



Original research article

Personality, empathy, and students' attitudes toward wheelchair users

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Abstract

Introduction: This study investigates the relationship between personality traits (extraversion, introversion, neuroticism), empathy levels, and attitudes toward wheelchair users among 4,474 university students from Poland, Lithuania, Belarus, Ukraine, and Slovakia.

Methods: Data were collected via an anonymous online survey (2024–2025) using the Eysenck Personality Inventory (EPI) for personality, the KRE-II Scale for empathy, and the Multidimensional Attitudes Scale toward Persons with Disabilities (MAS) for social attitudes.

Results: Extraversion was significantly associated with higher empathy, while neuroticism correlated with specific aspects of emotional sensitivity. High empathy (62% of respondents) was linked to more positive attitudes toward wheelchair users; overall, 70% of students reported positive attitudes. Notably, Ukrainian students exhibited higher empathy (75%) and more positive attitudes toward wheelchair users (78%).

Conclusion: These findings suggest that personality traits, particularly extraversion and neuroticism, significantly influence empathy and attitudes toward wheelchair users. Cross-national variations highlight the interplay between individual dispositions and broader sociopolitical contexts, underscoring the potential for educational interventions to foster empathy and supportive attitudes toward individuals with mobility limitations.

Keywords: Central and Eastern Europe; Disability; Empathy; Personality traits; Social attitudes; Students

Introduction

The interplay between personality traits, empathy, and social attitudes is a central focus in psychology, medicine, and the social sciences (Derksen et al., 2013; Hülsemann et al., 2025). Empathy is a multidimensional construct encompassing cognitive, emotional, and behavioral components (Díaz-Narváez et al., 2025; Laughy et al., 2021; Thompson et al., 2022), and plays a key role in promoting prosocial behavior, moral development, and social cohesion (Batson, 2009). Its expression is shaped not only by individual characteristics but also by socio-cultural context (McNulty and Politis, 2023) and personality traits, particularly extraversion and neuroticism.

Examining these relationships in the context of attitudes toward individuals with disabilities is especially relevant among young adults preparing for professions involving direct interpersonal contact. Given the heterogeneity of disability, this study focuses specifically on wheelchair users as a visible form of physical disability, enabling more consistent cross-cultural comparison. While this approach provides targeted insights, it also contributes to broader understanding of attitudes toward disability.

The study adopts a cross-sectional design, which allows identification of associations but not causal relationships. In addition, reliance on self-report measures introduces potential bias, including social desirability effects. Personality was assessed using Eysenck's framework, focusing on extraversion

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and neuroticism (Eysenck, 1995), chosen for its cross-cultural applicability and emphasis on core temperamental dimensions. Extraversion, associated with sociability and interpersonal engagement, is linked to higher empathy (Bhuriveth et al., 2025), whereas introversion may limit emotional expression and social interaction (Tuovinen et al., 2020). Neuroticism, characterized by emotional instability and anxiety, may hinder empathic processes and communication (Hughes et al., 2020; Martos Martínez et al., 2021). Prior research consistently shows a positive association between extraversion and empathy, and a negative association with neuroticism (Hojat et al., 2020; Schoeps et al., 2020), with these relationships shaped by social and cultural factors (Zhang and Noels, 2023).

The current sociopolitical context in Central and Eastern Europe, particularly the war in Ukraine, places additional emotional and social strain on young people (Danese and Martsenkivskyi, 2023). Such conditions may intensify stereotypes and negative attitudes toward individuals with disabilities (Sharma et al., 2021), while the increasing number of people with mobility impairments necessitates greater societal adaptation (Shpigelman and Gelkopf, 2019). In this context, understanding how students' personality traits influence empathy and attitudes toward wheelchair users is especially important.

This study aims to examine the relationships between personality traits (extraversion, introversion, neuroticism), empathy, and social attitudes toward wheelchair users among university students in selected Central and Eastern European countries, with particular attention to Ukraine. By clarifying these relationships, the study contributes to understanding the psychosocial determinants of empathy, and informs interventions aimed at promoting inclusive attitudes toward individuals with mobility disabilities.

Materials and methods

This comparative study (2024–2025) involved university students from five Central and Eastern European countries: Poland, Lithuania, Belarus, Ukraine, and Slovakia. Despite geographical proximity, these countries differ in socio-historical contexts, levels of European Union integration, and approaches to disability rights and social inclusion, which is important for cross-cultural analysis.

Participants were recruited from medical and non-medical disciplines (mainly humanities and pedagogy), focusing on fields involving future direct interpersonal contact. A purposeful sampling strategy was applied; however, due to the anonymous online design, the response rate could not be calculated.

A total of 4,474 students participated: Lithuania ($n = 494$), Belarus ($n = 1,099$), Poland ($n = 988$), Ukraine ($n = 985$), and Slovakia ($n = 908$). Recruitment was conducted across multiple academic centers in each country with the support of university authorities and local coordinators, using institutional communication channels and faculty-level social media.

Inclusion criteria were age ≥ 18 years, enrolment in higher education (undergraduate, graduate, or long-cycle master's programs), informed consent, and complete questionnaire submission. Individuals under 18, without consent, or with incomplete responses were excluded.

Data were collected via an anonymous, voluntary online survey (average completion time ~15 minutes). The survey design included mandatory fields and logical branching to ensure complete responses. Additional quality control measures, such as attention checks and time monitoring, were implemented to enhance data reliability.

Socio-demographic and contextual questionnaire

A standardized questionnaire collected data on sex, age, marital status, place of residence, field and level of study, and frequency of contact with wheelchair users. Although the literature highlights the importance of contact quality and familial relationships, these variables were omitted to reduce questionnaire length; therefore, contact frequency was used as a proxy. Items were developed based on literature review and expert consultation to ensure content validity. Pilot studies in each country were conducted to refine wording and ensure cultural and linguistic appropriateness.

Data collection instruments

Personality traits – Eysenck Personality Inventory (EPI)

Personality traits were assessed using the Eysenck Personality Inventory (EPI), measuring extraversion–introversion and neuroticism–stability (Eysenck, 1995). A Likert-type format was applied to enhance cross-cultural applicability (Hughes et al., 2020).

Empathy – KRE II questionnaire

Empathy was assessed using the 33-item KRE-II questionnaire (Węgliński, 2010), which conceptualizes empathy as an emotional-cognitive construct comprising affective (empathic concern) and cognitive (perspective taking) components. The instrument includes five subscales (detailed in [Suppl. Table S1](#)). It demonstrated satisfactory internal consistency across the sample (overall Cronbach's $\alpha = 0.852$; LT = 0.864; BY = 0.875; PL = 0.860; SK = 0.837; UA = 0.828).

Attitudes toward persons with disabilities – multidimensional attitudes scale toward persons with disabilities (MAS)

Social attitudes were assessed using the Multidimensional Attitudes Scale Toward Persons with Disabilities (MAS) (Findler et al., 2007), focusing on attitudes toward wheelchair users as a visible form of physical disability. The scale evaluates affective, cognitive, and behavioral components using a vignette-based scenario, reducing social desirability bias. The total score (Global MAS) reflects overall attitudes.

Procedure and ethical considerations

Participants provided informed consent, acknowledging the study's aims, anonymity, and voluntary nature. Eligibility was restricted to adults (≥ 18 years). Data were collected via an anonymous, voluntary online survey, consistent with the study's cross-sectional design, which facilitates the investigation of associations but not causal inferences. To address potential social desirability bias, particularly relevant for sensitive topics, the MAS incorporated a vignette-based approach designed to elicit responses from a narrator's perspective, thereby minimizing overt socially desirable responding. All questionnaires underwent translation into native languages and rigorous validation/reliability assessment prior to the main survey.

Statistical analysis

Statistical analyses were conducted using Statistica 13.0 PL (TIBCO Inc., USA). Prior to the main analysis, data integrity, logical consistency, outliers, and distributional assumptions were evaluated. The Shapiro–Wilk test was used to assess normality. Due to frequent violations of normality assumptions, non-parametric tests were applied. Descriptive statistics were presented using mean (M), standard deviation (SD), median (Me), interquartile range (IQR), and percentage (%).

Differences between two groups were analyzed using the Mann–Whitney *U* test, and differences among multiple groups using the Kruskal–Wallis test with Dunn’s *post hoc* procedure and Benjamini–Hochberg correction. Categorical variables were analyzed using Pearson’s χ^2 test. Associations between quantitative and ordinal variables were assessed with Spearman’s rank order correlation coefficient (ρ). A two tailed *p*-value < 0.05 was considered statistically significant.

Results

Socio demographic characteristics

The final sample comprised 4,474 students from five Central and Eastern European countries (Lithuania, Belarus, Poland, Slovakia, and Ukraine). Detailed socio demographic characteristics, including age, gender, place of residence, marital status, respondent status, field of study, and frequency of contact with individuals who use wheelchairs, are presented in Table 1.

Significant between country differences were observed for most variables. The youngest participants were students from Belarus, whereas the oldest were from Poland. Women constituted the majority of the sample, with the highest proportion in Lithuania and the lowest in Belarus. Students from Poland and Slovakia most often reported rural backgrounds, whereas those from Lithuania and Belarus more frequently came from large cities. Most respondents were single and studying full

time. Medical students predominated in all countries, particularly in Ukraine and Lithuania. Daily contact with individuals with mobility impairments was most frequently reported by Ukrainian students. A composite comparison of these variables allowed the outline of typical socio demographic profiles for each national group (Table 2).

Personality traits

Descriptive statistics for extraversion–introversion, neuroticism–stability, and the honesty scale are summarized in [Suppl. Table S2](#).

In the extraversion–introversion dimension, the highest mean scores were observed in Belarus and Ukraine, and the lowest in Slovakia. In the neuroticism–stability dimension, higher mean scores were recorded in Poland and Ukraine compared with Slovakia. Scores on the honesty scale were uniform across the examined countries, with a median of 3. Non parametric tests (Mann–Whitney *U* and Kruskal–Wallis) confirmed statistically significant between country differences in the temperamental dimensions, while sincerity indices remained high and stable, supporting the internal validity of the data.

Empathy levels (KRE II)

Overall empathy scores were highest among Slovakian students, followed by Polish, with Belarusian students exhibiting the lowest values. Kruskal–Wallis tests confirmed significant cross-country differences across all empathy dimensions. Syn-

Table 1. Socio-demographic profile and summary characteristics of respondents’ variables

Socio-demographic characteristic	Country, <i>N</i>					Total (<i>N</i> = 4474)	Chi ² (χ^2 ; <i>p</i>); Kruskal–Wallis test (<i>H</i> , <i>p</i>)
	LT (<i>N</i> = 494)	BY (<i>N</i> = 1099)	PL (<i>N</i> = 988)	SK (<i>N</i> = 908)	UA (<i>N</i> = 985)		
Age, <i>M</i> ± <i>SD</i> ; (<i>Me</i>) (<i>IQR</i>)	21.1 ± 2.89 (20.0) (20–21)	19.1 ± 1.28 (19.0) (18–19)	24.5 ± 6.16 (22.0) (20–27)	22.9 ± 4.83 (21.0) (20–23)	20.6 ± 3.30 (20.0) (19–22)	21.6 ± 4.56 (20.0) (19–22)	<i>H</i> = 1471; <i>p</i> = 0.001
Sex, <i>N</i> (%)							
Men	79 (16.0)	347 (31.6)	374 (37.9)	253 (27.9)	230 (23.4)	1283 (28.7)	χ^2 = 98.1; <i>p</i> < 0.001
Women	415 (84.0)	752 (68.4)	614 (62.1)	655 (72.1)	755 (76.6)	3191 (71.3)	
Place of residence, <i>N</i> (%)							
Rural areas	90 (18.2)	187 (17.0)	426 (43.1)	400 (44.1)	354 (35.9)	1457 (32.6)	χ^2 = 2316; <i>p</i> < 0.001
Town <50,000 inhabitants	151 (30.6)	232 (21.1)	256 (25.9)	126 (13.8)	249 (25.3)	1014 (22.6)	
City <200,000 inhabitants	74 (15.0)	256 (23.3)	138 (14.0)	277 (30.5)	105 (10.7)	850 (19.0)	
City >200,000 inhabitants	179 (36.2)	424 (38.6)	168 (17.0)	105 (11.6)	277 (28.1)	1153 (25.8)	
Marital status, <i>N</i> (%)							
Widowed /divorced / separated	28 (7.7)	14 (1.3)	14 (1.4)	11 (1.2)	6 (0.6)	73 (1.6)	χ^2 = 947; <i>p</i> = 0.01
Single	381 (77.1)	912 (83.0)	420 (42.5)	500 (55.1)	635 (64.5)	2448 (54.7)	
Informal relationship	4 (0.8)	139 (12.6)	307 (31.1)	267 (29.4)	174 (17.7)	891 (19.9)	
Married cohabiting with spouse	71 (14.4)	34 (3.1)	232 (23.5)	130 (14.3)	170 (17.3)	637 (14.2)	
Respondent status, <i>N</i> (%)							
Studying only	327 (66.2)	961 (87.4)	574 (58.1)	577 (63.5)	684 (69.4)	3123 (69.8)	χ^2 = 246; <i>p</i> < 0.001
Studying and working	167 (33.8)	138 (12.6)	414 (41.9)	331 (36.5)	301 (30.6)	1351 (30.2)	
Field of study, <i>N</i> (%)							
Medical	412 (83.4)	604 (51.7)	626 (63.4)	638 (70.3)	840 (85.3)	3117 (69.7)	χ^2 = 293; <i>p</i> < 0.001
Non-medical	82 (16.6)	498 (45.3)	362 (36.6)	270 (29.7)	145 (14.7)	1357 (30.3)	
Daily contact with persons with physical disabilities, <i>N</i> (%)	26 (5.3)	68 (6.2)	304 (30.8)	268 (29.5)	660 (67.0)	1326 (29.6)	χ^2 = 1090; <i>p</i> < 0.001
General attitude toward individuals with mobility disabilities (self-assessment) <i>M</i> ± <i>SD</i> (<i>Me</i>) (<i>IQR</i>)	8.2 ± 1.3 (9) (8–9)	8.1 ± 1.4 (9) (8–9)	8.2 ± 1.3 (9) (8–9)	8.1 ± 1.3 (9) (8–9)	8.6 ± 1.0 (9) (9–9)	8.2 ± 1.3 (9) (8–9)	<i>H</i> = 112; <i>p</i> = 0.001

Note: Mann–Whitney *U* test $P_{BY-UA} < 0.001$; $P_{LT-SK} < 0.01$; $P_{LT-UA} < 0.001$; $P_{PL-SK} < 0.01$; $P_{PL-UA} < 0.001$; $P_{SK-UA} < 0.001$

Table 2. Characteristic features of the sociodemographic profile of respondent groups across countries

Characteristics	LT	BY	PL	SK	UA
Age	Mean age: 21.1 years; half of the respondents were 20–21 years old	The youngest group with a mean age of 19.1 years	The oldest group with a mean age of 24.5 years	Mean age: 22.9 years	Mean age: 20.6 years
Sex	A higher proportion of women (84%) than men (16%)	A predominance of women (68.4%)	Slightly more women (62.1%)	More women (72.1%)	More women (76.6%)
Level of education	61.1% were enrolled in first-cycle (Bachelor's) programmes, and 38.9% in second-cycle (Master's) programmes	Almost all students were in first-cycle programmes (99.3%)	86.7% were enrolled in first-cycle programmes	First-cycle programmes predominated (95.4%)	66.3% were enrolled in first-cycle programmes
Place of residence	A predominance of individuals living in cities with more than 200,000 inhabitants (73.5%)	Most were raised and currently live in cities with over 200,000 inhabitants (75.3%)	A large proportion were raised in rural areas and reside in smaller towns		A predominance of individuals living in cities with more than 200,000 inhabitants (59.6%)
Marital status	The majority were single (77.1%)	83% were single	Most participants were single (76.5%)	The majority were single (85.7%)	64.5% were single
Field of study	Medical degree programmes predominated (83.4%)	A balanced distribution of medical and non-medical fields	Medical degree programmes predominated (63.4%)	70.3% were students of medical fields	Medical degree programmes predominated (85.3%)
Contact with individuals with disabilities	23.8% reported frequent contact	21.7% reported frequent contact	30.8% reported frequent contact	29.5% reported frequent contact	The largest proportion (67%) reported frequent contact

dromes reflecting sensitivity to others' experiences and willingness to make sacrifices were notably pronounced in Ukrainian and Slovakian national groups. Specifically, Ukrainian students reported the highest empathy scores (75%) and more positive attitudes toward wheelchair users (78%).

Attitudes toward wheelchair users (MAS)

The MAS results, detailed in [Suppl. Table S3](#), indicated significant inter-country differences across affective, cognitive, behavioral, and Global MAS scores. Higher scores uniformly represent less favorable (more distant) attitudes. Polish and Slovakian students reported relatively higher Global MAS scores, whereas Ukrainian and Belarusian students exhibited the lowest Global MAS values, signifying more positive attitudes toward wheelchair users/individuals with mobility impairments.

Correlations between personality, empathy, and attitudes

Spearman's rank order correlations between personality traits, empathy syndromes (KRE II), and MAS components are shown in [Suppl. Table S4](#).

Significant positive correlations were observed among MAS subscales and with Global MAS. Higher scores in empathy syndromes, particularly sensitivity to others' experiences and readiness to act on their behalf, were associated with lower Global MAS scores. Within the personality domain, neuroticism exhibited moderate positive correlations with selected empathy syndromes, while associations with extraversion were less pronounced.

Discussion

This study confirms the significant influence of personality traits on empathy and attitudes toward wheelchair users

among university students in five Central and Eastern European countries. While the cross-sectional design limits causal inferences, the findings align with Eysenck's model. Highly extraverted students consistently demonstrated elevated cognitive and behavioral empathy, as their sociability facilitates perspective-taking and affective resonance (Bhuriveth et al., 2025; Tuovinen et al., 2020). Conversely, elevated neuroticism was associated with increased emotional tension and diminished empathic understanding, as heightened emotional reactivity and an internalizing focus impede the accurate appraisal of others' emotions (Hughes et al., 2020; Martos Martínez et al., 2021). Thus, emotional stability is crucial for fostering prosocial attitudes and cooperative readiness (Laughy et al., 2021).

The observed cross-country differences underscore the profound influence of sociocultural, historical, and developmental contexts on collective attitudes (Baar et al., 2025; Babik and Gardner, 2021; Gould and Harris, 2012). Notably, Ukrainian students exhibited the highest overall empathy and most favorable attitudes toward wheelchair users. This may reflect an adaptive societal response to war-related stressors and the increasing population with mobility impairments, which can catalyze national solidarity (Bilewicz et al., 2024; Danese and Martsenkovskyi, 2023; Shpigelman and Gelkopf, 2019). However, lacking pre-war baseline data, other contributing factors must be considered: the Ukrainian sample comprised 85% medical students, who reported higher frequencies of direct contact with persons with disabilities – a strong predictor of positive attitudes. In contrast, the less favorable attitudes in Poland and Slovakia may reflect reduced direct contact, differing social policies, and varying levels of societal integration efforts (Hunt et al., 2023).

Global MAS scores further highlighted these differences: Polish and Slovak students showed less favorable attitudes (higher MAS scores), while Ukrainian and Belarusian students presented more positive attitudes (lower MAS scores),

reflecting both contact frequency and broader sociopolitical contexts (Cieza et al., 2021; Gréaux et al., 2023). Consistently negative correlations between Global MAS scores and KRE-II empathy syndromes empirically support the link between empathic capacity and prosocial attitudes. This corroborates the intergroup contact hypothesis (Pettigrew and Tropp, 2006), reinforcing that meaningful interactions and inclusive social climates diminish prejudice and enhance societal acceptance (Freer, 2021; Fu et al., 2022).

These findings offer actionable implications for educational interventions. While applicable to physical mobility impairments, strategies must be tailored to specific geopolitical contexts and cultural nuances. It is essential to integrate emotional competency training into academic curricula, particularly for future healthcare and pedagogical professionals. Interventions combining structured contact with individuals with disabilities and reflective activities effectively challenge stereotypes and promote inclusion (McNulty and Politis, 2023; Tervo et al., 2002). Ultimately, this study affirms that extraversion and neuroticism are distinct predictors of empathy and social attitudes toward wheelchair users. The cross-national variations illustrate the dynamic interplay between individual dispositions and socio-political conditions, providing a foundation for culturally sensitive strategies to cultivate inclusive attitudes among future professionals.

Limitations

Several limitations warrant critical consideration when interpreting these findings, impacting both the depth of interpretation and the generalizability of conclusions.

Firstly, the cross-sectional design allows the identification of associations but not causal relationships or directionality between variables. Secondly, reliance on self-report measures introduces potential biases, including social desirability, which may inflate reported empathy and positive attitudes despite mitigation strategies.

Thirdly, the purposeful sampling strategy and voluntary online participation – particularly through varied university communication channels – likely introduced self-selection bias. Students with a pre-existing interest in the research topic (personality, empathy, attitudes toward wheelchair users) or those with particular experiences might have been more inclined to complete the questionnaire. The absence of a calculable response rate further limits the rigorous assessment of sample representativeness. Consequently, the generalizability of findings is restricted primarily to the population of university students sharing similar characteristics to our sample, and their perspectives may not fully reflect the attitudes and empathy levels of the broader general population in these countries. Future studies employing more robust random sampling techniques and diverse age groups would significantly enhance the external validity and representativeness of similar research.

Fourthly, concerning the theoretical framework, while Eysenck's model provided a robust foundation for examining fundamental temperamental dimensions, we acknowledge that alternative, more comprehensive frameworks, such as the Big Five model (e.g., including Agreeableness and Openness), might offer additional nuanced insights into specific facets of attitudes toward disability. For instance, traits like agreeableness are conceptually very close to empathy and prosociality, and their inclusion could have enriched the predictive power and theoretical understanding of the observed relationships. The omission of such broader personality constructs represents a deliberate choice for parsimony in this initial cross-cultural

exploration, but one that future research could address to provide a more exhaustive personality profile.

Fifthly, although our study considered the “frequency of contact” with individuals with mobility disabilities, it did not systematically measure the quality or nature of this contact, nor did it inquire about familial relationships with disabled individuals. “The existing literature strongly suggests that the ‘quality’ of contact (e.g., positive, meaningful interactions vs. superficial encounters) and the presence of a disabled family member are powerful predictors of attitudes, often exerting a more significant influence than mere frequency.” The absence of these granular measures means our understanding of the contact hypothesis in this context remains incomplete, representing a potential source of confounding or an area for more detailed exploration in subsequent research.

Sixthly, a significant limitation stems from the “specific operationalization of ‘disability’ within this study”. Our investigation, by design and choice of measurement instrument (MAS vignette), focused exclusively on attitudes toward “wheelchair users”, representing a visible form of physical mobility impairment. While this approach allowed for a clear and consistent assessment, it inherently limits the scope of our conclusions. Attitudes toward individuals with other types of disabilities, such as intellectual, sensory (e.g., visual or hearing impairments), or psychiatric conditions, may differ substantially due to varying social perceptions, levels of perceived threat or discomfort, and interaction experiences. Therefore, the findings presented here should be interpreted with caution regarding their direct generalizability to the broader “people with disabilities” population, and future research is warranted to explore these diverse attitudinal landscapes.

Finally, the study was conducted during a “period of significant political and social upheaval, including the ongoing war in Ukraine”, which represents a unique contextual factor. These extraordinary circumstances may have influenced both reported empathy levels and attitudes toward individuals with disabilities, particularly in Ukraine, potentially fostering heightened prosociality as an adaptive response to crisis (as hypothesized in the Discussion). Therefore, the results should be interpreted specifically within the context of the unique conditions at the time of data collection and “may not directly extrapolate to periods of stability or other geopolitical regions without further validation”. This temporal and contextual specificity is crucial for accurate interpretation. Moreover, “cultural variations in defining and expressing empathy and disability” further complicate direct cross-national comparisons, potentially limiting the generalizability of the results beyond the examined Central and Eastern European countries.

Conclusion

Extraversion and neuroticism significantly shape students' empathy and attitudes toward wheelchair users. Higher empathy, particularly sensitivity to others' experiences and readiness for prosocial action, is associated with lower MAS scores, indicating reduced social distance and greater acceptance. Cross-national differences suggest the influence of sociocultural and political contexts, including potential war-related factors in Ukraine, as well as variability in contact with individuals with mobility impairments.

These findings support the need for educational interventions that strengthen empathy, reduce stereotypes, and promote inclusive attitudes toward people with disabilities.

Ethics approval and consent to participate

Ethical approval was obtained from the Bioethics Committee of the Medical University of Białystok (APK.002.233.2023), the Bioethics Committee of the Academy of Medical Sciences in Białystok (KB.97/2024/2025), and the Bioethics Committee of the Regional Chamber of Physicians in Kraków (OIL/KBL/41/2025). The administrations of all participating educational institutions provided permission for student involvement. Participation was anonymous, voluntary, and only adults (≥ 18 years) were included.

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Use of generative artificial intelligence

The authors confirm that no generative artificial intelligence (AI) tools were used in the design, conduct, analysis, or interpretation of the research data presented in this manuscript. AI-powered linguistic tools were utilized exclusively for editorial purposes, specifically to refine sentence structure, improve vocabulary, and correct grammatical errors. All scientific content, arguments, and conclusions are solely the responsibility of the authors and were thoroughly reviewed and approved by them.

Conflict of interest

The authors have no conflict of interest to declare.

References

1. Baar M, Mladenov T, Titterton M (2025). Rethinking "transition" in Central and Eastern Europe and the former Soviet Union through the lens of disability. *Probl Post-Communism* 72(3): 211–215. DOI: 10.1080/10758216.2024.2341169.
2. Babik I, Gardner ES (2021). Factors affecting the perception of disability: a developmental perspective. *Front Psychol* 12: 702166. DOI: 10.3389/fpsyg.2021.702166.
3. Batson CD (2009). These things called empathy: eight related but distinct phenomena. In: Decety J, Ickes W (Eds). *The social neuroscience of empathy*. Boston Review. DOI: 10.7551/mitpress/9780262012973.003.0002.
4. Bhuriveth V, Lertsakulbunlue S, Tangdumrongvong V, Charoensakulchai S, Piyaraj P, Mahagita C, Kantiwong A (2025). Unveiling barriers of introverts to collaborative learning: an exploratory mixed-methods study across medical student personalities. *BMC Psychol* 13(1): 937. DOI: 10.1186/s40359-025-03282-y.
5. Bilewicz M, Babińska M, Gromova A (2024). High rates of probable PTSD among Ukrainian war refugees: the role of intolerance of uncertainty, loss of control and subsequent discrimination. *Eur J Psychotraumatol* 15(1): 2394296. DOI: 10.1080/20080866.2024.2394296.
6. Cieza A, Causey K, Kamenov K, Hanson SW, Chatterji S, Vos T (2021). Global estimates of the need for rehabilitation based on the global burden of disease study 2019: a systematic analysis. *Lancet* (London, England) 396(10267): 2006–2017. DOI: 10.1016/S0140-6736(20)32340-0.
7. Danese A, Martsenkovskiy D (2023). Editorial: measuring and buffering the mental health impact of the war in Ukraine in young people. *J Am Acad Child Adolesc Psychiatry* 62(3): 294–296. DOI: 10.1016/j.jaac.2022.11.001.
8. Derksen F, Bensing J, Lagro-Janssen A (2013). Effectiveness of empathy in general practice: a systematic review. *Br J Gen Pract* 63(606): e76–e84. DOI: 10.3399/bjgp13X660814.
9. Díaz-Narváez VP, Palacio LMA, González JB, Rod JE, De Las Salas R, Cabrera JA, et al. (2025). Synergy between resilience and empathy in health sciences students: a cross-sectional study. *BMC Med Educ* 25(1): 1520. DOI: 10.1186/s12909-025-08099-2.
10. Eysenck HJ (1995). Some comments on the Gough Socialization Scale. *Psychol Rep* 76(1): 298. DOI: 10.2466/pr0.1995.76.1.298.
11. Findler E, Vilchinsky N, Werner S (2007). The Multidimensional Attitudes Scale towards persons with disabilities (MAS): construction and validation. *Rehabil Couns Bull* 50(3): 166–176. DOI: 10.1177/00343552070500030401.
12. Freer JRR (2021). Students' attitudes toward disability: a systematic literature review (2012–2019). *Int J Inclusive Educ* 27(5): 652–670. DOI: 10.1080/13603116.2020.1866688.
13. Fu W, Xiao Y, Yin C, Zhou T (2022). The relationship of inclusive climate and peers' attitude on children with disabilities in China: a mediating role of empathy. *Front Psychol* 13: 1034232. DOI: 10.3389/fpsyg.2022.1034232.
14. Gould R, Harris SP (2012). Welfare reform and disability in Slovakia: exploring neoliberalism, social justice and employment policy. *Disabil Stud Q* 32(2): 15–26. DOI: 10.18061/dsq.v32i2.3200.
15. Gréaux M, Moro MF, Kamenov K, Russell AM, Barrett D, Cieza A (2023). Health equity for persons with disabilities: a global scoping review on barriers and interventions in healthcare services. *Int J Equity Health* 22(1): 236. DOI: 10.1186/s12939-023-02035-w.
16. Hojat M, Shannon SC, DeSantis J, Speicher MR, Bragan L, Calabrese LH (2020). Does empathy decline in the clinical phase of medical education? A nationwide, multi-institutional, cross-sectional study of students at DO-granting medical schools. *Acad Med* 95(6): 911–918. DOI: 10.1097/ACM.0000000000003175.
17. Hughes DJ, Kratsiotis IK, Niven K, Holman D (2020). Personality traits and emotion regulation: a targeted review and recommendations. *Emotion* (Washington, D.C.) 20(1): 63–67. DOI: 10.1037/emo0000644.
18. Hülsemann MJ, Kaurin A, Kollmann B, Chmitorz A, Ahrens KF, Schenk C, et al. (2025). Self-oriented affective empathy is associated with increased negative affect. *Sci Rep* 15(1): 27767. DOI: 10.1038/s41598-025-09860-9.
19. Hunt X, Hameed S, Tetali S, Ngoc LA, Ganle J, Huq L, et al. (2023). Impacts of the COVID-19 pandemic on access to healthcare among people with disabilities: evidence from six low- and middle-income countries. *Int J Equity Health* 22(1): 172. DOI: 10.1186/s12939-023-01989-1.
20. Laughery WF, Atkinson J, Craig AM, Douglas L, Brown ME, Scott JL, et al. (2021). Empathy in medical education: its nature and nurture – a qualitative study of the views of students and tutors. *Med Sci Educ* 31(6): 1941–1950. DOI: 10.1007/s40670-021-01430-8.
21. Martos Martínez Á, Pérez-Fuentes MDC, Molero Jurado MDM, Simón Márquez MDM, Barragán Martín AB, Gázquez Linares JJ (2021). Empathy, affect and personality as predictors of engagement in nursing professionals. *Int J Environ Res Public Health* 18(8): 4110. DOI: 10.3390/ijerph18084110.
22. McNulty JP, Politis Y (2023). Empathy, emotional intelligence and interprofessional skills in healthcare education. *J Med Imaging Radiat Sci* 54(2): 238–246. DOI: 10.1016/j.jmir.2023.02.014.
23. Pettigrew TE, Tropp LR (2006). A meta-analytic test of intergroup contact theory. *J Pers Soc Psychol* 90(5): 751–783. DOI: 10.1037/0022-3514.90.5.751.
24. Schoeps K, Mónaco E, Cotoli A, Montoya-Castilla I (2020). The impact of peer attachment on prosocial behavior, emotional difficulties and conduct problems in adolescence: the mediating role of empathy. *PLoS One* 15(1): e0227627. DOI: 10.1371/journal.pone.0227627.
25. Sharma N, Pratap Yadav V, Sharma A (2021). Attitudes and empathy of youth towards physically disabled persons. *Heliyon* 7(8): e07852. DOI: 10.1016/j.heliyon.2021.e07852.
26. Shpigelman CN, Gelkopf M (2019). The impact of exposure to war and terror on individuals with disabilities. *Psychol*

- Trauma Theory Res Pract Policy 11(2): 189–196. DOI: 10.1037/tra0000381.
27. Tervo RC, Azuma S, Palmer G, Redinius P (2002). Medical students' attitudes toward persons with disability: a comparative study. *Arch Phys Med Rehabil* 83(11): 1537–1542. DOI: 10.1053/apmr.2002.34620.
28. Thompson NM, van Reekum CM, Chakrabarti B (2022). Cognitive and affective empathy relate differentially to emotion regulation. *Affect Sci* 3(1): 118–134. DOI: 10.1007/s42761-021-00062-w.
29. Tuovinen S, Tang X, Salmela-Aro K (2020). Introversion and social engagement: scale validation, their interaction, and positive association with self-esteem. *Front Psychol* 11: 590748. DOI: 10.3389/fpsyg.2020.590748.
30. Węgliński A (2010). Zrewidowana wersja kwestionariusza rozumienia empatycznego innych ludzi – KRE-II. In: Wojnarska A (ed). *Diagnostyka resocjalizacyjna – wybrane zagadnienia*. Lublin: UMCS: 67–90.
31. Zhang YSD, Noels KA (2023). Cultural empathy in intercultural interactions: the development and validation of the intercultural empathy index. *J Multiling Multicult Dev* 45(10): 4572–4590. DOI: 10.1080/01434632.2023.2173759.