83 (8.3)	326 (31.5)	749 (41.5)	2490 (29.0)	
Course of study	Nonmedical students	675 (59.7)	79 (11.4)	123 (54.2)	216 (21.3)	45 (6.8)	184 (18.0)	0	122 (11.8)	1072 (59.4)	2516 (29.3)	χ^2= 2295; *p* <0.001
	Medical students	456 (40.3)	615 (88.6)	104 (45.8)	800 (78.7)	614 (93.2)	838 (82.0)	1005 (100)	913 (88.2)	732 (40.6)	6077 (70.7)	

Table 1 (continued)

Variable		Country, *N* (%) All percentages are row percentages unless otherwise specified								Total, *N* = 8593	Chi^2 (χ^2; *p*); *K–W test* (*H*, *p*)
		BY, *N* = 1131; (13.2)	LT, *N* = 694; (8.1)	ME, *N* = 227; (2.6)	PL, *N* = 1016; (11.8)	RS, *N* = 659; (7.7)	SK, *N* = 1022; (11.9)	TR, *N* = 1005; (11.7)	UA, *N* = 1035; (12.0)	CZ, *N* = 1804; (21.0)	
Age, years, mean±SD; Me (IQR)		19.2±1.92; 19 (18–19)	20.7±2.78; 20 (19–21)	21.9±2.82; 22 (20–23)	24.3±6.15; 22 (20–26)	21.2±2.58; 21 (20–22)	22.6±4.67; 21 (20–23)	21.0±2.58; 21 (20–22)	20.8±3.55; 20 (19–22)	22.9±3.82; 22 (21–24)	21.7±4.07; 21 (19–23)	H=2190; *p* <0.001
Religious persuasion	Indifferent	206 (18.2)	182 (26.2)	11 (4.8)	185 (18.2)	19 (2.9)	289 (28.3)	50 (5.0)	193 (18.6)	1255 (69.6)	2390 (27.8)	χ^2= 15295; *p* <0.001
	Catholic	217 (19.2)	390 (56.2)	8 (3.5)	649 (63.9)	23 (3.5)	539 (52.7)	5 (0.5)	37 (3.6)	311 (17.2)	2179 (25.4)	
	Protestantism	11 (1.0)	13 (1.9)	1 (0.4)	5 (0.5)	4 (0.6)	55 (5.4)	1 (0.1)	31 (3.0)	59 (3.3)	180 (2.1)	
	Muslim	6 (0.5)	3 (0.4)	8 (3.5)	2 (0.2)	2 (0.3)	0	899 (89.5)	5 (0.5)	2 (0.1)	927 (10.8)	
	Orthodox Christian	509 (45.0)	15 (2.2)	182 (80.2)	51 (5.0)	588 (89.2)	11 (1.1)	2 (0.2)	381 (36.8)	5 (0.3)	1744 (20.3)	
	No answer	182 (16.1)	89 (12.8)	17 (7.5)	124 (12.2)	22 (3.3)	112 (11.0)	48 (4.8)	145 (14.0)	172 (9.5)	911 (10.6)	
	Greek Catholic	0	2 (0.3)	0	0	1 (0.2)	16 (1.6)	0	243 (23.5)	0	262 (3.0)	

K–W Kruskal–Wallis test

sociodemographic factors, such as age, education level, place of upbringing, marital status, and type of contact (daily or past), exhibit a limited effect. Effect sizes for these correlations were small (ρ typically <0.30). As a result, self-esteem-related indicators emerge as the primary factors shaping scores on the MAS subscales.

Tables and graphs were created to illustrate key relationships in students' attitudes. The analysis compared responses across the various MAS subscales and highlighted differences between participant groups. The observed differences may stem from varying life experiences and the social contexts in which respondents operate. Conversely, the similarities suggest shared tendencies in perceiving certain phenomena, potentially reflecting the influence of cultural or polarized factors shaping public opinion. Analysis of the presented subscales (Table 4) reveals significant relationships between social attitudes.

The emotional subscale showed the strongest association with the global MAS score (Spearman's $\rho = 0.762$ $p < 0.001$), followed by the behavioral ($\rho = 0.711$, $p < 0.001$) and cognitive subscales ($\rho = 0.655$, $p < 0.001$). The cognitive subscale, however, demonstrates the weakest correlation with the others, particularly in the emotional context ($\rho = 0.099$), indicating that negative emotions may contribute to the development of negative beliefs.

Table 5 provides descriptive statistics for the questionnaire's subscales, categorized into three dimensions: affective (emotional), cognitive (beliefs and thoughts), and behavioral intentions (planned actions). Additionally, it includes the global MAS summary index and a ranking of the surveyed countries based on this index.

Countries ranked by median global MAS indicated the least negative attitudes in Ukraine and Belarus (rank I) and the most negative in Serbia (rank VI);

> When examining the MAS subscale results across different countries, substantial differences emerge in social attitudes toward wheelchair users. Respondents from Belarus stand out by being characterized by positive scores on the emotional and cognitive subscales, while those from Lithuania exhibit positive emotional scores but only moderate results in the other subscales. Conversely, groups from Serbia and Montenegro show negative values in these subscales, indicating less favorable attitudes. Polish respondents display average scores in both emotional and cognitive aspects. Notably, Ukraine combined the highest reported daily contact with comparatively less negative attitudes (lower MAS scores), aligning with contact-related mechanisms. These findings are supported by the global MAS indicators that place Ukraine at the top of the list, suggesting a more inclusive and accepting environment for wheelchair

Table 2 Contact with wheelchair users in the nine countries

Country	Contact (daily or several times per week), *n* (%)	Frequent contact with wheelchair users in the past, *N* (%)	Overall self-assessment of mean±SD (Me) (IQR)*
Belarus	77 (6.8)	144 (12.7)	8.10±1.41; 9 (8–9)
Lithuania	63 (9.1)	85 (12.2)	8.21±1.32; 9 (8–9)
Montenegro	108 (47.6)	23 (10.1)	7.54±2.01; 9 (6–9)
Poland	306 (30.1)	205 (20.2)	8.18±1.34; 9 (8–9)
Serbia	382 (58.0)	69 (10.5)	7.86±1.81; 9 (7–9)
Slovakia	292 (28.6)	301 (29.5)	8.08±1.32; 9 (8–9)
Turkey	569 (56.6)	140 (13.9)	7.98±1.57; 9 (7–9)
Ukraine	684 (66.1)	277 (26.8)	8.54±1.0; 9 (8–9)
Czech Republic	375 (20.8)	237 (13.1)	7.85±1.44; 9 (7–9)
Total, N=8593	2856 (33.2)	1481 (17.2)	8.07±1.44; 9 (8–9)

N number of participants; *Me* median; *SD* standard deviation; *IQR* interquartile range (Q_{25} lower quartile; Q_{75} upper quartile); *p* value

* Higher value indicates better self-assessed attitudes toward wheelchair users

Table 3 Correlations (Spearman's ρ) between MAS questionnaire subscales and sociodemographic factors ($p < 0.05$)

Subscale	Age	Gender	Education	Place of upbringing	Marital status	Self-esteem	Everyday contact	Past contact
Emotional	0.055	−0.037	−0.031	−0.029	−0.034	**−0.171**	−0.012	−0.053
Cognitive	0.052	**−0.174**	0.034	−0.036	−0.026	**−0.265**	0.017	−0.001
Behavioral	0.040	**−0.192**	−0.050	−0.045	−0.010	**−0.235**	−0.055	−0.023
Global MAS	0.062	**−0.174**	−0.013	−0.046	−0.044	**−0.294**	−0.002	−0.035

Significant correlations ($p < 0.05$) are highlighted in bold. Global MAS = Multidimensional Attitudes Scale

Table 4 Spearman's correlation matrix among MAS subscales and global score ($p < 0.05$)

Subscale	Emotional	Cognitive	Behavioral	Global MAS
Emotional	1.000			
Cognitive	0.099	1.000		
Behavioral	0.421	0.285	1.000	
Global MAS	0.762	0.625	0.680	1.000

All correlations $p < 0.05$

users compared to other groups, where greater challenges in fostering acceptance are evident.

Discussion

Collaboration between the state, educational institutions, and society is essential for fostering an inclusive environment that enables individuals to fully develop their potential (Townsend et al. 2021). Our analysis of the data from nine Eastern European countries reveals both similarities and differences in social attitudes toward wheelchair users, emphasizing the strong influence of socio-demographic, cultural, and social factors on perceptions of disability. Data from 8593 respondents indicate that while the impact of these characteristics and factors cannot be definitively assessed, key differences can still be identified. Age emerges as a significant factor, with younger respondents demonstrating greater flexibility and evolving views on disability, whereas older participants are more likely to exhibit moderately negative attitudes. However, the correlation between age and attitudes remains weak. Additionally, a review (Antonopoulos et al. 2023) highlights moderate implicit biases against people with disabilities, though the underlying causes of these biases remain uncertain. Gender also plays a substantial role in shaping attitudes. Women are generally more likely to display positive and empathetic attitudes, while men may exhibit more neutral or negative views. These differences may stem from social and cultural norms that encourage women to express care and support more prominently (Barr and Bracchitta 2015; Comer et al. 2024). In contrast, Ukraine's pattern of frequent contact coexisted with comparatively less negative attitudes, suggesting that contextual factors (e.g., cooperative, prosocial contact, and community support) may have fostered higher-quality interactions.

Table 5 Statistical analysis of MAS subscales in the international context

The studied group	MAS subscales, mean±SD; (Me) (IQR - Q_{25}–Q_{75})								Ranking by global MAS
	Emotional (affective)		Cognitive (beliefs and thoughts)		Behavioral (planned activities)		Global MAS		
UA	33.9±10.03	32.0 (27–40)	24.1±10.21	23.0 (15–31)	16.3 ±4.84	16.0 (13–19)	74.3±18.2	74.0 (61–88)	I
BY	35.1±9.97	33.0 (28–41)	22.6±10.98	20.0 (12–30)	17.0±5.40	16.0 (13–20)	74.7±19.46	74.0 (59–91)	I
LT	39.6±11.50	38.0 (30–48)	21.5±8.41	21 (14–28)	18.0±5.33	17 (14–22)	79.1±18.91	78.0 (65–92)	II
PL	37.5±10.15	36.0 (29–45)	25.1±7.33	25.0 (20–30)	17.8±5.35	17.0 (14–22)	80.3±16.30	81.0 (68–92)	III
SK	37.9±10.66	37.0 (30–46)	24.1±8.09	24.0 (19–30)	18.8±5.38	18.0 (15–23)	80.7±17.01	81.0 (68–93)	III
CZ	38.9±9.78	38.0 (32–46)	23.8±7.24	24.0 (20–29)	18.8±5.29	18.0 (15–22)	81.4±15.59	81.0 (71–92)	III
TR	37.9±10.84	36.0 (30–45)	29.3±8.99	30.0 (23–35)	15.5±5.14	15.0 (12–19)	82.8±16.99	83.0 (70–94)	IV
ME	45.1±13.01	45.0 (35–53)	26.9±12.03	28.0 (16–36)	20.2±5.8	20.0 (16–24)	92.1±15.01	94.0 (85–102)	V
RS	45.7±13.02	46.0 (36–54)	26.2±10.23	28.0 (19–30)	20.4±5.38	21.0 (16–24)	92.3±16.56	95.0 (83–102)	VI
Total	**38.1±11.05**	**37.0 (29–46)**	**24.6±9.22**	**24.0 (18–30)**	**17.9±5.45**	**17.0 (14–22)**	**80.6±17.91**	**81.0 (68–94)**	
K–W: H; *p*	588; $p < 0.001$		462; $p < 0.001$		598; $p < 0.001$		650; $p < 0.001$		

Me median; *SD* standard deviation; *IQR* interquartile range (Q_{25} lower quartile; Q_{75} upper quartile); *p* value

K–W Kruskal–Wallis Test; lower MAS values = less negative attitudes (according to Methods).

Ranking by global MAS: I–VI based on the median (lower rank = less negative attitudes). Shared rank when medians are equal

Our findings align with prior research, confirming a link between female gender and positive attitudes. Women predominate in most of the surveyed groups, except in Serbia and Montenegro, where men constitute the majority. This gender distribution may contribute to higher levels of negative attitudes toward people with disabilities in these countries compared to others where women predominate, thereby increasing the overall prevalence of negative attitudes within these regions.

The analysis of attitudes can be enhanced by considering the place of upbringing and residence, as this provides a more nuanced understanding of the issue. Approximately a quarter of participants (25.4%) were from large cities (over 200,000 inhabitants). Residents of rural areas may experience different life circumstances compared to urban environments, which often provide more opportunities for intergroup contact; greater contact is associated with more positive attitudes toward people with disabilities (Pettigrew and Tropp 2006).

Urban residents tended to show less negative attitudes (lower MAS scores) than those from smaller towns or rural areas, consistent with contexts offering more opportunities for intergroup contact (Iezzoni et al. 2006). However, effects were modest and should be interpreted cautiously (ρ small). It is noteworthy, however, that the place where participants were born and raised has a lesser influence on tolerance levels compared to their current place of residence. The findings of this study also confirm that interactions with people with disabilities positively influence students' willingness to engage with this group. Frequent contact with wheelchair users is a particularly significant factor shaping social attitudes. This trend aligns with findings from other studies, which show that adolescents with prior interactions with people with disabilities demonstrate higher readiness for integration (Avramidis and Norwich 2002; Strnadova et al. 2023). Increased frequency of such interactions tends to foster more empathetic attitudes. For example, the highest percentage of respondents having regular contact with people with disabilities was observed in Ukraine, potentially influenced by the ongoing armed conflict and the associated rise in the number of wheelchair users. Similarly, in Turkey and Serbia, significant levels of contact were reported (56.6% and 58.0%, respectively). These experiences appear to shape empathetic attitudes, as reflected in participants' overall self-assessments. High frequency of contact in Serbia and Montenegro coexisted with less positive attitudes, suggesting that contact quantity alone may be insufficient without conditions favoring positive, high-quality interactions (e.g., equal status, cooperation), as highlighted by intergroup contact theory. This suggests that frequent contact does not always translate into positive attitudes, particularly among men, where biases and stereotypes may persist. Research by Smith et al. (2019) conducted in Western European countries confirms that more frequent interactions with people with disabilities generally foster more positive attitudes. Meanwhile, other studies (Babicki et al. 2021) indicate lower self-assessment levels among students, including those in medical fields, highlighting variability in attitudes toward disability education. Ukraine, with the highest percentage of individuals in regular contact with wheelchair users (66.1%),

illustrates the impact of current events, such as wartime conflicts, on perceptions of disability. These interactions during times of adversity often result in greater empathy and understanding, fostering solidarity and support for people with disabilities. Conversely, groups from Serbia and Montenegro demonstrated the lowest positive attitude scores, reinforcing the importance of face-to-face interactions in promoting positive attitudes toward diversity, in this case related to disability.

In addition to contact frequency, education (particularly in medical fields), is a critical factor in shaping students' social attitudes. Research indicates that medical students generally exhibit greater openness and tolerance toward people with disabilities (Saadun et al. 2023; Barr 2013). Regular interactions, combined with academic training, enhance empathy and positively influence the self-esteem of future medical professionals. This underscores the importance of incorporating comprehensive approaches to disability education across various academic disciplines (Moudatsou 2020).

An interesting factor influencing social attitudes is respondents' views on religion. Several key aspects can be identified in this regard. The sample includes students from various religious backgrounds, such as Orthodox, Catholic, Protestant, Islamic, and other faiths. The largest groups are Catholic (25.4%) and Orthodox students (20.3%). Catholics are predominant in Poland, Slovakia, and Lithuania, Orthodox predominate in Belarus, Ukraine, Serbia, and Montenegro, and Muslims in Turkey. Despite doctrinal differences, religions often foster similar positive attitudes toward people with disabilities. Students identifying with a religion tend to hold views shaped by teachings of mercy and outreach. Conversely, students who do not identify with any religion (27.8%) or those who chose not to answer (10.6%) tend to display more neutral or less biased attitudes. In the Czech Republic, where religious indifference is common (with about 70% declining a response), a more liberal attitude can be observed. These differences highlight that religious and cultural backgrounds play a significant role in shaping perceptions of people with disabilities.

Analysis of the MAS questionnaire shows that the emotional subscale, which is most responsive in extreme situations, is key to the overall assessment of attitudes toward people with disabilities. The strong correlation between the emotional subscale and the overall MAS score ($\rho = 0.762$, $p<0.05$) suggests that positive emotions are a strong predictor of tolerant attitudes. This underscores the importance of addressing negative beliefs and stereotypes, which may hinder the development of positive attitudes. The cognitive and behavioral subscales, while moderately correlated with emotions, point to barriers that may limit action, which could restrict positive attitudes toward people with disabilities. Cultural differences in attitudes may arise from each country's historical context and traditions. In countries with more developed social integration and support programs, such as Poland and the Czech Republic, students may show more positive attitudes toward people with disabilities compared to countries where such programs are less developed. However, this cannot be stated definitively, as former socialist bloc countries including Belarus, Ukraine, and Lithuania also demonstrate relatively high levels of tolerance.

Our findings align with the theory that emotional perceptions of people with disabilities are connected to empathy levels. Recent research (Moudatsou et al. 2020) suggests that positive emotions like empathy contribute to more positive attitudes toward people with disabilities. Our study indicates that 70% of students experience positive emotions toward people with disabilities, consistent with other research. For example, Babik and Gardner (2021) found that students participating in inclusive activities are more likely to feel positive emotions and empathy toward people with disabilities. However, despite these positive emotional responses, approximately one-third of students still hold stereotypes about people with disabilities. This finding is consistent with the conclusions of Eaton et al. (2022), who also discovered the presence of stereotypes among students, often present due to limited information and experience in interacting with people with disabilities.

When comparing our results with previous studies, it is evident that they largely support existing theories and conclusions about young people's perceptions of disability. Positive emotional perceptions, presence of stereotypes, the willingness to interact, and the influence of the cultural context all warrant further research and attention from educational institutions and society. In Ukraine, wartime conditions have increased the visibility of disability and opportunities for contact; while our data indicate comparatively less negative attitudes, sustained, high-quality contact and structured educational initiatives remain essential to counter residual stereotypes. The war in Ukraine has led to a shift in students' attitudes toward people with disabilities towards promoting greater empathy and understanding. However, stereotypes and a lack of experience in communication remain significant barriers. Many students are eager to assist or be involved, but they require support and guidance on how to do so (Szpakow et al. 2025).

The observed trends in student attitudes toward wheelchair users are shaped by various factors, including education, personal experiences, cultural norms, and social conditions. While the survey results indicate generally positive perceptions, the persistence of stereotypes and limited experience underscores the need for targeted interventions. Providing students with appropriate support and opportunities for practical engagement can enhance their attitudes and contribute to greater social inclusion. Collaboration between educational institutions, policymakers, and society is

essential for fostering empathy, reducing biases, and creating a more inclusive environment for people with disabilities.

Limitations and implications

While this study offers valuable insights, several limitations should be acknowledged. The research was conducted in only nine Eastern European countries, limiting the applicability of the findings to other regions with distinct cultural and social contexts. Additionally, reliance on self-reported questionnaires may introduce bias, as respondents might provide socially desirable answers. Preexisting stereotypes and biases among participants could also impact their responses, complicating the assessment of genuine attitudes toward individuals with disabilities. Finally, data were collected during an ongoing armed conflict in Ukraine. Although this context reflects real-world conditions, it may limit generalizability and complicate causal interpretation of contact–attitude associations. Despite these limitations, the findings of this study have important implications. They underscore the need for targeted educational programs and initiatives aimed at reducing stereotypes and fostering empathy toward people with disabilities. Policymakers, educators, and social organizations should collaborate to create inclusive environments that promote positive attitudes and meaningful interactions. Future research should address the identified limitations by incorporating more diverse populations, employing mixed-method approaches (e.g., combining qualitative and quantitative data), and exploring the long-term impact of interventions on societal attitudes.

Conclusions

The research conducted in nine Eastern European countries revealed significant variations in students' socio-demographic characteristics, such as marital status, gender, and frequency of contact with wheelchair users, that influence their attitudes toward people with disabilities.

Younger individuals demonstrate greater flexibility and openness in their perceptions of people with disabilities compared to older participants.

Regular interaction with people with disabilities, combined with appropriate education, particularly in medical fields, fosters empathy and enhances students' willingness to participate in inclusive activities.

Despite generally positive attitudes, a substantial proportion of students still hold stereotypical beliefs, highlighting the need for continued education and targeted efforts to challenge and reshape these perceptions.

Cultural and religious factors significantly influence attitudes toward people with disabilities, suggesting that educational programs should be tailored to account for these contextual differences.

In the context of the ongoing war in Ukraine, increased societal exposure to disability may contribute to empathy and less negative attitudes; however, sustained support and structured, high-quality contact are needed to effectively assist people with disabilities and consolidate attitudinal change.

Understanding students' attitudes toward wheelchair users is crucial for fostering a more inclusive society, where people with disabilities are treated as equal members, deserving of respect, empathy, and support.

Practical Implications of the Findings

The findings of this study hold significant practical relevance for various fields, including education, social policy, and community engagement.

A key implication is the need to design and implement educational programs aimed at raising awareness about disabilities, fostering empathy, and promoting inclusive attitudes among students.

The research highlights the importance of organizing inclusive events and activities that encourage direct interactions between students and people with disabilities, as such experiences have been shown to reduce stereotypes and enhance understanding.

The results provide a foundation for community-based initiatives and public awareness campaigns aimed at challenging stereotypes and reshaping societal perceptions of people with disabilities.

From a social policy perspective, the data can inform lawmakers and policymakers in developing strategies and legislation that improve the quality of life, accessibility, and societal participation of people with disabilities.

Recommendations for Future Research

Investigating students' attitudes toward individuals with disabilities through diverse studies is essential for understanding how these perceptions evolve and assessing the impact of educational initiatives. Long-term research is recommended to evaluate the effectiveness of inclusion programs over time. Incorporating qualitative approaches, such as interviews or focus groups, could uncover deeper underlying factors influencing attitudes and identify barriers to positive perceptions of disability. Comparative studies across different countries and cultures would provide insight into cultural influences while exploring the role of personal experiences could highlight strategies to foster empathy among students.

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Declarations

Ethics approval and consent to participate Ethical approval was granted by the Bioethics Committee of the Medical University of Bialystok (APK 002.233.2023) and the Bioethics Committee of the I. Horbachevsky Ternopil National Medical University (Protocol No. 72, January 6, 2023). Informed consent was obtained from all participants.

Competing Interests The authors declare no competing interests.

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