Implicit and explicit attitudes toward people with physical disabilities in clinicians, rehabilitation assistants, and other occupations: A comparative study

Matthieu P. Boisgontier

Faculty of Health Sciences, University of Ottawa, Canada; Bruyère Health Research Institute, Ottawa, Canada; Perley Health Centre of Excellence in Frailty-Informed Care, Ottawa, Canada. Email for correspondence: matthieu.boisgontier@uOttawa.ca

ABSTRACT

Objective. Ableism is driven by attitudes that influence behaviors and decisions toward people with disabilities. To assess whether these attitudes vary by occupation, we compared the preferences for people with or without physical disabilities between healthcare practitioners and individuals in other professions.

Methods. Data from 213,191 participants collected through Project Implicit were analyzed, including 6445 clinicians, 3482 rehabilitation assistants, and 203,264 individuals in other occupations. Implicit attitudes were assessed using D-scores derived from the Implicit Association Test. Explicit attitudes were assessed using a Likert scale. Multiple linear regression models were conducted to examine the association between occupation groups and attitudes toward people with and without physical disabilities, while controlling for demographic variables.

Results. Healthcare practitioners showed both an implicit and explicit preference for people without physical disabilities. Equivalence tests showed that implicit attitudes of clinicians and rehabilitation assistants were equivalent to those in other occupations. Clinicians had less favorable explicit attitudes toward people with physical disabilities, whereas rehabilitation assistants had more favorable ones. Older age, male sex, and no personal experience of disability were associated with less favorable attitudes toward people with physical disabilities. Associations with education, race, geographic region, and year of data collection were also observed.

Conclusions. This study provides evidence of attitudes against people with physical disabilities among healthcare practitioners. Moreover, implicit attitudes of healthcare practitioners toward people with physical disabilities were not more favorable than those of other occupations; and explicit attitudes of clinicians were even less favorable.

Impact. Our findings suggest that despite ongoing educational shifts toward more inclusive approaches, the longstanding framework of disability as an abnormality to be normalized may still affect healthcare practitioners. This underscores the need for continued efforts to address ableism in healthcare by promoting disability-inclusive education and training.

Keywords. Attitude of Health Personnel; Bias; Cultural Competency; Disabled Persons; Education, Medical, Continuing; Healthcare Disparities; Prejudice; Professional-Patient Relations

Disclosures: None

INTRODUCTION

An attitude is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor".[1] Explicit attitudes can be reported using self-report instruments such as questionnaires, and their activation can be consciously controlled.[2] In constrast, implicit (or automatic)[3] attitudes, typically assessed using reaction time tasks, are traces of past experience that remain introspectively unidentified.[4] Attitudes not only predict and are causally related to behavior,[5,6] they also shape interpersonal interactions and influence decision making in professional contexts.[7,8]

In healthcare, attitudes toward people with disabilities are considered a primary measurable indicator of ableism, defined as "a set of assumptions and practices promoting the differential or unequal treatment of people because of actual or presumed impairment or disability that privileges one way of being based on normative expectations of capability and independence".[9] Understanding implicit and explicit attitudes toward people with disabilities in healthcare practionners is essential to identifying potential biases in care, especially given the historical and prevailing view of disability through a deficit framework.[10] This framework views disability as an abnormality that needs to be normalized to conform to societal ideals of "normalcy".[10] This view has been embedded in healthcare practice for decades, particularly in rehabilitation professions, where a biomechanical approach to correcting deficits is foundational.[11] While this deficit framework has been criticized for failing to recognize the importance of inclusion and accessibility,[10,11] whether healthcare practitioners' attitudes toward people with disabilities still reflect this framework remains unclear.

A systematic review of explicit attitudes toward people with disabilities in healthcare students and practitionners reported mixed results.[12] Some studies found positive attitudes toward people with disabilities in occupational therapy students and professionals,[13,14] more favorable attitudes in physical therapists compared to schoolteachers[15] or the general population,[16] and more favorable attitudes among occupational therapy students compared to business students.[17] However, other studies found less favorable explicit attitudes toward people with disabilities in healthcare students, including nursing, medical, and rehabilitation students, compared to the general popluation.[18] Negative explicit attitudes toward children with disabilities were observed in nursing students and professionals.[19] In addition, dental surgery assistants and dental students showed less favorable explicit attitudes toward people with disabilities than psychology students,[20] and no statistical difference was found between occupational therapy students and business students.[21]

Recently, several studies have used data collected by Project Implicit between 2006 and 2021 to examine implicit and explicit attitudes using the Implicit Association Test (IAT) for general disability (Suppl. Fig. 1).[22-24] One of these studies focused on healthcare professionals (n = 25,006), including clinicians, occupational and physical therapy assistants, nursing and home health assistants, technologists, technicians, and other healthcare support personnel.[22] Results showed that healthcare professionals scored 4.41 ± 0.90 on a 7-point Likert scale, with a score of 4 indicating "I like abled persons and disabled persons equally" and a score of 5 indicating "I slightly prefer abled persons to disabled persons". This score was significantly different from 4, suggesting a slight explicit preference for people without disabilities among healthcare professionals. Results also showed a moderate implicit preference for people without disabilities (D-score = 0.54 ± 43). The same authors used the same dataset to focus on the implicit and explicit attitudes of 6113 occupational and physical therapy assistants.[23] Results were similar to those of their previous study, suggesting a slight explicit preference (Likert score = 4.29 ± 0.80) and a

moderate implicit preference (D-score = 0.51 ± 0.44) for people without disabilities. When compared with another study of 8,544 participants from the general population (Likert score = 4.06 ± 1.17; D-score = 0.45 ± 0.43),[24] these results seem to indicate that healthcare professionals, including rehabilitation assistants, have less favorable implicit and explicit attitudes toward people with disabilities. However, to demonstrate such differences, analyses must be conducted using the same dataset to control for potential confounding variables and to ensure that differences are not due to variations in data collection methods, sample characteristics, or measurement conditions. This type of comparative study was conducted in nursing and home health assistants,[25] who showed more favorable explicit attitudes (Likert score = 4.30 vs. 4.35) but less favorable implicit attitudes (D-score = 0.55 vs. 0.51) toward people with disabilities than individuals in non-healthcare occupations.

In the current study, we examined implicit and explicit attitudes toward a specific type of disability that has not been studied in isolation before: physical disability. For the first time, we compare these attitudes in healthcare practitioners and the general population using a single dataset. Given differences in education, training, and professional roles, we examined attitudes in two types of healthcare practitioners: clinicians, who actively diagnose and treat patients, and rehabilitation assistants, who support clinicians in delivering therapy. Finally, understanding and reducing ableism among healthcare pratitioners requires identifying the factors associated with attitudes toward people with disabilities. Studies have identified several such factors in healthcare professionals, including younger age[22], female sex[18,22,26-29], white race[22,27], personal experience with disability (e.g., having friends, acquaintances, or family members with disabilities or having a disability oneself),[14,17,22,27,28,30-32] and country of residence.[33] Therefore, we explored whether sex, age, personal experience of disability, education level, geographic region, race, and year of data collection were associated with implicit and explicit attitudes toward people with physical disabilities in clinicians and rehabilitation assistants.

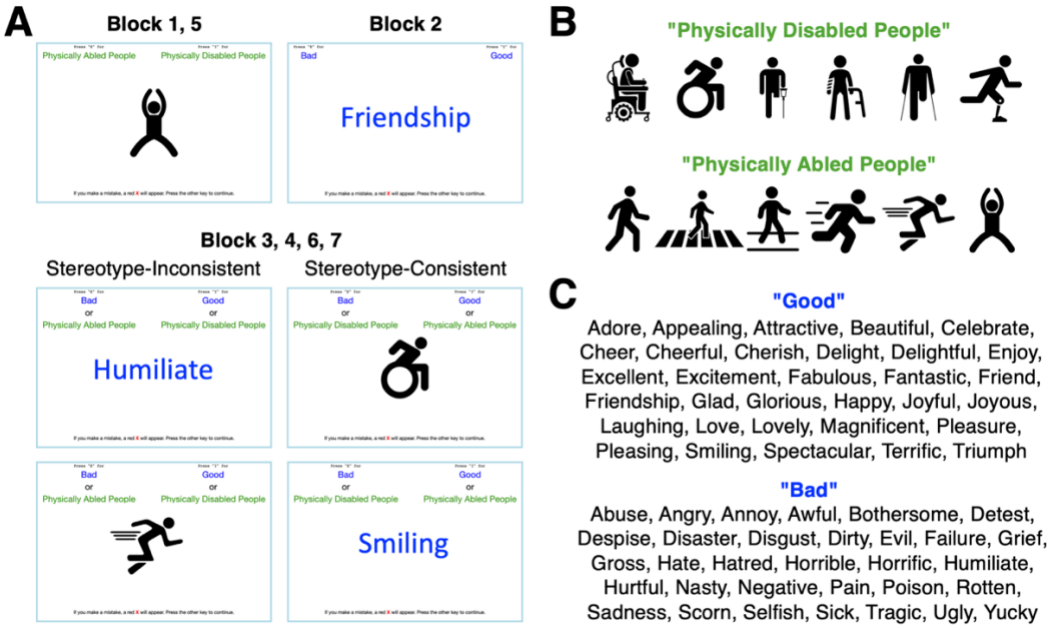

Figure 1. Implicit Association Test for physical disability. (A) Illustration of trials for the different blocks. (B) Images used for the target concepts ("physically disabled people" and "physically abled people"). (C) Words used for the evaluative attributes ("good" and "bad"). For each evaluative attribute, a set of 8 words was randomly selected before the start of each series.

METHODS

Participants

This study is based on the physical disability IAT dataset collected from 2022 to 2024 on the Project Implicit demonstration website (https://implicit.harvard.edu/implicit/selectatest.html) and made available on the Open Science Framework (OSF) under the CC0 1.0 Universal License.[34] The website allows any adult aged 18 years or older to participate and measure their implicit and explicit attitudes toward people with and without physical disabilities, as well as answer demographic questions (e.g., age, sex, race, country of residence). Participants were informed that data without directly identifying information would be made publicly available for research purposes. Project Implicit was approved by the Institutional Review Board for the Social and Behavioral Sciences at the University of Virginia, USA, and the current study was approved by the University of Ottawa Research Ethics Board (H-02-25-11349), Canada.

Implicit Association Test for Physical Disability

Assessment of Implicit Attitudes

The physical disability IAT is designed to assess implicit attitudes toward people with and without physical disabilities. In other words, this test measures the strength of automatic associations between the target concepts (i.e., people with vs. without physical disabilities) and evaluative attributes (i.e., good vs. bad). The underlying principle is that participants respond more quickly when strongly associated categories share the same response key, reflecting implicit associations.

Procedures

Participants completed a series of categorization tasks, totaling 180 trials, in which they sorted words and images appearing on a computer screen into groups by pressing designated keys on a keyboard. The categories appeared on the left and right sides of the screen, and participants were instructed to press the "E" key if the presented stimulus belonged to the left-side category and the "I" key if it belonged to the right-side category. Participants were asked to respond as quickly and accurately as possible. If a participant placed a stimulus in the incorrect category, a red "X" appeared on the screen, and the correct response had to be selected before proceeding to the next trial. Participants performed seven sequential blocks (Fig. 1A): (1) Participants categorized 12 images (Fig. 1B) of people with or without physically disabilities into the respective categories: "physically disabled people" and "physically abled people". (2) Participants categorized 16 words (Fig. 2C) into evaluative attribute categories (good vs. bad). (3) The disability and attribute categories were paired for 20 trials. For example, "physically disabled people" and "good" shared the same response key, while "physically abled people" and "bad" shared the other key. (4) The third block was repeated with 40 additional trials. (5) Similar to the first block of 20 trials but "physically disabled people" and "physically abled people" switched sides. (6) Similar to the third block of 20 trials but with a different pairing (e.g., "physically disabled people" and "bad" shared the same response key, while "physically abled people" and "good" shared the other key). (7) The sixth block was repeated with 40 additional trials. Before each block, participants were provided detailed on-screen instructions, explaining the category pairing for the upcoming block and emphasizing the need for speed and accuracy. The same 6 images were used for each target concept across series (Fig. 1B). For each series, a set of 8 words was randomly selected from a set of 16 words for each attribute (Fig. 1C).

Outcome Variables

Implicit Attitudes

Implicit attitudes toward people with and without physical disabilities were assessed using the D-score measure,[35] which is based on participants' performance on blocks 3, 4, 6, and 7 of the physical disability IAT. This measure divides the difference between the mean response latency on the stereotype-consistent trials (i.e., "physically disabled people" paired with "bad" and "physically abled people" paired with "good") and the mean response latency on the stereotype-inconsistent trials (i.e., "physically disabled people" paired with "good" and "physically abled people" paired with "bad") by the standard deviation of all the latencies across the four blocks:

$$D\ score = \frac{\text{Mean latency (stereotype inconsistent trials)} - \text{Mean latency (stereotype consistent trials)}}{\text{Standard Deviation of all latencies}}$$

Error trials were included. Trials with response latencies below 400 ms and above 10,000 ms were excluded to reduce the influence of random or disengaged responses, and participants with more than 10% of trials below 300 ms were excluded to ensure data validity.[35] D-scores typically range from about –2 to 2. A positive D-score indicates that participants responded faster on stereotype-consistent trials than on stereotype-inconsistent trials, reflecting an implicit preference for people without physical disabilities. A negative D-score indicates the opposite, reflecting an implicit preference for people with physical disabilities. D-scores are interpreted as follows: no implicit preference ($|D| < 0.15$), slight implicit preference ($0.15 \leq |D| < 0.35$), moderate implicit preference ($0.35 \leq |D| < 0.65$), and strong implicit preference ($|D| \geq 0.65$) (Fig. 2C).

Explicit Attitudes

Explicit attitudes were assessed using a 7-point Likert scale in which participants rated their preference for people with or without physical disabilities. A score of 1 indicated a strong preference for people with disabilities, 4 indicated no preference, and 7 indicated a strong preference for people without disabilities. Specifically, this measure was based on the question "Which statement best describes you?", with response options as follows: (1) "I strongly prefer physically disabled people to physically abled people", (2) "I moderately prefer physically disabled people to physically abled people", (3) "I slightly prefer physically disabled people to physically abled people", (4) "I like physically disabled people and physically abled people equally", (5) "I slightly prefer physically abled people to physically disabled people", (6) "I moderately prefer physically abled people to physically disabled people", and (7) "I strongly prefer physically abled people to physically disabled people" (Fig. 2D).

Explanatory Variables

Occupation. Participants' occupation was determined by their response to the item: "Please select the most appropriate occupation category". Participants who selected "Healthcare – Diagnosing and treating practitioners (MD, dentist, etc.)" were categorized as clinicians, while those who selected "Healthcare – Occupational and physical therapist assistants" were categorized as rehabilitation assistants. All other occupations were categorized as "other occupations". A complete list of occupation categories is available in Suppl. List 1.

Age. Age was treated as a continuous variable calculated as the difference between the year of data collection and the year of birth. As the focus of our study was on occupation, participants under the age of 20 and over the age of 70 were excluded from the analyses.

Sex. Participants' sex was determined by the question "What sex were you assigned at birth, on your original birth certificate?"

Personal Experience of Disability. Personal experience of disability was derived from two questions: "Do you have a disability or learning difficulty?" and "Do you have a close friend or family member with a disability or learning difficulty?" Responses to these questions were combined into a new categorical variable, where people who answered "yes" to either question were classified as having personal experience of disability, while those who answered "no" to both questions were classified as having no personal experience of disability.

Education Level. Education level was categorized into three groups based on participants' responses to the question: "Please indicate the highest level of education that you have completed". Participants who selected "elementary school", "junior high or middle school", "some high school", or "high school graduate" were categorized as having primary or secondary education. Participants who selected "some college", "associate's degree", or "bachelor's degree" were categorized as having college or undergraduate education. Participants who selected "some graduate school", "master's degree", "M.B.A.", "J.D.", "M.D.", "Ph.D.", or "other advanced degree" were categorized as having graduate or postgraduate education.

Geographic Region. Geographic region of residence was derived from the question: "What is your country/region of primary residence?". The numeric country codes from participants' responses were merged with the Standard Country or Area Codes for Statistical Use.[36] The resulting categorical variable included six geographic regions: Africa, Asia, Europe, Latin America and the Caribbean, Northern America, and Oceania.

Race. Race was determined by the question: "What is your race or ethnicity?" Participants selected from eight predefined categories: "American Indian or Alaska Native", " Asian", "Black or African American", "Hispanic", "Middle Eastern", "Pacific Islander", "Multiracial, other, or unknown", "White".

Year. The year of data collection was included in the models as a continuous variable.

Statistical Analyses

Main Analyses

All analyses were conducted in R version 4.4.1.[37] In agreement with good research practices,[38] the analysis scripts are available on Zenodo.[39] To examine the relationship between attitudes and occupation, multiple linear regression models were fitted using the lm() function with the D-score (implicit attitudes) or the Likert score (explicit attitudes) as the outcome, occupation as the exposure, and age, sex, personal experience of disability, education level, geographic region, race, year of data collection, and the other type of attitudes as control variables. Continuous variables were standardized. The significance level (α) was set at 0.05 for all statistical tests. Because the absence of statistical significance should not be interpreted as the absence of an effect,[40] we conducted equivalence tests to further examine the nonsignificant effect of occupation on implicit attitudes.

Equivalence Testing

Equivalence testing is a statistical method used to formally demonstrate that two groups do not differ by more than a specified margin. Here, this method was used to determine whether clinicians and rehabilitation assistants had implicit attitudes that were statistically equivalent to those of individuals in other occupations. We used the tsum_TOST() function of the TOSTER package[41] to conduct two-sample equivalence tests based on Welch's two-sample t-test approach,

comparing clinicians and rehabilitation assistants to the reference group (other occupations). The equivalence bounds for the D-score were set based on a smallest effect size of interest (SESOI) of ± 0.15, consistent with the interpretation thresholds described above. The SESOI was scaled by multiplying it by the residual standard error from the multiple linear regression model.[42]

Estimated D-scores, standard errors, and sample sizes were derived from the multiple linear regression model. The residual standard error from this model was used for the reference group. The null hypothesis for the equivalence test was that the effect was greater than the equivalence bounds, while the alternative hypothesis was that the effect was within the equivalence bounds. Thus, a significant result would indicate that the implicit attitudes of clinicians or rehabilitation assistants are statistically equivalent to those of individuals in other occupations.

Table 1. Descriptive characteristics of the study sample by occupation group

Exposures	**Clinicians** (n = 6445)	**Rehabilitation Assistants** (n = 3482)	**Other Occupations** (n = 203,264)
	Mean ± SD or Count (%)	Mean ± SD or Count (%)	Mean ± SD or Count (%)
Implicit Attitudes	0.54 (0.44)	0.50 (0.44)	0.54 (0.44)
Explicit Attitudes	4.38 ± 0.77	4.25 ± 0.73	4.30 ± 0.82
Age	35.0 ± 12.3	28.7 ± 9.7	34.2 ± 12.4
Female Participant	4650 (72.2)	2914 (83.7)	156,161 (76.8)
Personal Experience of Disability	3803 (59.0)	2236 (64.2)	138,019 (67.9)
Education Level			
Primary or Secondary	62 (1.0)	133 (3.8)	15,920 (7.8)
College or Undergraduate	1270 (19.7)	1625 (46.7)	70,085 (34.5)
Graduate or Postgraduate	5113 (79.3)	1724 (49.5)	117,259 (57.7)
Geographic Region			
Africa	47 (0.7)	17 (0.5)	2694 (1.3)
Asia	221 (3.4)	90 (2.6)	10,422 (5.1)
Europe	183 (2.8)	90 (2.6)	9501 (4.7)
Latin America and the Caribbean	126 (2.0)	51 (1.5)	6614 (3.3)
Northern America	5764 (89.4)	3159 (90.7)	170,761 (84.0)
Oceania	104 (1.6)	75 (2.1)	3272 (1.6)
Race			
American Indian or Native People	37 (0.6)	19 (0.6)	2244 (1.1)
Asian People	895 (13.9)	289 (8.3)	17,026 (8.4)
Black or African American People	332 (5.1)	172 (4.9)	18,478 (9.1)
Hispanic People	238 (3.7)	135 (3.9)	12,824 (6.3)
Middle Eastern People	84 (1.3)	23 (0.7)	1323 (0.6)
Multiracial, Other, or Unknown	358 (5.5)	184 (5.3)	13,851 (6.8)
Pacific Islander People	17 (0.3)	12 (0.3)	759 (0.4)
White People	4484 (69.6)	2648 (76.0)	136,759 (67.3)

RESULTS

Descriptive Results

A total of 213,191 participants from three occupation groups were included in the study (Table 1): clinicians (n = 6445), rehabilitation assistants (n = 3482), and participants in other occupations (n = 203,264). Implicit attitudes were similar across occupation groups, with clinicians scoring 0.54 ± 0.44, rehabilitation assistants 0.50 ± 0.44, and participants in other occupations 0.54 ± 0.44. Explicit attitudes were similar across occupation groups, with clinicians scoring 4.38 ± 0.77, rehabilitation assistants 4.25 ± 0.73, and participants in other occupations 4.30 ± 0.82. The

mean age of clinicians was 35.0 ± 12.3 years, which was older than rehabilitation assistants (28.7 ± 9.7 years) and similar to participants in other occupations (34.2 ± 12.4 years). Female participants represented 72.2% of clinicians, 83.7% of rehabilitation assistants, and 76.8% of participants in other occupations. A larger proportion of participants in all occupation groups had personal experience of disability, either themselves, a family member, or a friend with 59.0% of clinicians, 64.2% of rehabilitation assistants, and 67.9% of participants in other occupations reporting such experience. Education level varied between occupation groups. Most clinicians (79.3%) had a graduate or postgraduate degree, while 19.7% had a college or undergraduate education, and 1.0% had a primary or secondary education. Among rehabilitation assistants, 49.5% had a graduate or postgraduate degree, 46.7% had a college or undergraduate education, and 3.8% had a primary or secondary education. In other occupations, these proportions were 57.7%, 34.5%, and 7.8%, respectively. Most clinicians (89.4%) and rehabilitation assistants (90.7%) were from Northern America, with lesser representation from other regions. Regarding race, 69.6% of clinicians, 76.0% of rehabilitation assistants, and 67.3% of participants in other occupations identified as White people. Asian people were the second most represented race (8.3 to 13.9%).

Statistical Results

Implicit Attitudes – All Occupations

The multiple linear regression model explained 6.1% of the variance in implicit attitudes (adjusted $R^2 = 0.061$). The overall fit of the model was significant ($F(21,213169) = 666.71$; $P < 2.0 \times 10^{-16}$), with a residual standard error of 0.4271, indicating a moderate fit to the data.

Results showed no evidence suggesting that clinicians (b = 0.0017 [95% CI: -0.0090 to 0.0125]; $P = .752$) or rehabilitation assistants (b = 0.0075 [95% CI: -0.0069 to 0.0218]; $P = .307$) differed from individuals in other occupations on implicit attitudes (Fig. 2A; Fig. 3A). This absence of significant differences, combined with a significantly positive intercept (b = 0.5164 [95% CI: 0.5068 to 0.5261]; $P < 2.0 \times 10^{-16}$) representing the mean implicit attitude score for individuals in other occupations, indicated that all occupational groups had a D-score significantly greater than zero, i.e., an implicit preference for people without physical disabilities (Fig. 2C).

Age was positively associated with implicit attitudes (b = 0.0709 [95% CI:0.0690 to 0.0728]; $P < 2.0 \times 10^{-16}$), with older participants showing less favorable implicit attitudes toward people with physical disabilities. Specifically, the D-score increased by 0.071 for each standard deviation increase in age and by 0.006 for each additional year of age. Sex was associated with implicit attitudes, with male participants showing less favorable implicit attitudes toward people with physical disabilities compared to female participants (b = 0.1066 [95% CI: 0.1022 to 0.1110]; $P < 2.0 \times 10^{-16}$). Personal experience of disability was associated with implicit attitudes (b = 0.0568 [95% CI: 0.0528 to 0.0607]; $P < 2.0 \times 10^{-16}$), with participants who had experienced disability themselves or in their family or friends having more favorable implicit attitudes toward people with physical disabilities than those who had not. Higher levels of education were associated with more favorable implicit attitudes toward people with physical disabilities. Specifically, participants with a college or undergraduate education (b = -0.0303 [95% CI: -0.0374 to -0.0232]; $P < 2.0 \times 10^{-16}$) and those with graduate or postgraduate education (b = -0.0756 [95% CI: -0.0831 to -0.0682]; $P < 2.0 \times 10^{-16}$) had more favorable attitudes than participants with primary or secondary education. Regarding geographic regions, participants from Africa (b = 0.0339 [95% CI: .0177 to 0.0500]; $P = 3.9 \times 10^{-5}$), Europe (b = 0.0170 [95% CI: 0.0082 to 0.0258]; $P = 1.5 \times 10^{-4}$), and Asia (b = 0.0142 [95% CI: 0.0055 to 0.0229]; $P = 1.3 \times 10^{-3}$) had less favorable implicit

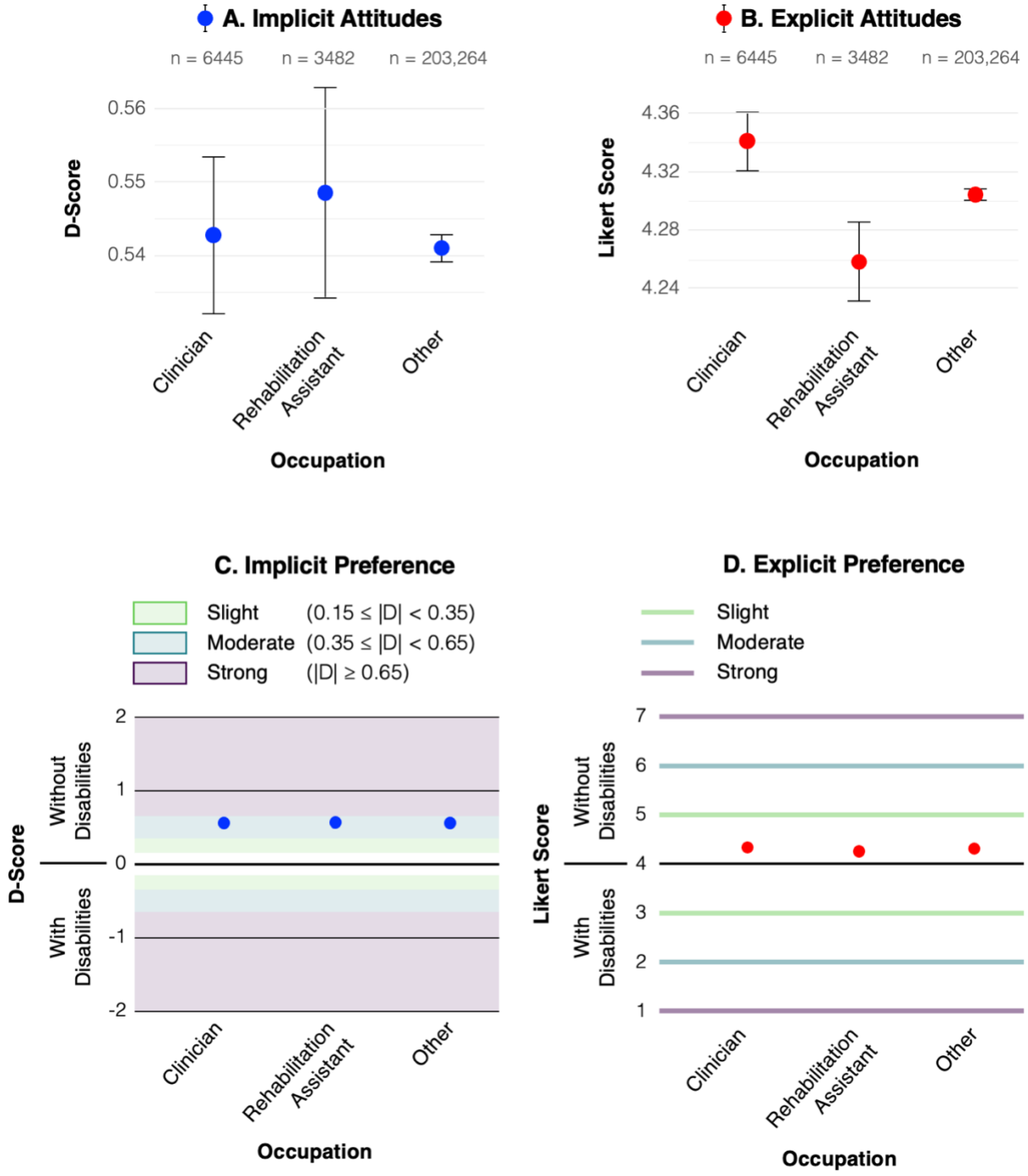

Figure 2. Estimated implicit (A) and explicit (B) attitudes toward physical disability across occupation groups. D-scores between 0.35 and 0.65 indicate a moderate implicit preference (C). On the 7-point Likert scale used to test explicit attitudes, a score of 4 was associated with "I like physically disabled people and physically abled people equally" (D). And a score of 5 was associated with "I slightly prefer physically abled people to physically disabled people". Points represent model-based estimated means from the linear regressions adjusting for age, sex, explicit attitudes (A), implicit attitudes (B), personal experience of disability, education level, geographic region, and race. Error bars indicate 95% confidence intervals.

attitudes toward people with physical disabilities than participants from the other regions. Implicit attitudes differed by race, with Black or African American (b = 0.0719 [95% CI: 0.0654 to 0.0785]; $P = < 2.0 \times 10^{-16}$) and Asian (b = 0.0399 [95% CI: 0.0330 to 0.0468]; $P < 2.0 \times 10^{-16}$) participants showing less favorable implicit attitudes toward people with physical disabilities compared to the other racial categories, whereas American Indian or Alaska Native (b = -0.0190 [95% CI: -0.0366to -0.0013]; $P = .035$), Hispanic (b = -0.0158 [95% CI: -0.0236 to -0.0080]; $P = 7.4 \times 10^{-5}$), and multiracial people or from another race (b = -0.0157 [95% CI: -0.0231 to -0.0084]; $P = 2.8 \times 10^{-5}$) showed more favorable implicit attitudes. Implicit attitudes toward people with physical disabilities became less favorable over the years of data collection (b = 0.0099 [95% CI: 0.0080 to 0.0118]; $P < 2.0 \times 10^{-16}$). Explicit attitudes were positively associated with implicit attitudes (b = 0.0483 [95% CI: 0.0464 to 0.0501]; $P < 2.0 \times 10^{-16}$). Specifically, the D-score increased by 0.048 for each standard deviation increase in the Likert score and by 0.058 for each unit increase in the Likert score. The other effects were not significant (Suppl. Table 1)

Equivalence Testing

To assess the equivalence of implicit attitudes between occupation groups, we conducted two equivalence tests with a SESOI of ± 0.15, scaled by the residual standard error from the linear regression model (0.4271), yielding equivalence bounds of ± 0.0642 in Cohen's d. These bounds correspond to ± 0.0194 on the raw D-score scale.

The equivalence test comparing implicit attitudes between clinicians and individuals in other occupations was significant (t(205211.16) = -18.60, $P < 2.0 \times 10^{-16}$). The 90% CI for the difference in implicit attitudes between clinicians and people in other occupations ranged from 0.0002 to 0.0033. Since this difference fell within the equivalence bounds of ± 0.0194, the implicit attitudes of clinicians and those in other occupations were considered equivalent.

The equivalence test comparing implicit attitudes between rehabilitation assistants and individuals in other occupations was significant (t(206743.97) = -12.47; $P < 2.0 \times 10^{-16}$). The 90% CI for the difference in implicit attitudes between rehabilitation assistants and people in other occupations ranged from 0.0059 to 0.0091. Since this difference fell within the equivalence bounds, the implicit attitudes of rehabilitation assistants and those in other occupations were considered equivalent.

Explicit Attitudes – All Occupations

The multiple linear regression model explained 3.4% of the variance in explicit attitudes (adjusted $R^2 = 0.034$). The overall fit of the model was significant ($F(21,213169) = 353.4$; $P < 2.0 \times 10^{-16}$), with a residual standard error of 0.803, indicating a moderate fit to the data.

Results showed less favorable explicit attitudes toward people with physical disabilities in clinicians than among individuals in other occupations (b = 0.0364 [95% CI: 0.0161 to 0.0568]; $P = 4.6 \times 10^{-4}$), whereas rehabilitation assistants showed more favorable explicit attitudes (b = -0.0459 [95% CI: -0.0731 to -0.0187]; $P = 9.4 \times 10^{-4}$) (Fig. 2B, Fig. 3B). To test whether explicit attitudes were significantly greater than a Likert score of 4 representing "I like physically disabled people and physically abled people equally", we re-leveled the model to set the group with the lowest explicit attitude (rehabilitation assistants) as the reference group. Results of this model showed that the intercept, which represents the mean explicit attitude score for rehabilitation assistants, was estimated at 4.172 with a standard error of 0.0154. To determine whether this value was significantly above 4, a one-sample t-test was conducted by dividing the difference between the intercept and 4 by its standard error, yielding a t-value of 11.16 ($P < 2.0 \times 10^{-16}$). This result

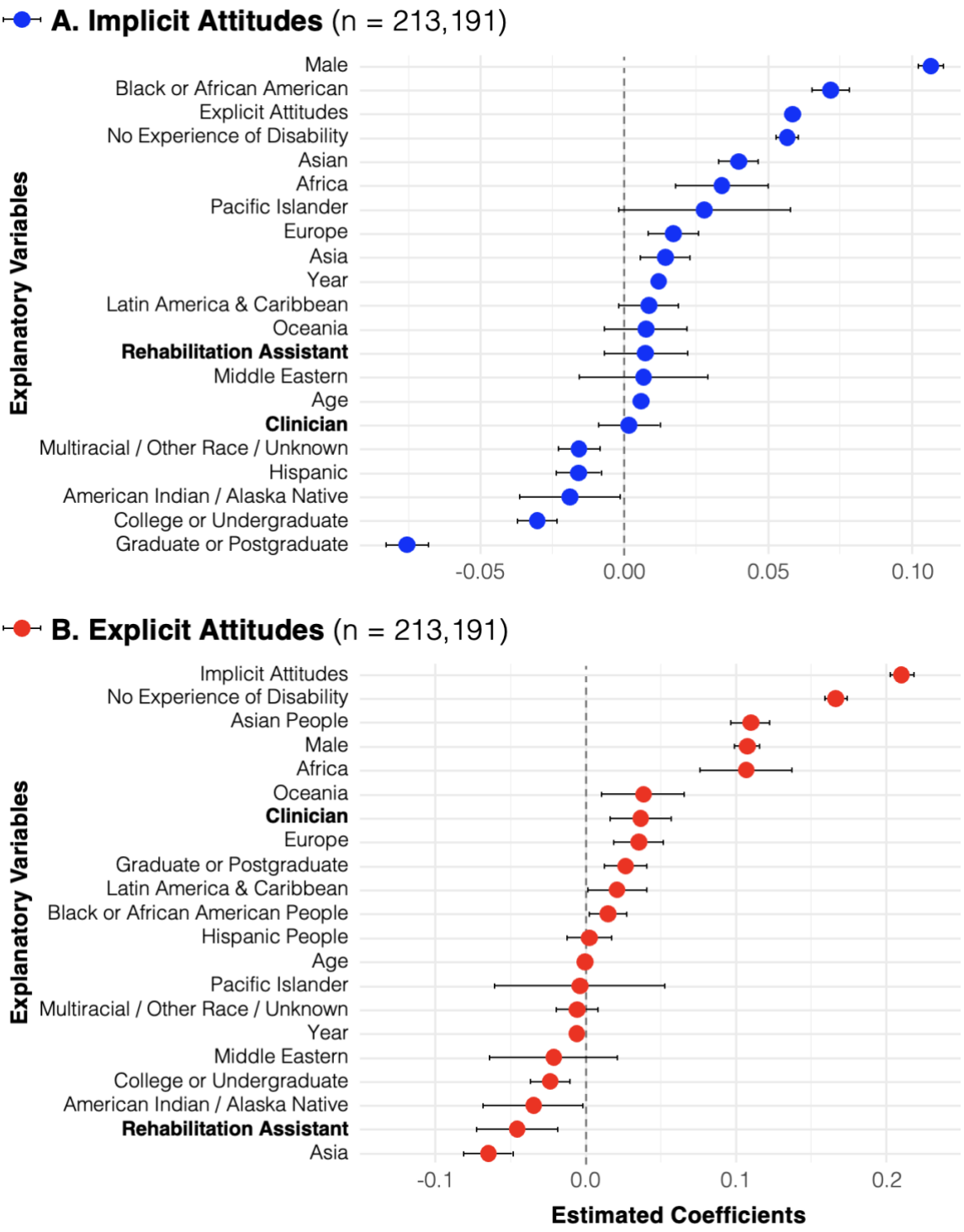

Figure 3. Regression coefficients from the linear models examining the association between explanatory variables with less favorable (negative coefficient) or more favorable (positive coefficient) implicit (A) and explicit (B) attitudes toward people with physical disabilities in all participants, relative to the reference categories. The reference categories are "other occupation", "female", "personal experience of disability", "Northern America", "White race", and "primary or secondary education". The figure shows the estimated coefficients (points) and 95% confidence intervals (error bars). For clarity, the continuous variables (i.e., age, explicit attitudes, implicit attitudes, year of data collection) are presented in their original units.

confirmed that explicit attitudes in rehabilitation assistants were significantly greater than 4. Since clinicians (b = 0.0823, [95% CI: 0.0488 to 0.1158]; $P = 1.4 \times 10^{-6}$) and participants in other occupations had significantly higher explicit attitude scores than rehabilitation assistants, it follows that all occupational groups had an explicit preference for people without physical disabilities (Fig. 2D).

Sex was associated with explicit attitudes, with male participants showing less favorable explicit attitudes toward people with physical disabilities than female participants (b = 0.1076 [95% CI: 0.0992 to 0.1159]; $P < 2.0 \times 10^{-16}$). Personal experience of disability was associated with explicit attitudes (b = 0.1665 [95% CI: 0.1590 to 0.1740]; $P < 2.0 \times 10^{-16}$), with participants who had experienced disability themselves or in their family or friends showing more favorable implicit attitudes toward people with physical disabilities than participants who had not this experience. Participants with graduate or postgraduate education reported less favorable explicit attitudes toward people with physical disabilities than participants with primary or secondary education (b = 0.0263 [95% CI: 0.0122 to 0.0405]; $P = 2.6 \times 10^{-4}$), whereas participants with a college or undergraduate degree showed more favorable explicit attitudes (b = -0.0238 [95% CI: -0.0372 to -0.01041]; $P = 4.9 \times 10^{-4}$). Participants residing in Africa (b = 0.1067 [95% CI: 0.0761 to 0.1373]; $P = 8.1 \times 10^{-12}$), Oceania (b = 0.0383 [95% CI: 0.0185 to 0.0519]; $P = 6.1 \times 10^{-3}$), Europe (b = 0.0352 [95% CI: 0.0185 to 0.0519]; $P = 3.6 \times 10^{-5}$), and Latin America and the Caribbean (b = 0.0210 [95% CI: 0.0013 to 0.0407]; $P = .037$) showed less favorable explicit attitudes toward people with physical disabilities than participants from Northern America, whereas participants residing in Asia showed more favorable explicit attitudes (b = -0.0651 [95% CI: -0.0816 to -0.0486]; $P = 9.7 \times 10^{-15}$). Explicit attitudes differed by race, with Asian (b = 0.1096 [95% CI: 0.0966 to 0.1227]; $P < 2.0 \times 10^{-16}$) and Black or African American (b = 0.0149 [95% CI: 0.0026 to 0.0273]; $P = .018$) participants showing less favorable explicit attitudes toward people with physical disabilities than White participants and the other racial categories, whereas American Indian or Alaska Native participants showed more favorable explicit attitudes (b = -0.0350 [95% CI: -0.0683 to -0.0016]; $P = .040$). Explicit attitudes toward people with physical disabilities became more favorable over the years of data collection (b = -0.0047 [95% CI: -0.0083 to -0.0011]; $P = .010$). Explicit attitudes were positively associated with implicit attitudes (b = 0.0927 [95% CI: 0.0892 to 0.0963]; $P < 2.0 \times 10^{-16}$). Specifically, the Likert score increased by 0.093 for each standard deviation increase in the D-score and by 0.211 for each unit increase in the D-score. The other effects were not significant (Suppl. Table 2).

Attitudes in Clinicians

Analysis of implicit attitudes showed that male (b = 0.1301 [95% CI: 0.1068 to 0.1534]; $P < 2 \times 10^{-16}$) and older (b = 0.0719 [95% CI: 0.0609 to 0.0829]; $P < 2 \times 10^{-16}$) clinicians had less favorable implicit attitudes toward people with physical disabilities than female and younger clinicians, respectively (Fig. 4A). Specifically, the D-score increased by 0.072 for each standard deviation increase in age and by 0.006 for each additional year of age (Fig. 5A). Clinicians who reported no personal experience of disability showed less favorable implicit attitudes toward people with physical disabilities compared to clinicians who had this experience (b = 0.0460 [95% CI: 0.0245 to 0.0675]; $P = 2.7 \times 10^{-5}$). Implicit attitudes toward people with physical disabilities became less favorable over the years of data collection (b = 0.0112 [95% CI: 0.0005 to 0.0219]; $P = .040$). Explicit and implicit attitudes were positively associated (b = 0.0546 [95% CI: 0.0441 to 0.0651]; $P < 2 \times 10^{-16}$). Specifically, the D-score increased by 0.055 for each standard deviation

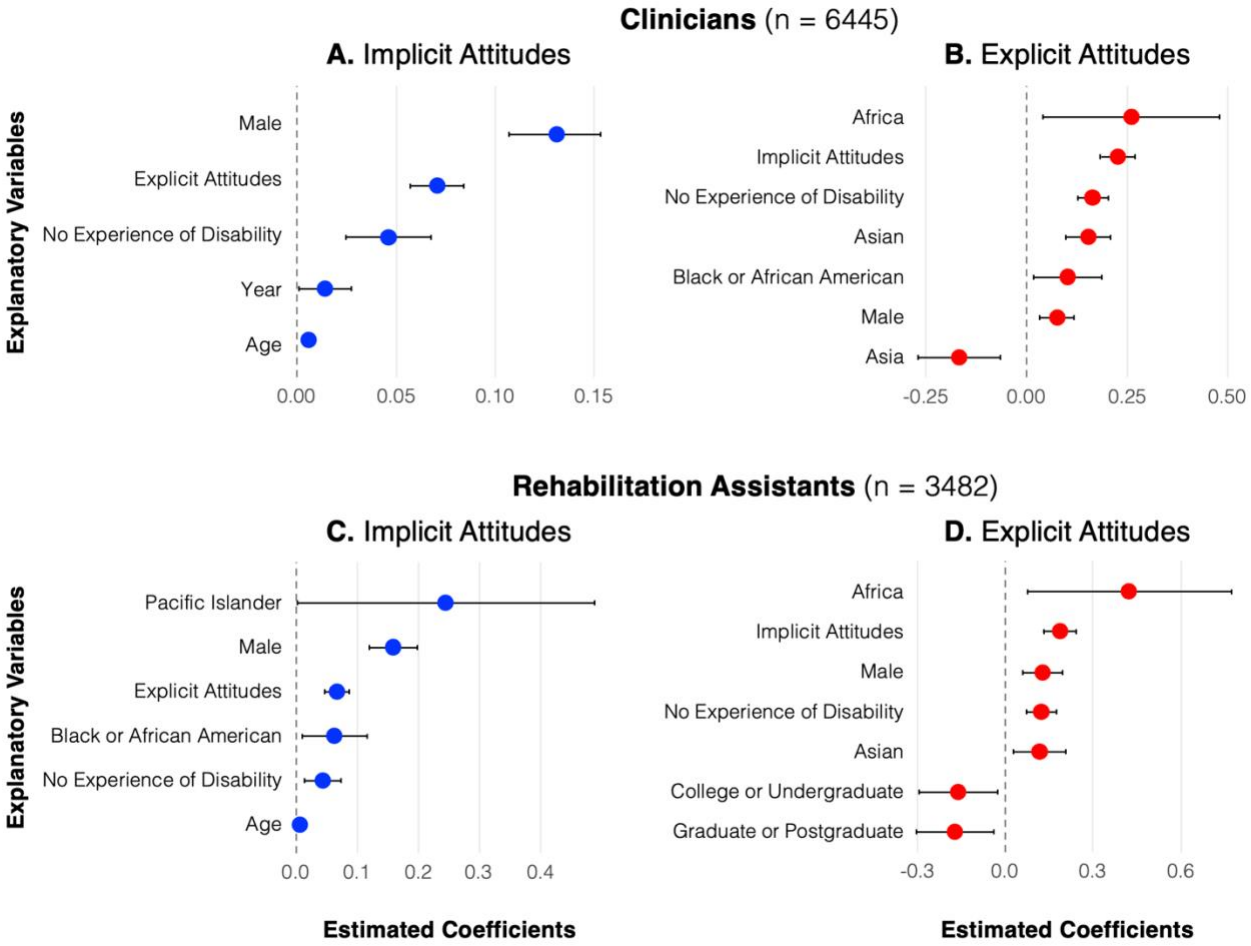

Figure 4. Regression coefficients from the linear models significantly associating explanatory variables with less favorable (negative) of more favorable (positive) implicit (left panel) and explicit (right panel) attitudes toward people with physical disabilities, relative to the reference categories, in clinicians (top panel) and rehabilitation assistants (bottom panel). Positive coefficients indicate less favorable attitudes toward people with physical disabilities, whereas negative coefficients indicate more favorable attitudes toward people with physical disabilities. The reference categories are "female", "personal experience of disability", "Northern America", "White race", "primary or secondary education". The figure displays estimated coefficients (points) with 95% confidence intervals (error bars). For clarity, continuous variables (i.e., age, explicit attitudes, implicit attitudes, year of data collection) are presented in their original units.

increase in the Likert score and by 0.071 for each unit increase in the Likert score (Fig. 5B). The other effects were not statistically significant (Suppl. Table 3).

Analysis of explicit attitudes showed that male clinicians had less favorable explicit attitudes toward people with physical disabilities than female clinicians (b = 0.0761 [95% CI: 0.0339 to 0.1184]; $P = 4.1\times 10^{-4}$) (Fig. 4B). Clinicians who reported no personal experience of physical disabilities had less favorable implicit attitudes toward people with physical disabilities than clinicians who had this experience (b = 0.1651 [95% CI: 0.1266 to 0.2035]; $P < 2 \times 10^{-16}$). Geographic region of residence was associated with explicit attitudes, with clinicians from Asia displaying more favorable explicit attitudes toward people with physical disabilities than people

from Northern America (b = -0.1671 [95% CI: -0.2703 to -0.0638]; $P = 1.5 \times 10^{-3}$), and clinicians from Africa showing less favorable explicit attitudes (b = 0.2610 [95% CI: 0.0424 to 0.4797]; P = .019). Explicit attitudes differed by race, with Asian (b = 0.1541 [95% CI: 0.0984 to 0.2098]; $P = 6.1 \times 10^{-8}$) and Black or African American (b = 0.1043 [95% CI: 0.0193 to 0.1892]; P = .016) clinicians showing less favorable explicit attitudes toward people with physical disabilities than White clinicians. Implicit and explicit attitudes were positively associated (b = 0.0994 [95% CI: 0.0804 to 0.1185]; $P < 2 \times 10^{-16}$). The other effects were not statistically significant (Suppl. Table 4).

Attitudes in Rehabilitation Assistants

The analysis of implicit attitudes showed that male (b = 0.1590 [95% CI: 0.1196 to 0.1985]; $P = 3.5 \times 10^{-15}$) and older (b = 0.0564 [95% CI: 0.0416 to 0.0711]; $P = 1.0 \times 10^{-13}$) rehabilitation assistants had less favorable implicit attitudes toward people with physical disabilities than female and younger rehabilitation assistants, respectively (Fig. 4C). Specifically, the D-score increased by 0.056 for each standard deviation increase in age and by 0.006 for each additional year of age (Fig. 5A). Rehabilitation assistants who reported no personal experience of disability themselves or in the family or friends showed less favorable implicit attitudes toward people with physical disabilities compared to rehabilitation assistants who had this experience (b = 0.0426 [95% CI: 0.0123 to 0.0729]; $P = 5.9 \times 10^{-3}$). Implicit attitudes differed by race, with Asian (b = 0.0619 [95% CI: 0.0089 to 0.1150]; P = .022) and Pacific Islander (b = 0.2449 [95% CI: 0.0013 to 0.4885]; P = .049) rehabilitation assistants showing less favorable explicit attitudes toward people with physical disabilities than White rehabilitation assistants. Implicit and explicit attitudes were positively associated (b = 0.0489 [95% CI: 0.0344 to 0.0633]; P = 3.9×10^{-11}). Specifically, the D-score increased by 0.049 for each standard deviation increase in the Likert score and by 0.067 for each unit increase in the Likert score (Fig. 5B). The other effects were not statistically significant (Suppl. Table 5).

Analysis of explicit attitudes showed that male rehabilitation assistants had less favorable explicit attitudes toward people with physical disabilities than female rehabilitation assistants (b = 0.1295 [95% CI: 0.0627 to 0.1963]; $P = 1.5 \times 10^{-4}$) (Fig. 4D). Rehabilitation assistants with no personal experience with disability had less favorable explicit attitudes toward people with physical disabilities (b = 0.1252 [95% CI: 0.0744 to 0.1761]; $P = 1.4 \times 10^{-6}$). Rehabilitation assistant from Africa (b = 0.4234 [95% CI: 0.0777 to 0.7691]; P = .016) and Asian rehabilitation assistants (b = 0.1196 [95% CI: 0.0303 to 0.2088]; $P = 8.6 \times 10^{-3}$) showed less favorable explicit attitudes toward people with disabilities than rehabilitation assistants from Northern America and White rehabilitation assistants, respectively. Rehabilitation assistants with college or undergraduate education (b = -0.1679 [95% CI: -0.2986 to -0.0372]; P = .012) and graduate or postgraduate education (b = -0.1567 [95% CI: -0.2895 to -0.0239]; P = .021) had more favorable explicit attitudes toward people with physical disabilities than rehabilitation assistants with primary or secondary education. Implicit and explicit attitudes were positively associated (b = 0.0833 [95% CI: 0.0587 to 0.1080]; P = 3.9×10^{-11}). The other effects were not statistically significant (Suppl. Table 6).

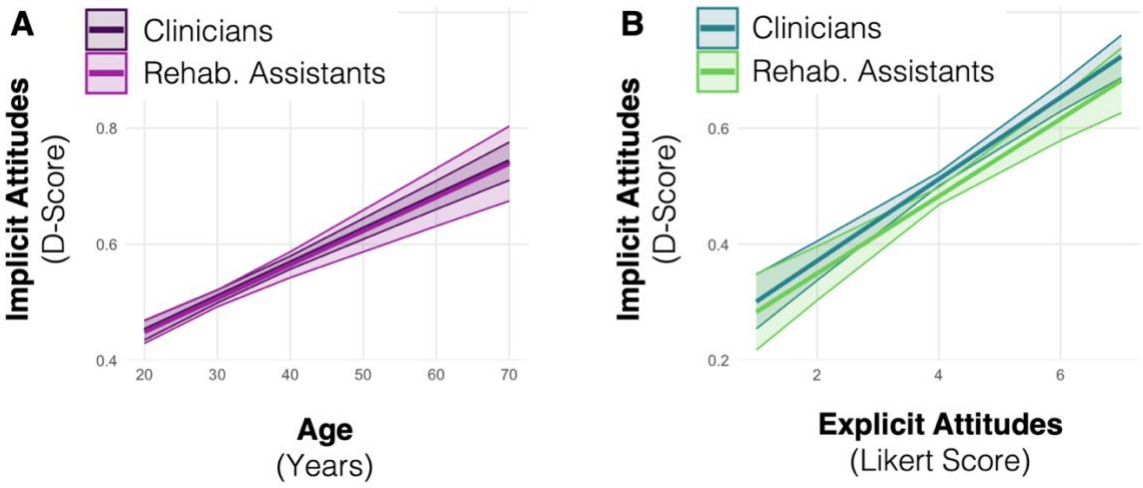

Figure 5. Estimated effect of age (A) and explicit attitudes (B) on the implicit preference for people without physical disabilities (positive D-score) in clinicians and rehabilitation assistants. The shaded area represents the 95% confidence interval.

DISCUSSION

Main Findings

The present study examined implicit and explicit attitudes toward physical disability among clinicians, rehabilitation assistants, and individuals in other occupations using a large-scale dataset. Results indicated that all occupational groups exhibited an implicit preference for people without physical disabilities, with D-scores reflecting a moderate implicit preference. Additionally, no significant differences were found between clinicians, rehabilitation assistants, and participants in other occupations in implicit attitudes, as confirmed by equivalence testing. Results also showed a slight explicit preference for people without physical disabilities in all occupation groups, but with small differences between professions: clinicians had less favorable explicit attitudes toward people with disabilities compared to those in other occupations, whereas rehabilitation assistants had more favorable explicit attitudes.

In healthcare practitioners, several demographic factors were significantly associated with implicit and explicit attitudes toward people with physical disabilities. Male participants exhibited less favorable implicit and explicit attitudes than female participants. Personal experience of disability was associated with more favorable implicit and explicit attitudes. Age was positively associated with implicit attitudes, with older participants showing less favorable implicit attitudes. Education attainment influenced explicit attitudes, with higher levels of education associated with more favorable attitudes. Residents of Africa and Asian healthcare practitioners showed less favorable explicit attitudes toward people with disabilities than practitioners from the other countries.

Comparison with the Literature

Our findings support previous research showing less favorable attitudes toward people with general disabilities in healthcare students and practitionners.[18,20] Specifically, similar to results from prior studies in healthcare professionals,[22-24] our findings showed a moderate implicit and slight explicit preference for people without disabilities, but with a focus on physical disabilities.

Similar to a study conducted in nursing and home health assistants,[25] we compared implicit and explicit attitudes between healthcare professionals and individuals in other occupations, but focused on clinicians and rehabilitation assistants. Consistent with the findings in nursing and home health assistants, differences in attitudes between healthcare professionals and individuals in other occupations were small or not significant, with differences raging from 0.00 to 0.05 on a D-score that typically ranges from -2 to 2, and from 0.04 to 0.09 on a 7-point Likert scale in both studies. Our small effect sizes suggest that healthcare practitioners, including clinicians and rehabilitation assistants, have only slightly different attitudes toward disability than the rest of the population. The minimal differences we found may reflect the enduring effects of decades of healthcare education that has been centered on the deficit framework.[10,11] Our findings suggest that ongoing educational shifts toward more inclusive approaches[9] should be pursued to reshape healthcare practitioners' attitudes toward physical disability. Although healthcare practitioners may recognize the importance of inclusion and accessibility, the persistent influence of the deficit framework may still shape their implicit and explicit attitudes, highlighting the need for further interventions to reduce biases and, in turn, improve the quality of care provided to people with disabilities.

Our results add to the evidence that male healthcare practitioners have less favorable implicit and explicit attitudes toward people with disabilities than female ones.[18,22,26-29] Our results support previous literature showing an association between age and attitudes toward people with general disabilities.[22] However, while our results showed that older age was associated with less favorable implicit attitudes toward physical disabilities, we found no evidence suggesting an association with explicit attitudes. Supporting a large body of previous research,[14,17,22,27,28,30-32] personal experience of disability, such as having a disability oneself, or having family members, friends, or acquaintances with a disability, was statistically significant in all the models we conducted.

Strengths and Limitations

A strength of our study is that it is the first to use the Implicit Project dataset to examine attitudes toward physical disability, whereas previous research has focused on disability in general. This focus on physical disability is important because attitudes can vary depending on the target concept, and because these attitudes are particularly relevant to rehabilitation. Another strength is the use of equivalence testing, which provides statistical evidence that implicit attitudes are equivalent across occupational groups.

Several limitations should be noted. First, due to the large-scale online data collection, we cannot rule out the possibility for selection bias (e.g., only participants interested in research or with high digital literacy may have participated). Second, the percentages of variance explained by the explanatory variables were modest. However, these variables may still be meaningful in large samples and contribute to a broader understanding of attitudes. Finally, the fact that the physical disability IAT on the Implicit Project website uses identity-first language (i.e., "physically disabled people"; "physically abled people") may be seen as a limitation because person-first language (i.e., "people with physical disabilities"; "people without physical disabilities") has traditionally been promoted as a way to reduce stigma.[43] However, recent literature suggests that person-first language in scientific writing may actually increase rather than decrease stigma.[44] Moreover, policies mandating the use of person-first language overlook the diverse language preferences among disabled people, including disabled researchers.[45] Accordingly, the American

Psychological Association (APA) now states that "both person-first and identity-first approaches to language are designed to respect disabled persons; both are fine choices overall".[46]

Conclusion

This study provides evidence of attitudes against people with physical disabilities among clinicians and rehabilitation assistants. Moreover, implicit and explicit attitudes toward people with physical disabilities were similar between healthcare practitioners and individuals in other occupations. While all occupation groups showed a moderate implicit preference for people without physical disabilities, explicit attitudes varied slightly, with clinicians showing less favorable explicit attitudes and rehabilitation assistants showing more favorable explicit attitudes than those in other occupations. These findings underscore the need for continued efforts to address ableism in healthcare by promoting disability-inclusive education and training.

ARTICLE INFORMATION

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Data and Code Sharing

In accordance with good research practices,[38] the R scripts used to analyze the data are publicly available in Zenodo.[39] The dataset and materials for the Implicit Association Test are available in the Project Implicit Demo Website Datasets, hosted on the Open Science Framework (OSF).[34]

Disclosure

The author completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest. ChatGPT (OpenAI) and DeepL were used to refine the language and improve readability of this manuscript.

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SUPPLEMENTARY MATERIAL

Supplementary Figure 1. Material used for the Disability Implicit Association Test (IAT), which was available on the Project Implicit demonstration website from 2004 to 2021.

Supplementary List 1. Occupation categories.

Supplementary Table 1. Association between occupation and implicit attitudes toward physical disability.

Supplementary Table 2. Association between occupation and explicit attitudes toward physical disability.

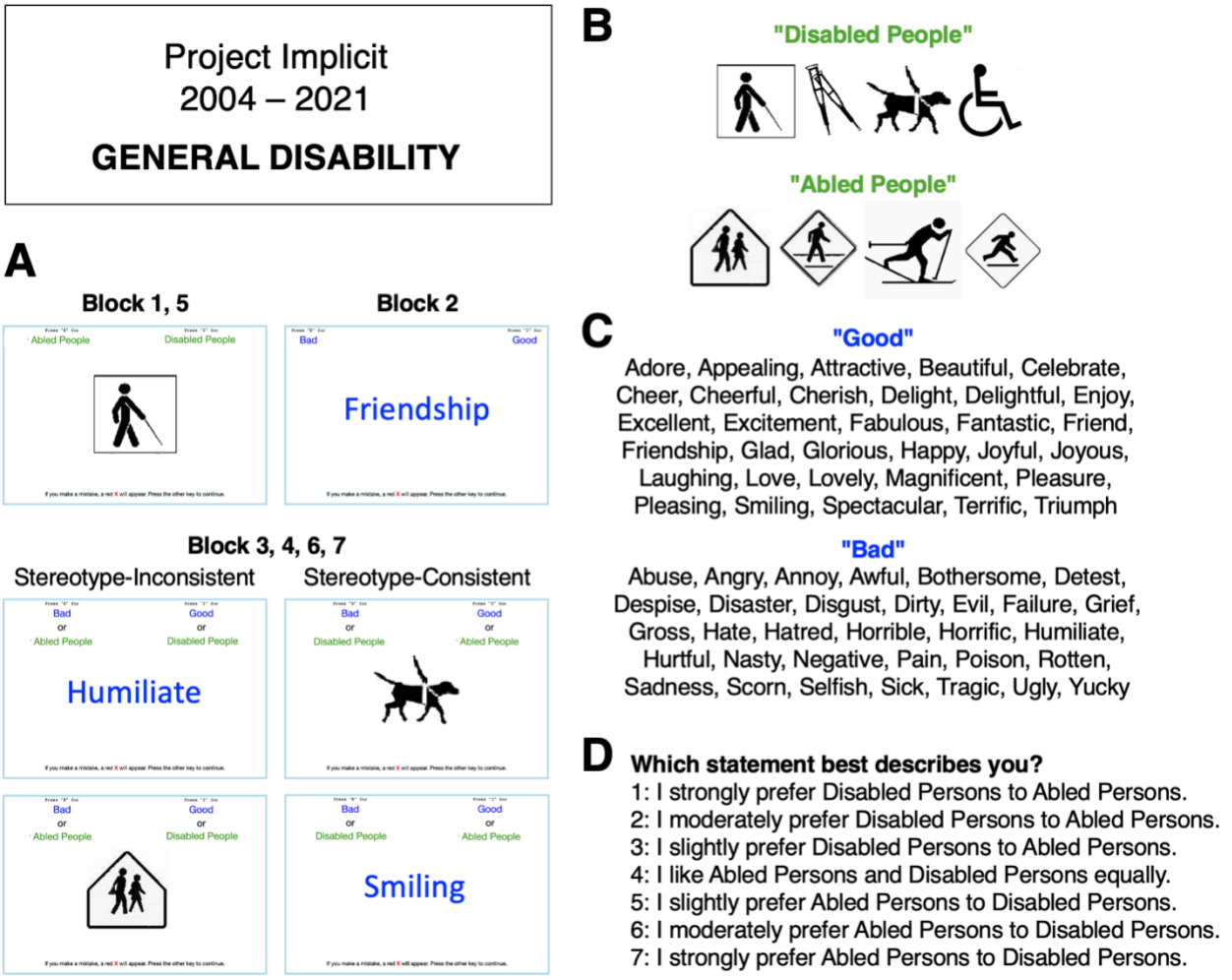
Supplementary Table 3. Explanatory factors of implicit attitudes toward physical disability in clinicians.

Supplementary Table 4. Explanatory factors of explicit attitudes toward physical disability in clinicians.

Supplementary Table 5. Explanatory factors of implicit attitudes toward physical disability in rehabilitation assistants.

Supplementary Table 6. Explanatory factors of explicit attitudes toward physical disability in rehabilitation assistants.

Supplementary Figure 1. Material used for the Disability Implicit Association Test (IAT), which was available on the Project Implicit demonstration website from 2004 to 2021. This IAT was used to test implicit (A, B, C) and explicit (D) attitudes toward "disabled people" and "abled people". In 2022, the Disability IAT on the Project Implicit demonstration website was modified to measure associations towards "physically disabled people" and "physically abled people". Previous studies used the IAT for general disability (2004-2021),[1-4] whereas our study used the IAT for physical disability (2022-2024).



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Supplementary List 1. Occupation categories

Administrative Support - Supervisors	Food Service - Supervisors	Protective services - Law Enforcement
Administrative Support - Financial Clerks	Food Service - Cooks and food prep	Protective Services - Other (e.g., security, lifeguards, crossing guards)
Administrative Support - Information and Records	Food Service - Servers	Repair/Installation - Supervisors
Administrative Support - Recording, Scheduling, Dispatching, Distributing	Food Service - Other food service workers (e.g., dishwasher, host)	Repair/Installation - Electrical and Electronic
Administrative Support - Secretaries and Assistants	**Healthcare - Diagnosing and Treating Practitioners (MD, Dentist, etc.)**	Repair/Installation - Vehicle and Mobile Equipment
Administrative Support - Other Support (data entry, office clerk, proofreaders)	Healthcare - Technologists and Technicians	Repair/Installation - Other
Arts/Design/Entertainment/Sports - Art and Design	Healthcare - Nursing and Home Health Assistants	Retired
Arts/Design/Entertainment/Sports - Entertainers and Performers	**Healthcare - Occupational and Physical Therapist Assistants**	Sales - Supervisors
Arts/Design/Entertainment/Sports - Media and communication	Healthcare - Other healthcare support	Sales - Retail
Arts/Design/Entertainment/Sports - Media Equipment workers	Homemaker or Parenting	Sales - Sales Representatives and Services
Business - Business Operations	Legal - Lawyers, Judges, and related workers	Sales - Wholesale and Manufacturing
Business - Financial Specialists	Legal - Legal support workers	Sales - Other sales (e.g., telemarketers, real estate)
Computer/Math - Computer Specialists	Maintenance - Building and Grounds Supervisors	Science - Life Scientists
Computer/Math - Math Scientists	Maintenance - Building workers	Science - Physical scientists
Computer/Math - Math Technicians	Maintenance - Grounds Maintenance	Science - Social Scientists
Construction/Extraction - Supervisors	Management - Top Executives	Science - Life, Physical, Social Science Technicians
Construction/Extraction - Construction Trades	Management - Advertising, Sales, PR, Marketing	Service and Personal Care - Supervisors
Construction/Extraction - Helpers, Construction Trades	Management - Operations Specialists	Service and Personal Care - Animal Care
Construction/Extraction - Extraction (e.g., mining, oil)	Management - Other Management Occupations	Service and Personal Care - Entertainment attendants
Construction/Extraction - Other	Military - Officer and Tactical Leaders/Managers	Service and Personal Care - Funeral Service
Education - Postsecondary Teachers	Military - First-line enlisted supervisor/manager	Service and Personal Care - Personal Appearance
Education - Primary, Secondary, and Special Ed Teachers	Military - enlisted tactical, air/weapons, crew, other	Service and Personal Care - Transportation, Tourism, Lodging
Education - Other teachers and instructors	Production - Supervisors	Service and Personal Care - Other service (e.g., child care, fitness)
Education - Librarians, Curators, Archivists	Production - Assemblers and Fabricators	Social Service - Counselors, Social Workers, Community specialists
Education - Other education, training, and library occupations	Production - Food processing	Social Service - Religious Workers
Education - Student	Production - Metal and Plastic	Transportation - Supervisors
Engineers/Architects - Architects, Surveyors, Cartographers	Production - Printers	Transportation - Air Transportation
Engineers/Architects - Engineers	Production - Textile, Apparel, Furnishings	Transportation - Motor Vehicle Operators
Engineers/Architects - Drafters, Engineering and Mapping Technicians	Production - Woodworkers	Transportation - Rail Transport
Farming, Fishing, Forestry - Supervisors	Production - Plant and System Operators	Transportation - Water Transport
Farming, Fishing, Forestry - Agriculture	Production - Other	Transportation - Material Moving
Farming, Fishing, Forestry - Fishing and Hunting	Protective Service - Supervisors	Transportation - Other
Farming, Fishing, Forestry - Forest, Conservation, Logging	Protective Services - Fire fighting and prevention	Unemployed
Farming, Fishing, Forestry - Other		

Supplementary Table 1. Association between occupation and implicit attitudes toward people with physical disabilities. This table presents the results of the linear regression model examining the relationship between occupation and implicit attitudes toward physical disability, as measured by the Implicit Association Test (IAT). The model adjusts for sex, age, explicit attitudes, personal experience of disability, education, geographic region, race, and year of data collection. Estimates are presented as regression coefficients (b-values) with 95% confidence intervals (CIs). The reference groups for categorical variables are indicated in parentheses. Asterisks indicate statistical significance (*P < .05, **P < .01, ***P < .001).

IMPLICIT ATTITUDES – All occupations (N = 213,191)		
Exposure	**b-value (95% CI)**	***P*-value**
(Intercept)	0.532 (0.525, 0.539)	$< 2e^{-16}$***
Occupation (ref.: Other occupation)		
Clinician	0.002 (-0.009, 0.012)	.752
Rehabilitation Assistant	0.007 (-0.007, 0.022)	.307
Sex (ref.: Female)	0.107 (0.102, 0.111)	$< 2e^{-16}$***
Age (continuous)	0.071 (0.069, 0.073)	$< 2e^{-16}$***
Explicit Attitudes (continuous)	0.048 (0.046, 0.050)	$< 2e^{-16}$***
No personal experience of disability (ref.: Experience)	0.057 (0.053, 0.061)	$< 2e^{-16}$***
Education (ref.: primary / secondary)		
College / Undergraduate	-0.030 (-0.037, -0.023)	$< 2e^{-16}$***
Graduate / Postgraduate	-0.076 (-0.083, -0.068)	$< 2e^{-16}$***
Geographic Region (ref.: Northern America)		
Africa	0.034 (0.018, 0.050)	$3.9e^{-5}$***
Asia	0.014 (0.006, 0.023)	$1.4e^{-3}$**
Europe	0.017 (0.008, 0.026)	$1.5e^{-4}$***
Oceania	0.008 (-0.007, 0.022)	.307
Latin America & the Caribbean	0.009 (-0.002, 0.019)	.106
Race (ref.: White People)		
Asian People	0.040 (0.033, 0.047)	$< 2e^{-16}$***
Black or African American People	0.072 (0.065, 0.078)	$< 2e^{-16}$***
Hispanic People	-0.016 (-0.024, -0.008)	$7.4e^{-5}$***
Middle Eastern People	0.007 (-0.016, 0.029)	.556
American Indian or Alaska Native People	-0.019 (-0.037, -0.001)	$3.5e^{-2}$*
Multiracial, Other, or Unknown Race People	-0.016 (-0.023, -0.008)	$2.8e^{-5}$***
Pacific Islander People	0.028 (-0.002, 0.058)	$6.7e^{-2}$
Year of Data Collection	0.010 (0.008, 0.012)	$< 2e^{-16}$***

Residual standard error: 0.4271 on 213169 degrees of freedom.
Multiple R-squared: 0.06158, adjusted R-squared: 0.06148.
F-statistic: 666.1 on 21 and 213169 degrees of freedom, p-value: < 2.0e-16

Supplementary Table 2. Association between occupation and explicit attitudes toward people with physical disabilities. This table presents the results of the linear regression model examining the relationship between occupation and explicit attitudes toward physical disability, as measured by the 7-point Likert-type scale. The model adjusts for sex, age, implicit attitudes, personal experience of disability, education, geographic region, and race. Estimates are presented as regression coefficients (b-values) with 95% confidence intervals (CIs). Asterisks indicate statistical significance (*P < .05, **P < .01, ***P < .001).

EXPLICIT ATTITUDES – All occupations (N = 213,191)		
Exposure	**b-value (95% CI)**	***P*-value**
(Intercept)	4.218 (4.205, 4.231)	$< 2e^{-16}$***
Occupation (ref.: Other occupation)		
Clinician	0.036 (0.016, 0.057)	$4.59e^{-4}$***
Rehabilitation Assistant	-0.046 (-0.073, -0.019)	$9.44e^{-4}$***
Sex (ref.: Female)	0.108 (0.099, 0.116)	$< 2e^{-16}$***
Age (continuous)	-0.003 (-0.006, 0.001)	.169
Implicit Attitudes (continuous)	0.093 (0.089, 0.096)	$< 2e^{-16}$***
No personal experience of disability (ref.: Experience)	0.166 (0.159, 0.174)	$< 2e^{-16}$***
Education (ref.: primary / secondary)		
College / Undergraduate	-0.024 (-0.037, -0.010)	$4.91e^{-4}$***
Graduate / Postgraduate	0.026 (0.012, 0.040)	$2.62e^{-4}$***
Geographic Region (ref.: Northern America)		
Africa	0.107 (0.076, 0.137)	$8.1e^{-12}$***
Asia	-0.065 (-0.082, -0.049)	$9.7e^{-15}$***
Europe	0.035 (0.019, 0.052)	$3.6e^{-5}$***
Oceania	0.038 (0.011, 0.066)	$6.1e^{-3}$**
Latin America & the Caribbean	0.021 (0.001, 0.041)	$3.7e^{-2}$*
Race (ref.: White People)		
Asian People	0.110 (0.097, 0.123)	$< 2e^{-16}$***
Black or African American People	0.015 (0.003, 0.027)	$1.8e^{-2}$*
Hispanic People	0.002 (-0.012, 0.017)	.761
Middle Eastern People	-0.022 (-0.064, 0.021)	.316
American Indian or Alaska Native People	-0.035 (-0.068, -0.002)	$4.0e^{-2}$*
Multiracial, Other, or Unknown Race People	-0.006 (-0.020, 0.008)	.431
Pacific Islander People	-0.004 (-0.061, 0.053)	.893
Year of Data Collection	-0.005 (-0.008, -0.001)	$1.02e^{-2}$*

Residual standard error: 0.8088 on 213169 degrees of freedom.
Multiple R-squared: 0.03364, adjusted R-squared: .03354.
F-statistic: 353.4 on 21 and 213169 degrees of freedom, p-value: < 2.0e-16

Supplementary Table 3. Explanatory factors of implicit attitudes toward people with physical disabilities in clinicians. This table presents the results of the linear regression model examining the factors associated with implicit attitudes toward physical disability in clinicians. The model adjusts for sex, age, explicit attitudes, personal experience of disability, education, geographic region, and race. Estimates are presented as regression coefficients (b-values) with 95% confidence intervals (CIs). The reference groups for categorical variables are indicated in parentheses. Asterisks indicate statistical significance (*P < .05, **P < .01, ***P < .001).

IMPLICIT ATTITUDES – Clinicians (N = 6445)		
Exposure	**b-value (95% CI)**	***P*-value**
(Intercept)	0.494 (0.386, 0.601)	$< 2e^{-16}$***
Sex (ref.: Female)	0.130 (0.107, 0.153)	$< 2e^{-16}$***
Age (continuous)	0.072 (0.061, 0.083)	$< 2e^{-16}$***
Explicit Attitudes (continuous)	0.055 (0.044, 0.065)	$< 2e^{-16}$***
No personal experience of disability (ref.: Experience)	0.046 (0.025, 0.067)	$2.7e^{-5}$***
Education (ref.: primary / secondary)		
College / Undergraduate	0.019 (-0.089, 0.128)	.726
Graduate / Postgraduate	-0.019 (-0.127, 0.088)	.726
Geographic Region (ref.: Northern America)		
Africa	0.044 (-0.078, 0.166)	.480
Asia	-0.012 (-0.070, 0.045)	.677
Europe	0.001 (-0.062, 0.064)	.982
Oceania	-0.010 (-0.093, 0.073)	.816
Latin America & the Caribbean	0.009 (-0.065, 0.084)	.806
Race (ref.: White People)		
Asian People	0.018 (-0.013, 0.049)	.259
Black or African American People	0.042 (-0.006, 0.089)	.084
Hispanic People	-0.043 (-0.099, 0.013)	.131
Middle Eastern People	0.013 (-0.079, 0.104)	.788
American Indian or Alaska Native People	0.080 (-0.057, 0.217)	.253
Multiracial, Other, or Unknown Race People	-0.028 (-0.073, 0.018)	.231
Pacific Islander People	-0.025 (-0.226, 0.177)	.809
Year of Data Collection	0.011 (0.001, 0.022)	.040*

Residual standard error: 0.4219 on 6425 degrees of freedom.
Multiple R-squared: 0.07056, adjusted R-squared: 0.06781.
F-statistic: 25.67 on 19 and 6425 degrees of freedom, p-value: < 2.0e-16

Supplementary Table 4. Explanatory factors of explicit attitudes toward people with physical disabilities in clinicians. This table presents the results of the linear regression model examining the factors associated with explicit attitudes toward physical disability in clinicians. The model adjusts for sex, age, implicit attitudes, personal experience of disability, education, geographic region, and race. Estimates are presented as regression coefficients (b-values) with 95% confidence intervals (CIs). The reference groups for categorical variables are indicated in parentheses. Asterisks indicate statistical significance (*P < .05, **P < .01, ***P < .001).

EXPLICIT ATTITUDES – Clinicians (N = 6445)		
Exposure	**b-value (95% CI)**	***P*-value**
(Intercept)	4.348 (4.155, 4.541)	$< 2e^{-16}$***
Sex (ref.: Female)	0.076 (0.034, 0.118)	$4.0e^{-4}$***
Age (continuous)	0.018 (-0.002, 0.038)	.080
Implicit Attitudes (continuous)	0.099 (0.080, 0.118)	$< 2e^{-16}$***
No personal experience of disability (ref.: Experience)	0.165 (0.127, 0.204)	$< 2e^{-16}$***
Education (ref.: primary / secondary)		
College / Undergraduate	-0.121 (-0.315, 0.074)	.225
Graduate / Postgraduate	-0.068 (-0.260, 0.125)	.492
Geographic Region (ref.: Northern America)		
Africa	0.261 (0.042, 0.480)	$1.9e^{-2}$*
Asia	-0.167 (-0.270, -0.064)	$1.5e^{-3}$**
Europe	-0.068 (-0.182, 0.046)	.240
Oceania	0.082 (-0.066, 0.231)	.277
Latin America & the Caribbean	-0.003 (-0.137, 0.131)	.962
Race (ref.: White People)		
Asian People	0.154 (0.098, 0.210)	$6.1e^{-8}$***
Black or African American People	0.104 (0.019, 0.189)	$1.6e^{-2}$*
Hispanic People	0.025 (-0.076, 0.125)	.631
Middle Eastern People	-0.034 (-0.199, 0.131)	.689
American Indian or Alaska Native People	-0.123 (-0.369, 0.123)	.328
Multiracial, Other, or Unknown Race People	0.040 (-0.042, 0.121)	.345
Pacific Islander People	0.174 (-0.188, 0.537)	.346
Year of Data Collection	-0.015 (-0.034, 0.005)	.133

Residual standard error: 0.7583 on 6425 degrees of freedom.
Multiple R-squared: 0.04671, adjusted R-squared: 0.04389.
F-statistic: 16.57 on 19 and 6425 degrees of freedom, p-value: < 2.2e-16.

Supplementary Table 5. Explanatory factors of implicit attitudes toward people with physical disabilities in rehabilitation assistants. This table presents the results of the linear regression model examining the factors associated with implicit attitudes toward physical disability in rehabilitation assistants. The model adjusts for sex, age, explicit attitudes, personal experience of disability, education, geographic region, and race. Estimates are presented as regression coefficients (b-values) with 95% confidence intervals (CIs). The reference groups for categorical variables are indicated in parentheses. Asterisks indicate statistical significance (*P < .05, **P < .01, ***P < .001).

IMPLICIT ATTITUDES – Rehabilitation Assistants (N = 3482)		
Exposure	**b-value (95% CI)**	***P*-value**
(Intercept)	0.491 (0.413, 0.568)	$< 2e^{-16}$***
Sex (ref.: Female)	0.159 (0.120, 0.198)	$3.5e^{-15}$***
Age (continuous)	0.056 (0.042, 0.071)	$1.0e^{-13}$***
Explicit Attitudes (continuous)	0.049 (0.034, 0.063)	$3.9e^{-11}$***
No personal experience of disability (ref.: Experience)	0.043 (0.012, 0.073)	$5.9e^{-3}$**
Education (ref.: primary / secondary)		
College / Undergraduate	-0.024 (-0.102, 0.054)	.546
Graduate / Postgraduate	-0.068 (-0.147, 0.011)	.092
Geographic Region (ref.: Northern America)		
Africa	0.068 (-0.138, 0.273)	.519
Asia	0.035 (-0.057, 0.127)	.455
Europe	0.074 (-0.017, 0.166)	.112
Oceania	0.060 (-0.040, 0.160)	.242
Latin America & the Caribbean	0.004 (-0.115, 0.124)	.946
Race (ref.: White People)		
Asian People	0.062 (0.009, 0.115)	.022*
Black or African American People	0.033 (-0.033, 0.100)	.326
Hispanic People	0.073 (-0.002, 0.148)	.058
Middle Eastern People	-0.028 (-0.205, 0.150)	.760
American Indian or Alaska Native People	-0.051 (-0.245, 0.143)	.604
Multiracial, Other, or Unknown Race People	-0.058 (-0.123, 0.006)	.076
Pacific Islander People	0.245 (0.001, 0.489)	.049*
Year of Data Collection	0.009 (-0.006, 0.024)	.240

Residual standard error: 0.4289 on 3462 degrees of freedom.
Multiple R-squared: 0.06434, adjusted R-squared: 0.05921.
F-statistic: 12.53 on 19 and 3462 degrees of freedom, p-value: < 2.2e-16.

Supplementary Table 6. Explanatory factors of explicit attitudes toward people with physical disabilities in rehabilitation assistants. This table presents the results of the linear regression model examining the factors associated with explicit attitudes toward physical disability in rehabilitation assistants. The model adjusts for sex, age, implicit attitudes, personal experience of disability, education, geographic region, and race. Estimates are presented as regression coefficients (b-values) with 95% confidence intervals (CIs). The reference groups for categorical variables are indicated in parentheses. Asterisks indicate statistical significance (*P < .05, **P < .01, ***P < .001).

EXPLICIT ATTITUDES – Rehabilitation Assistants (N = 3482)		
Exposure	**b-value (95% CI)**	***P*-value**
(Intercept)	4.328 (4.197, 4.459)	$< 2e^{-16}$***
Sex (ref.: Female)	0.130 (0.063, 0.196)	$1.5e^{-4}$***
Age (continuous)	0.006 (-0.020, 0.031)	0.665
Implicit Attitudes (continuous)	0.083 (0.059, 0.108)	$3.9e^{-11}$***
No personal experience of disability (ref.: Experience)	0.125 (0.074, 0.176)	$1.4e^{-6}$***
Education (ref.: primary / secondary)		
College / Undergraduate	-0.168 (-0.299, -0.037)	.012*
Graduate / Postgraduate	-0.157 (-0.290, -0.024)	.021*
Geographic Region (ref.: Northern America)		
Africa	0.423 (0.078, 0.769)	.016*
Asia	-0.013 (-0.167, 0.142)	.871
Europe	-0.053 (-0.207, 0.102)	.502
Oceania	-0.076 (-0.245, 0.092)	.375
Latin America & the Caribbean	-0.047 (-0.248, 0.154)	.647
Race (ref.: White People)		
Asian People	0.120 (0.030, 0.209)	$8.6e^{-3}$**
Black or African American People	0.098 (-0.014, 0.211)	.086
Hispanic People	-0.059 (-0.186, 0.068)	.363
Middle Eastern People	0.068 (-0.231, 0.366)	.657
American Indian or Alaska Native People	0.096 (-0.231, 0.423)	.565
Multiracial, Other, or Unknown Race People	0.083 (-0.026, 0.192)	.135
Pacific Islander People	-0.310 (-0.720, 0.100)	.138
Year of Data Collection	0.016 (-0.009, 0.041)	.210

Residual standard error: 0.7217 on 3462 degrees of freedom.
Multiple R-squared: 0.04028, adjusted R-squared: 0.03501.
F-statistic: 7.647 on 19 and 3462 degrees of freedom, p-value: < 2.2e-16.