Evolution of attitudes toward people with disabilities in healthcare practitioners and other occupations from 2006 to 2024: A comparative study

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ABSTRACT

Purpose. Healthcare practitioners have shown implicit and explicit attitudes against people with disabilities. This study aimed to examine how these attitudes evolved between 2006 and 2024 across occupation groups and as a function of sex.

Methods. Data from 660,430 participants were analyzed, including 20,405 clinicians, 9357 rehabilitation assistants, and 630,668 individuals in other occupations. Implicit attitudes were assessed using D-scores derived from the Disability Implicit Association Test of Project Implicit. Explicit attitudes were assessed using a Likert scale. Generalized additive models were conducted to examine the evolution of attitudes over time.

Results. The preference for people without disabilities showed a linear decrease over time. No such effect was found for implicit attitudes. However, non-linear interactions between time, occupation group, and sex suggest a complex effect of time on attitudes that should be interpreted in the context of each specific combination of occupation group and sex, rather than assuming a uniform trend. Attitudes toward people with physical disabilities were less favorable than toward people with general disabilities. Older age was associated with less favorable implicit attitudes and more favorable explicit attitudes toward people with disabilities. Rehabilitation assistants had less favorable implicit attitudes than other occupation groups, while clinicians showed no evidence of a significant difference. In contrast, explicit attitudes were more favorable among rehabilitation assistants but less favorable among clinicians.

Conclusions. The contrast between the evolution of implicit and explicit attitudes suggests that implicit bias remains resistant to change despite increased positive consideration and awareness of people with disabilities. Understanding these patterns may inform training programs aimed at reducing bias among healthcare practitioners.

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

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INTRODUCTION

Human behavior is influenced by a tendency to evaluate entities from the environment with some degree of favor or disfavor.[1,2] This tendency results in attitudes toward various social groups and behaviors, such as race,[3] age,[4] and physical activity.[5] These attitudes can be explicit and consciously controlled,[6] or implicit (i.e., automatic),[7] reflecting traces of past experience that remain introspectively unidentified.[8]

Understanding health practitioners' attitudes toward people with disabilities is essential to reducing potential biases in care, especially given the historical perspective of disability through a deficit framework.[9] This framework views disability as an abnormality that needs to be normalized to conform to societal ideals of "normalcy".[9] This view has been embedded in healthcare practice for decades, particularly in rehabilitation professions, where a biomechanical approach to correcting deficits is foundational.[10] While this deficit framework has been criticized for failing to recognize the importance of inclusion and accessibility,[9,10] studies suggest that it continues to influence healthcare profesionnals' attitudes toward people with disabilities.

Recent large-scale studies have examined implicit and explicit attitudes toward people with general disabilities (Fig. 1A-C).[11-13] 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.[11] 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. Further results showed a moderate implicit preference for people without disabilities (D-score = 0.54 ± 0.43). Using the same dataset, these authors focused on implicit and explicit attitudes of 6113 occupational and physical therapy assistants.[12] 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),[13] these results seem to indicate that healthcare professionals, including rehabilitation assistants, have less favorable implicit and explicit attitudes toward people with general disabilities. To formally test this difference, a comparative analysis was conducted in a study focusing on physical disability (Fig. 1C-D) (n = 213,191).[14] Results showed similar implicit attitudes in clinicians (D-score = 0.54 ± 0.44) and rehabilitation assistants (D-score = 0.50 ± 0.44) as compared to individuals in other occupations (D-score = 0.54 ± 0.44). However, clinicians showed less favorable explicit attitudes toward people with physical disabilities (Likert score = 4.38 ± 0.77) than individuals in other occupations (Likert score = 4.30 ± 0.82), whereas rehabilitation assistants showed more favorable explicit attitudes (Likert score = 4.28 ± 0.73).[14] Whether health practitioners' attitudes have shifted in recent decades away from a preference for people without disabilities remains unclear.

The objective of this study was to examine how implicit and explicit attitudes toward people with disabilities evolved between 2006 and 2024 in male and female healthcare practitioners as compared to other occupation groups.
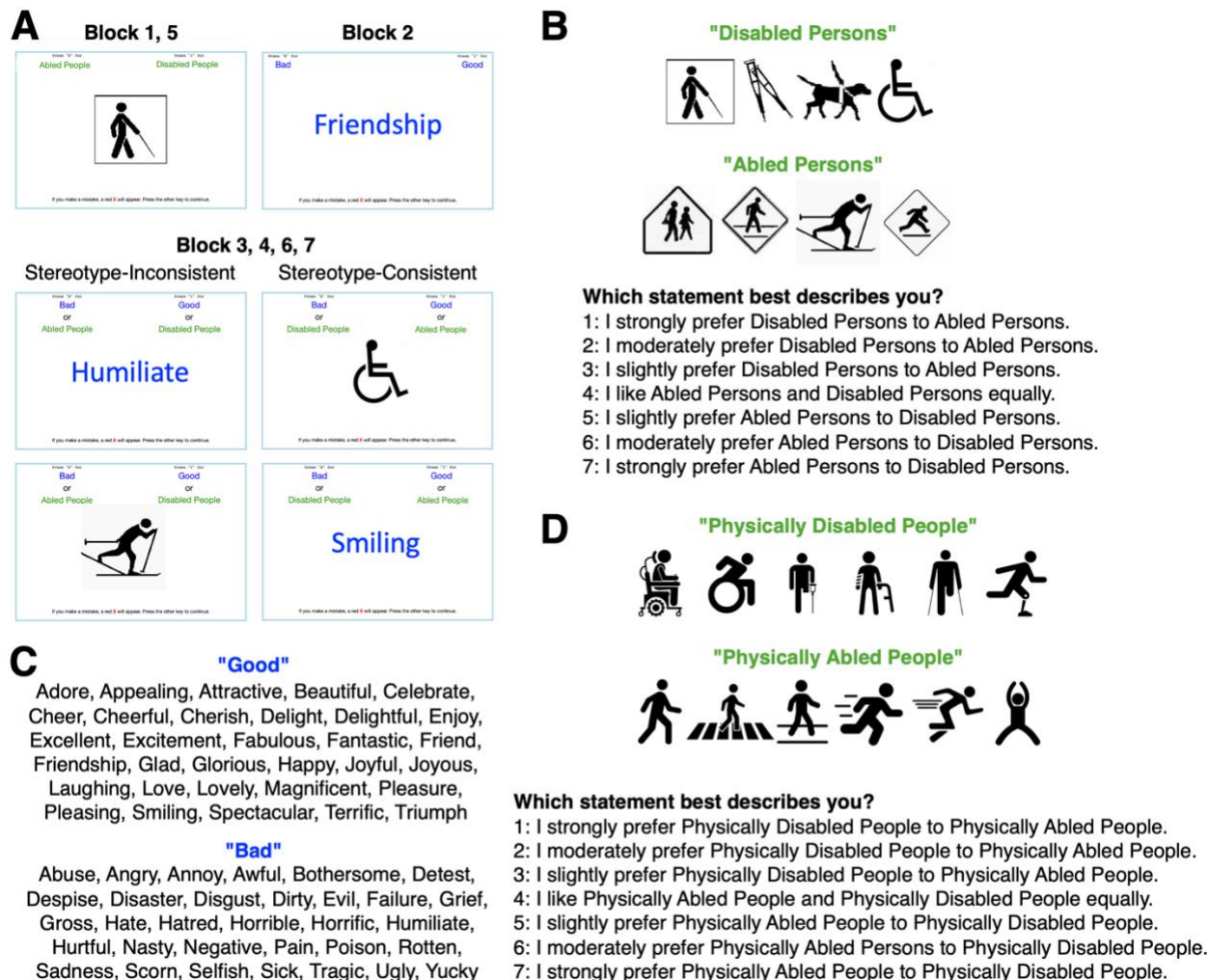
Figure 1. Assessment of implicit and explicit attitudes. (A) Illustration of trials for the different blocks of the Disability Implicit Association Test. (B) Images and questions used to assess attitudes toward people with *general* disabilities. (C) Words used for the evaluative attributes ("good" and "bad"). For each evaluative attribute, a set of 8 words was randomly selected before the start of each series. (D) Images and questions used to assess attitudes toward people with *physical* disabilities.

METHODS

Participants

This study is based on two Implicit Association Test (IAT) datasets collected through 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.[15] The website allows any adult aged 18 years of age or older to participate and measure their implicit and explicit attitudes toward people with and without disabilities, and to answer demographic questions (e.g., age, sex). Participants were informed that data without directly identifying information would be made publicly available for research purposes.

Disability Implicit Association Test

Assessment of Implicit Attitudes

The Disability IAT from Project Implicit assesses implicit attitudes toward people with and without 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.

General (2006-2021) and Physical Disability (2022-2024)

The Disability Implicit Association Test (IAT) has been available on the Project Implicit demonstration website since 2004. However, the type of disability assessed has changed over time. From 2006 to 2021, the IAT measured attitudes toward *general* disability, whereas since 2022, the IAT has specifically measured attitudes toward *physical* disability. The two versions differ in two ways. First, the 2006-2021 version included four images representing disability: a guide dog, a person with a cane, crutches, and the International Symbol of Access (wheelchair) (Fig. 1A-B). In contrast, the 2022–2024 version included six images, all of which represent physical disability (Fig. 1D). Second, the 2006-2021 version used a 7-point Likert scale to assess explicit attitudes toward "abled persons" and "disabled persons" (Fig. 1B), whereas the 2022–2024 version assessed explicit attitudes toward "physically disabled people" and "physically abled people" (Fig. 1D). To account for these differences, a variable coding for each type of IAT was included in the analyses. The set of 16 words for each attribute was the same across versions (Fig. 1C). Detailed procedures are described in Suppl. Material 1.

Outcome Variables

Implicit Attitudes

Implicit attitudes toward people with and without disabilities were assessed using the D-score measure,[16] which is based on participants' performance on blocks 3, 4, 6, and 7 of the Disability IAT (Fig. 1A). This measure divides the difference between the mean response latency on the stereotype-consistent trials (e.g., "disabled people" paired with "bad" and "abled people" paired with "good") and the mean response latency on the stereotype-inconsistent trials (e.g., "disabled people" paired with "good" and "abled people" paired with "bad") by the standard deviation of all the latencies across the four blocks:

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

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.[16] 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 disabilities. A negative D-score indicates the opposite, reflecting an implicit preference for people with disabilities. Absolute 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 ($|D| \geq 0.65$).[14]

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Explicit Attitudes

Explicit attitudes were assessed using a 7-point Likert scale in which participants rated their preference for people with or without 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 (Suppl. Material 2).

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. Material 3. This variable, which is central to our study, was added to the Project Implicit website in 2006. Therefore, the data included in the models range from 2006 to 2024.

Time. A continuous variable was derived by combining the year, month, and day of data collection into a single date format (YYYY-MM-DD). This date was then converted into a numeric variable representing the number of days since 1970-01-01 to facilitate its use as a continuous variable in the analyses.

Age. Age was treated as a continuous variable, determined by the question asking participants their age in years. If this question was not asked, age was calculated as the difference between the year of data collection and the participant's 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?". If this question was not asked, we used the answer to a gender-related question that included male and female as response options.

Disability Type. A categorical variable was created to account for the two versions of the Disability IAT (general vs. physical) in the analyses.

Statistical Analyses

All analyses were conducted in R version 4.4.1,[17] and the analysis scripts are available on Zenodo.[18,19] To examine the evolution of implicit and explicit attitudes toward people with disabilities across different occupational groups and sexes, between 2006 and 2024, we fitted two separate generalized additive models using the mgcv package (version 1.9-1).This type of model were selected for its flexibility and robustness in capturing potential non-linear relationships between outcomes and explanatory variables,[20,21] as evidenced in studies investigating the effects of age on brain structure and function.[22,23]

The outcome of the first model was the D-score representing implicit attitudes toward people with disabilities. The explanatory variables included time, occupation group, (clinicians, rehabilitation assistants, other occupations), sex (male, female), age, explicit attitudes (Likert score), and disability type (general, physical). In addition, the interaction between time, occupation group, and sex was modeled using the tensor product smooth function. In this interaction, time was modeled with a cubic regression spline to capture potential non-linear relationships between time and implicit attitudes toward people with disabilities. This spline provides flexibility to account for complex temporal trends, recognizing that the effect of time on attitudes may not

follow a linear pattern. Occupation group and sex were treated as random effects, recognizing that different occupational groups and sexes may have distinct baseline levels of attitudes toward disability without requiring a smooth or continuous transition between their categories. The second model estimated explicit attitudes (Likert score) using the same structure, with D-score replacing explicit attitudes as an explanatory variable. Continuous explanatory variables were standardized. The significance of the smooth terms was evaluated using F-tests, while Wald tests were used to assess the significance of the fixed effects. The significance level (α) was set at 0.05.

The effective degrees of freedom (edf) from the generalized additive models were used to assess the complexity of the smooth functions, with higher complexity typically reflecting greater non-linearity: 1 was considered to indicate a linear relationship,]1–5] mild complexity,]5–10] moderate complexity, and >10 high complexity.

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

Exposures	Clinicians (n = 20,405)	Rehabilitation Assistants (n = 9357)	Other Occupations (n = 630,668)
	Mean ± SD	Mean ± SD	Mean ± SD
Implicit Attitudes (D-score)	0.53 ± 0.44	0.51 ± 0.45	0.53 ± 0.45
Explicit Attitudes (Likert score)	4.44 ± 0.82	4.27 ± 0.76	4.34 ± 0.86
Age (years)	33.6 ± 11.9	28.6 ± 9.4	33.6 ± 12.3
	Count (%)	Count (%)	Count (%)
Female Participant	14,056 (68.9)	7863 (84.0)	470,520 (67.9)
Male Participant	6349 (31.1)	1494 (16.0)	160,148 (25.4)
General Disability	15,235 (74.7)	6552 (70.0)	465,097 (73.8)
Physical Disability	5170 (25.3)	2805 (30.0)	165,571 (26.2)

RESULTS

Descriptive Results

A total of 660,430 participants from three occupation groups were included in the study: clinicians (n = 20,405), rehabilitation assistants (n = 9357), and participants in other occupations (n = 630,668). Mean implicit attitudes were similar across occupation groups, with clinicians scoring 0.53 ± 0.44 (mean ± standard deviation), rehabilitation assistants 0.51 ± 0.45, and participants in other occupations 0.53 ± 0.45. Mean explicit attitudes were slightly higher in clinicians (4.44 ± 0.82) and slightly lower in rehabilitation assistants (4.27 ± 0.76) than in participants in other occupations (4.34 ± 0.86). The mean age of clinicians was 33.6 ± 11.9 years, which was older than rehabilitation assistants (28.6 ± 9.4 years) and similar to participants in other occupations (33.6 ± 12.3 years). Female participants represented 68.9% of clinicians, 84.0% of rehabilitation assistants, and 74.6% of participants in other occupations. General disability was assessed in 74.7% of clinicians, 70.0% of rehabilitation assistants, and 73.8% of participants in other occupations.
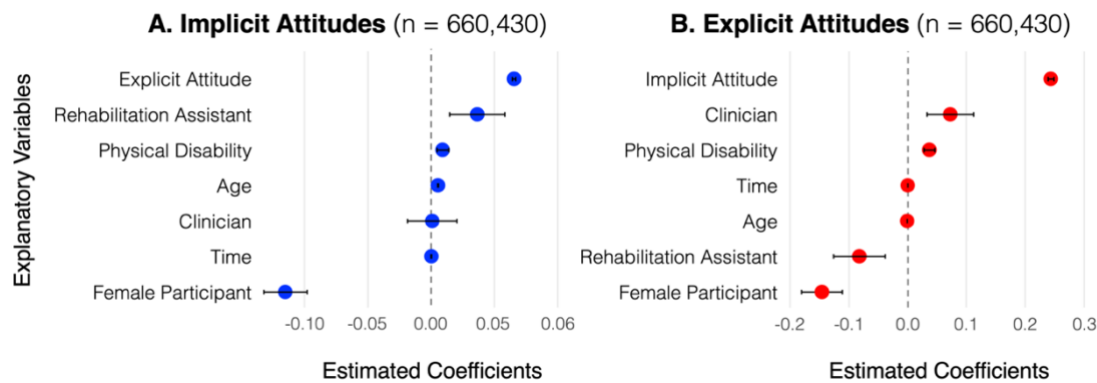
Figure 2. Estimated coefficients of the fixed effects from the generalized additive models examining the association of explanatory variables with implicit (A) and explicit (B) attitudes toward people with disabilities in all participants. Positive coefficients indicate less favorable attitudes toward people with disabilities, whereas negative coefficients indicate more favorable attitudes toward people with disabilities. For the categorical variables, the reference categories are "other occupation", "male", and "general disability". 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, time) are presented in their original units (i.e., were not standardized).

Implicit Attitudes

The generalized additive model examining implicit attitudes toward people with disabilities, as measured by the D-score, explained 4.9% of the variance (adjusted R^2 = 0.049). Analysis of the fixed effects (Fig. 2A) showed no evidence of a linear effect of time on implicit attitudes (b = -1.9×10^{-6}, 95% CI [-5.7×10^{-6} to 1.9×10^{-6}]; P = .329). Older (b = 5.3×10^{-3}, 95% CI [5.2×10^{-3} to 5.4×10^{-3}]; $P < 2 \times 10^{-16}$) (Fig. 3A) and male (b = -0.116, 95% CI [-0.133 to -0.099]; $P < 2 \times 10^{-16}$) participants showed less favorable implicit attitudes toward people with disabilities than younger and female participants, respectively. Compared to participants in other occupations, rehabilitation assistants had less favorable implicit attitudes toward people with disabilities (b = 0.036, 95% CI [0.014 to 0.058]; $P = 1.2 \times 10^{-3}$), while no significant difference was observed for clinicians (b = 8.6×10^{-4}, 95% CI [-0.019 to 0.020]; P = .931). Implicit attitudes were less favorable toward people with physical disabilities than toward people with general disabilities (b = 9.0×10^{-3}, 95% CI [4.4×10^{-3} to 1.4×10^{-2}]; $P = 1.3 \times 10^{-4}$) (Fig. 3A). Explicit attitudes were positively associated with implicit attitudes (b = 0.065, 95% CI [0.064 to 0.066]; $P < 2 \times 10^{-16}$), indicating that weaker explicit preferences for people with disabilities were associated with weaker implicit preferences (Fig. 3A).

Beyond the fixed effects, results showed and interaction between time, occupation group, and sex, modeled using a tensor product smooth (F = 2.922; edf = 11.88; $P < 2 \times 10^{-16}$) (Fig. 4A). This result indicated that the relationship between time and implicit attitudes toward people with disabilities varied by occupation group and sex, following a highly complex, non-linear pattern. The statistical significance and complexity of this smooth term suggested that these combined effects may not be adequately described by simple linear relationships.
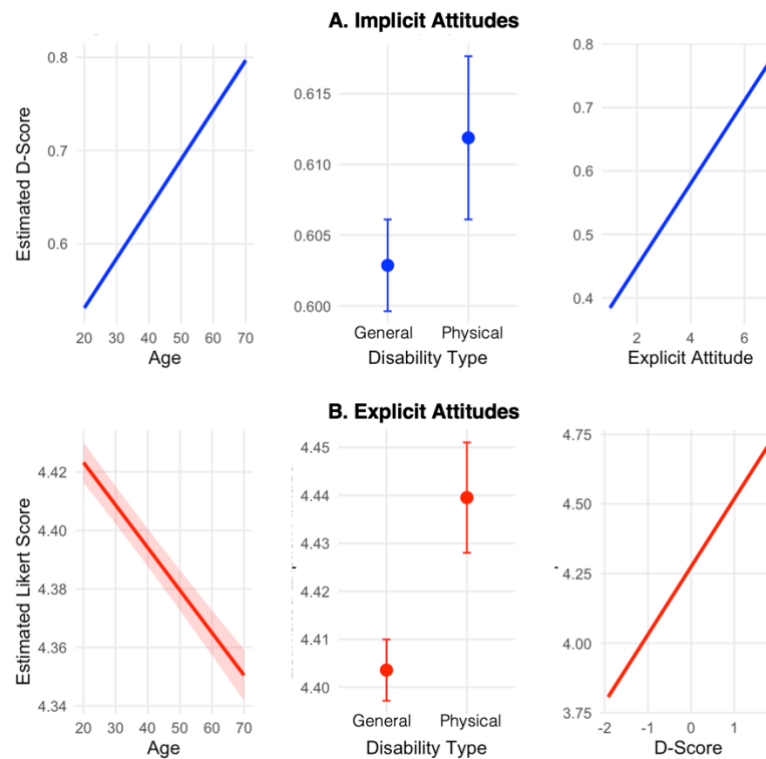
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Figure 3. Implicit (A) and explicit (B) attitudes as a function of age (left), disability type (middle), and the other type of attitudes (right), as estimated by the generalized additive models. The left and right panels show smooth effects with 95% confidence intervals (shaded areas), while the middle panel displays estimated means with 95% confidence intervals (error bars). Predictions are adjusted for time, occupation group, and sex.

Explicit Attitudes

The generalized additive model examining explicit attitudes toward people with disabilities, as measured by the Likert score, explained 2.9% of the variance (adjusted $R^2 = 0.029$). Analysis of the fixed effects (Fig. 2B) showed that explicit attitudes toward people with disabilities became more favorable over time (b = -4.2×10^{-5}, 95% CI [-5.0×10^{-5} to -3.4×10^{-5}]; $P < 2 \times 10^{-16}$). In Fig. 2B, the effect size of time appears small because the unit of measurement is a day. However, this seemingly small daily effect accumulates over an 18-year period, resulting in a more substantial cumulative effect. Older (b = -1.5×10^{-3}, 95% CI [-1.6×10^{-3} to -1.3×10^{-3}]; $P < 2 \times 10^{-16}$) (Fig. 3B) and female (b = -0.147, 95% CI [-0.181 to -0.112]; $P < 2 \times 10^{-16}$) participants expressed more favorable explicit attitudes toward people with disabilities compared to younger and male participants, respectively. Compared to participants in other occupations, clinicians reported less favorable explicit attitudes (b = 0.072, 95% CI [0.033 to 0.111]; $P = 3.4 \times 10^{-4}$), while rehabilitation assistants reported more favorable explicit attitudes (b = -0.083, 95% CI [-0.127 to -0.038]; $P = 2.5 \times 10^{-4}$). Explicit attitudes were less favorable toward people with physical disabilities than toward people with general disabilities (b = 0.036, 95% CI [0.027 to 0.045]; $P = 1.2 \times 10^{-14}$) (Fig. 3B). Explicit attitudes were positively associated with implicit attitudes (b = 0.243, 95% CI [0.239 to 0.248]; $P < 2 \times 10^{-16}$) (Fig. 3B).

Beyond the fixed effects, results showed and interaction between time, occupation group, and sex, modeled using a tensor product smooth (F = 13.95; edf = 14.56; $P < 2 \times 10^{-16}$) (Fig. 4B). This result indicated that the relationship between time and explicit attitudes toward people with disabilities varied by occupation group and sex, following a highly complex, non-linear pattern. The statistical significance and complexity of this smooth term suggested that these combined effects may not be adequately described by simple linear relationships.
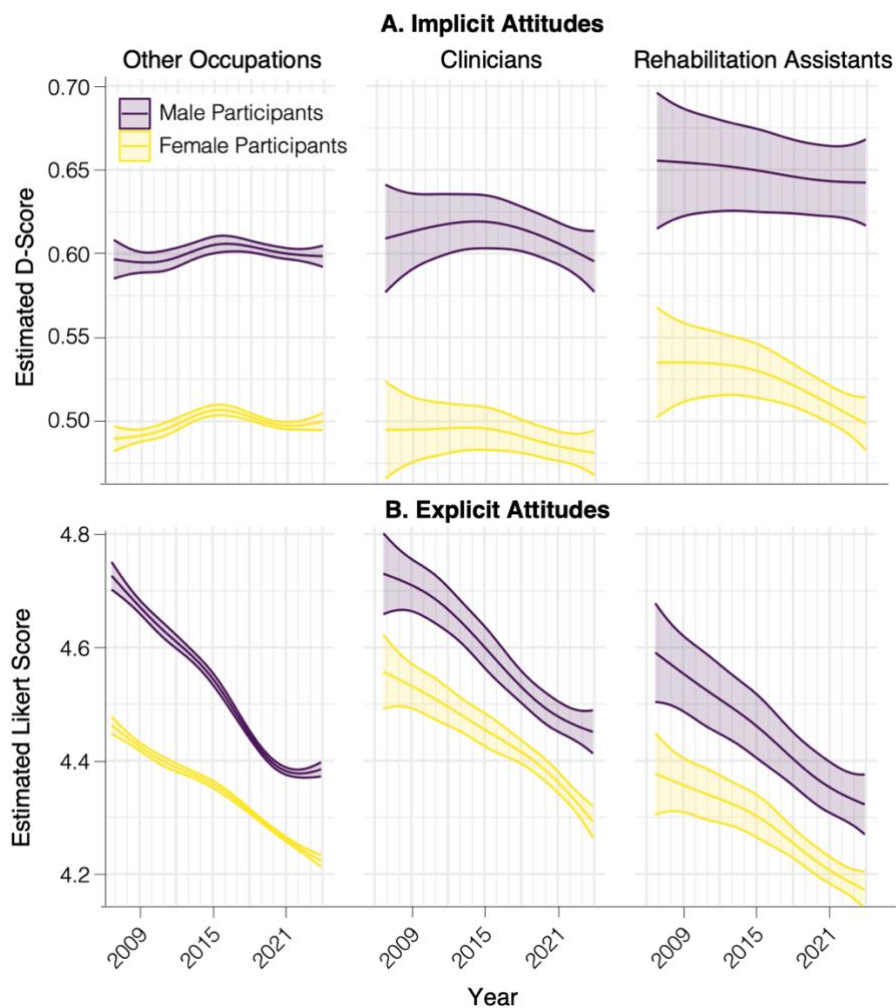

Figure 4. Results of the three-way interactions showing implicit (A) and explicit (B) attitudes over time as a function of occupation group and sex, as estimated by the generalized additive models. Solid lines represent estimated attitudes, and shaded areas indicate 95% confidence intervals.

DISCUSSION

Main Findings

The present study examined the evolution of implicit and explicit attitudes toward people with disabilities between 2006 and 2024 among clinicians, rehabilitation assistants, and individuals in other occupations, considering sex as a moderating factor, using a large-scale dataset. Results showed no evidence suggesting a linear effect of time on implicit attitudes, while explicit attitudes

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became more favorable toward people with disabilities over time. However, non-linear interactions between time, occupation, and sex suggest that the effect of time on attitudes is complex and should be interpreted within the context of each specific combination of occupation group and sex, rather than assuming a uniform trend.

Overall, male participants consistently showed less favorable attitudes toward people with disabilities than female participants. Both implicit and explicit attitudes toward people with physical disabilities were less favorable that toward people with general disabilities. Older age was associated with less favorable implicit attitudes and more favorable explicit attitudes toward people with disabilities. Rehabilitation assistants exhibited less favorable implicit attitudes than other occupation groups, whereas clinicians did not significantly differ. In contrast, explicit attitudes were more favorable among rehabilitation assistants but less favorable among clinicians than participants in other occupation groups.

Comparison with the Literature

Our sample showed a moderate implicit preference and a slight explicit preference for people without disabilities, confirming patterns of attitudes toward people with disabilities reported in the literature.[11-14] Our results also add to the evidence that male healthcare practitioners have less favorable implicit and explicit attitudes toward people with disabilities than female healthcare practitioners.[11,14]

Similar to a study focusing on attitudes toward people with physical disabilities,[14] we compared implicit and explicit attitudes between clinicians, rehabilitation assistants, and individuals in other occupations, but also included data on general disability. Results were overall consistent across both studies, with clinicians showing less favorable explicit attitudes toward people with disabilities compared to those in other occupations, whereas rehabilitation assistants had more favorable explicit attitudes. Additionally, no significant differences in implicit attitudes were found between clinicians and participants in other occupations. However, our results suggest that rehabilitation assistants have less favorable implicit attitudes than other occupational groups, which was not the case in the previous study focusing on physical disability. One possible explanation for our result is that rehabilitation assistants may have more frequent interactions with people with disabilities in ways that emphasize the perception of functional limitations and dependence, potentially reinforcing implicit biases. In contrast, clinicians, such as therapists and physicians, may approach disability from a more long-term, progress-oriented perspective, focusing on broader health outcomes. This perspective may buffer against the development of stronger implicit biases.

Our result showing that implicit and explicit attitudes toward people with physical disabilities were less favorable than toward people with general disabilities suggests that attitudes may be influenced by the visibility and perceived severity of the disability, with greater bias directed toward more apparent physical disability. In addition, this finding suggests that future research should either examine these attitudes separately.

The result that older age was associated with less favorable implicit attitudes but more favorable explicit attitudes toward people with disabilities can be explained by several factors. Older adults may have grown up in an environment more strongly dominated by the deficit framework that conceives disability as an abnormality that needs to be normalized,[9] which could have contributed to less favorable implicit attitudes. Over time, however, individuals may have consciously revised their views, leading to more favorable explicit attitudes, especially as societal attitudes toward disability have become more progressive.[9,10] In sum, older adults may endorse

inclusive beliefs consciously, as they align with contemporary values, but their implicit biases may be harder to change due to ingrained stereotypes.

Limitations

Several limitations should be considered. First, the use of a cross-sectional dataset that prevent causal inferences. Future research should examine longitudinal data to address this limitation. Second, the model explained a modest proportion of variance in attitudes, which was expected as attitudes are influenced by numerous individual and contextual factors. However, despite the modest variance explained, the observed effects are statistically robust and theoretically meaningful. Finally, the fact that the physical disability IAT on the Implicit Project website uses identity-first language (e.g., "disabled people") may be seen as a limitation because person-first language (i.e., "people with disabilities") has traditionally been promoted as a way to reduce stigma.[24] However, recent literature suggests that person-first language in scientific writing may actually increase rather than decrease stigma.[25] Moreover, policies mandating the use of person-first language overlook the diverse language preferences among disabled people, including disabled researchers.[26] 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".[27]

Conclusions

This study examines the evolution of implicit and explicit attitudes toward physical disability over time among male and female clinicians, rehabilitation assistants, and individuals in other professions. By analyzing this evolution over nearly two decades, this study provides novel insights into temporal patterns of implicit and explicit biases. The contrast between the evolution of implicit and explicit attitudes suggests that implicit biases remain resistant to change despite increased societal awareness and positive consideration of people with disabilities. Understanding these patterns may guide decision-making and help prioritize interventions and training programs aimed at reducing bias among healthcare practitioners.

DECLARATIONS

Data and Code Availability

In accordance with good research practices,[18] the R script used to analyze the data are publicly available in Zenodo.[19] 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).[15]

Funding

Ethical approval

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.

Disclosure

None.

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SUPPLEMENTARY MATERIAL

Evolution of attitudes toward people with disabilities in healthcare practitioners and other occupations from 2006 to 2024: A comparative study

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Supplementary Material 1. Procedures of the Implicit Association Test (IAT)

Supplementary Material 2. Explicit Attitudes.

Supplementary Material 3. Occupation categories.

Supplementary Material 1. Procedures of the Implicit Association Test (IAT)

Participants completed a series of categorization tasks, totaling 180 trials, in which they sorted words and images into groups by pressing designated keys on a keyboard. The categories appeared on the left and right sides of the computer 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. In the General Disability IAT, participants performed seven sequential blocks (Fig. 1A): (1) Participants categorized the images (Fig. 1B) of people with or without disabilities into the respective categories: "disabled people" and "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, "disabled people" and "good" shared the same response key, while "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 "disabled people" and "abled people" switched sides. (6) Similar to the third block of 20 trials but with a different pairing (e.g., "disabled people" and "bad" shared the same response key, while "abled people" and "good" shared the other key). (7) The sixth block was repeated with 40 additional trials. In the Physical Disability IAT, the word "physically" was added before each instance of the words "abled" and "disabled" (e.g., "physically disabled people"). 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-D). For each series, a set of 8 words was randomly selected from a set of 16 words for each attribute (Fig. 1C).

Supplementary Material 2. Explicit Attitudes.

Explicit attitudes were assessed using a 7-point Likert scale in which participants rated their preference for people with or without 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, in the General Disability IAT, this measure was based on the question "Which statement best describes you?", with response options as follows: (1) "I strongly prefer disabled persons to abled persons", (2) "I moderately prefer disabled persons to abled persons", (3) "I slightly prefer disabled persons to abled persons", (4) "I like disabled persons and abled persons equally", (5) "I slightly prefer abled persons to disabled persons", (6) "I moderately prefer abled persons to disabled persons", and (7) "I strongly prefer abled persons to disabled persons" (Fig. 2D). In the Physical Disability IAT, the word "physically" was added before each instance of the word "abled" and "disabled" (e.g., "I strongly prefer physically disabled people to physically abled people") and the word "persons" was replaced by "people".

Supplementary Material 3. 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., telemarkers, 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		