



Changing ageist mindsets - An experimental study on the effects of intervention methods on ageist hate speech perception

Lucie Stecker^{*} , Aike C. Horstmann^{ID} 

Department of Social Psychology: Media and Communication, University of Duisburg-Essen, Bismarckstraße 120, 47057 Duisburg, Germany

ARTICLE INFO

Keywords:

Ageism
Age discrimination
Online hate speech
Aging anxiety
Online interventions
Explicit bias
Implicit bias

ABSTRACT

Globally, one in two people discriminates against older adults. The COVID-19 pandemic has exacerbated this issue, as evidenced by the increase in ageist hate speech in social media, highlighting the urgent need to combat ageism also in digital spaces. To identify effective online interventions against ageism and hate speech, this study compares three intervention methods: 1) exposure to counter-stereotypical traits, 2) perspective taking, and 3) implementation intention, focusing on their differences in targeting explicit or implicit ageist biases. In an online experiment with a one factor between-subjects design, participants ($N = 184$) performed one of the three intervention tasks or a control task, followed by assessments of implicit and explicit ageism. Implicit ageism was measured using an Implicit Association Test (IAT; $N = 174$), which tested the association of old and young faces with age-related hate speech and friendly comments. The study also examined how aging anxiety as a moderator and other potential influencing factors, such as contact with older adults, affected the effectiveness of these interventions. The results show that perspective taking was the only intervention that significantly reduced explicit stereotypes, whereas none of the brief interventions shifted implicit ageism. Aging anxiety did not moderate the effectiveness of the interventions, but it did predict explicit ageism. In summary, this study delineates the conditions under which scalable, brief interventions prove effective within gerontological contexts, while indicating that implicit bias may require more sustained or repeated efforts.

Introduction

Among the many forms of discrimination that have also migrated to the digital space, ageism stands out as a widespread and surprisingly under-researched phenomenon (World Health Organization, 2021). A number of publications have examined various strategies for combating ageism, both explicit and implicit (e.g., Apriceno & Levy, 2023; Burnes et al., 2019; FitzGerald et al., 2019). However, current literature lacks conclusive evidence regarding the efficacy and feasibility of intervention strategies, particularly in the digital domain (Fragoso & Fonseca, 2022; Keskinen & Nikander, 2023; Nelson, 2019; Previtali et al., 2022; Swift et al., 2018).

With billions of users worldwide, social media plays a crucial role in reflecting and even actively shaping and perpetuating dominant social norms, trends, discourses, and actions (Meisner et al., 2024). This includes those that marginalize older adults, contributing to the normalization of ageism in digital environments. A distinctive feature of social media platforms as spaces that promote ageism is that the majority of today's users are young (Kang et al., 2022). Furthermore, the anonymity

and distance of the internet encourage the transgression of social norms (Kang et al., 2022; Meisner et al., 2024). Given the aging population, the increasing presence of older people on social media platforms, combined with these unique characteristics of social media, could amplify the prevalence and impact of online ageism and change the dynamics of the digital world (Meisner et al., 2024).

Ageism in the digital space can have significant negative effects on older people. In particular, ageism originating from others on the internet can, through internalization processes, also lead to self-directed age discrimination among older adults, which in turn affects their mental health and well-being (Lyons et al., 2018; World Health Organization, 2021). When they are discriminated against, this can cause a negative self-perception, demotivation, and psychological distress (Rothermund et al., 2021).

Beyond these general manifestations of online ageism, its most extreme and hostile expression emerges in the form of ageist hate speech, which directly targets older adults with derogatory or dehumanizing language (Fortuna & Nunes, 2018). While there has been a notable increase in research activities on ageist online hate speech since

^{*} Corresponding author.

E-mail addresses: lucie.stecker.research@outlook.de (L. Stecker), aike.horstmann@uni-due.de (A.C. Horstmann).

<https://doi.org/10.1016/j.jaging.2026.101447>

Received 13 November 2025; Received in revised form 15 March 2026; Accepted 3 August 2026

Available online 8 August 2026

0890-4065/© 2026 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

the onset of the COVID-19 pandemic (Soto-Perez-de-Celis, 2020), to date, only a few studies have been conducted in this field, with very limited discussion of possible intervention methods (Jimenez-Sotomayor et al., 2020; Lichtenstein, 2021; Meisner et al., 2024; Sipocz et al., 2021; Skipper & Rose, 2021; Soto-Perez-de-Celis, 2020; Xiang et al., 2021). In general, researchers emphasize that due to the prevalence of ageist hate speech online, it is necessary to develop effective online interventions that are comprehensive and accessible (Windisch et al., 2022).

Considering these gaps, the present study aims to address three main research objectives. First, the study compares three intervention methods—exposure to counter-stereotypical traits, perspective taking, and implementation intention—in terms of their effectiveness in reducing explicit and implicit ageism. Second, it provides a much-needed distinction between implicit and explicit ageism and how they are measured. Third, this research sheds light on the largely unexplored phenomenon of ageist hate speech on the internet. To provide a more nuanced understanding, it examines the moderating role of aging anxiety on the anti-ageist effect of intervention methods. In the current study, we focus on other-directed online ageism as negative attitudes, stereotypes, or discriminatory behaviors directed towards older adults by younger individuals within digital spaces. Through this approach, the study's findings will provide evidence-based recommendations for reducing online ageism and other forms of discrimination and make a valuable contribution to research on the effectiveness of short online intervention methods.

Related work

Forms and specificity of ageism

Ageism, also referred to as age discrimination, reflects a broad idea that consists of a tripartite concept. Ageism is understood as stereotypes (cognitive), prejudice (affective) and discrimination (behavioral level) associated with people based on their (perceived) chronological age (Cuddy & Fiske, 2002; World Health Organization, 2021).

Stereotypes are widely held beliefs and knowledge about characteristics or traits of a particular group of people, which often turn out to be false (Palmore, 2005). They can be hostile or benevolent. According to the most prominent psychological model pertaining to stereotyping, the Stereotype Content Model (SCM; Fiske et al., 2002), older people are often perceived ambivalently as warm but relatively low in competence (Cuddy et al., 2005; North & Fiske, 2013). Research shows that older adults are perceived as marginalized members of society such as people with disabilities and young children with low status and low competitiveness, cooperative rather than powerful, arousing feelings of sympathy and pity (Cuddy et al., 2008; Shepherd & Brochu, 2021). In digital discourse, cohort labels such as “Baby Boomer” have crystallized additional hostile profiles like being closed-minded or out-of-touch (Frey & Bisconti, 2023), pointing to several negative stereotypes that go beyond the classic pattern of warmth but incompetence.

In contrast to stereotypes, the concept of prejudice is not a cognitive phenomenon, but rather an affective reaction (Allport, 1954). Accordingly, prejudices elicit emotional reactions to social groups (Fiske & Taylor, 2017), founded “upon a faulty and inflexible generalization” (Allport, 1954, p. 9).

Both stereotypes and prejudices can manifest in discriminatory behavior towards a specific group, defining the third component of ageism at the behavioral level (e.g., Levin, 2005). Palmore refers to ageism as an unfair and negative treatment of individuals belonging to a specific age group (Palmore, 1999, p. 4). Examples of such discrimination include the forced retirement of older workers due to downsizing or the mistreatment of older workers.

The WHO further differentiates between institutional, interpersonal or self-directed ageism (World Health Organization, 2021). Palmore (1999) understands institutional ageism as discrimination by

institutions or social structures and personal ageism as prejudice and discrimination by individuals. Self-directed ageism develops through prolonged exposure to negative stereotypes about older people that leads to the internalization of age discrimination (Levy, 2009).

In addition to this conceptualization, Levy and Banaji (2002) further differentiate between implicit and explicit ageism. According to their differentiation, ageism in its explicit form happens with awareness and intent to harm. It involves overt and conscious discriminatory attitudes, ideas, rules and behaviors towards individuals based on their age (Iversen et al., 2009; Levy & Banaji, 2002; Liao et al., 2023). In contrast, in its implicit form ageism can occur without awareness, control or intent to harm. It refers to the more automatic, unconscious, and indirect attitudes, ideas, rules, microaggressions and stereotypes that individuals hold towards different age groups, which can influence their behavior and decisions without their awareness (Dolberg et al., 2018; Gendron et al., 2016; Greenwald et al., 2022; Levy & Banaji, 2002). These differences highlight the need to examine the psychological processes through which explicit and implicit ageism develop, a topic that will be explored in greater detail in the next section.

Development and perpetuation of ageism

Processes of social categorization, together with widely experienced aging anxiety, contribute substantially to the emergence of ageism. The Social Identity Theory (SIT; Tajfel & Turner, 2004) highlights how age-based in-/outgroup distinctions can elicit prejudice: people judge their age group in comparison to others and, when group mobility is constrained by the inevitability of aging, this may lead to compensatory ingroup favoritism or devaluation of other age groups.

Potentially due to the inevitability of aging and becoming part of the dislike outgroup, ageism is also linked to a fear of aging, known as aging anxiety (Benau et al., 2025; Kikuchi et al., 2026). Aging anxiety can be explained by the Terror Management Theory (TMT) by Greenberg et al. (1986). The TMT originally posits that people cope with their inherent fear of mortality by creating symbolic representations and associated values that give them a sense of meaning and control (Greenberg et al., 1986). Martens et al. (2005) have extended the TMT to ageism. They propose that older adults are perceived as a threat because they represent the inevitability of death, the fallibility of the human body and the transience of the foundations on which self-esteem and fear of death are based. As everyone has an innate instinct for self-preservation, the reminder of inevitable death triggers a fear, which leads to a motivated willingness to reject or marginalize this age group. Consequently, ageism is often a fear-based response (Boudjemadi & Gana, 2012; Chonody & Teater, 2016; Greenberg et al., 1986; Martens et al., 2005). Bodner et al. (2015), for instance, showed that aging anxiety moderated the relation between death anxiety and ageism. So far, only a few studies dealing with interventions against ageism have considered the fear of aging (Apriceno & Levy, 2023).

The psychological mechanisms that shape ageism differ for explicit versus implicit ageism. While explicit ageism is based on controlled, propositional processes, implicit ageism is based on automatic associative activation (see dual process theories, Bodenhausen et al., 1999, and the Associative-Propositional Evaluation (APE) model, Gawronski & Bodenhausen, 2011). Explicit attitudes can be understood as evaluative judgments about an attitude object that are based on processes of propositional thinking (Gawronski & Bodenhausen, 2006). Implicit ageism, by contrast, arises from automatic affective reactions in response to specific associations when an individual is presented with the associated stimulus. Implicit ageism presents a distinctive challenge for recognition due to its inherent difficulty in identification, cultural acceptance, lack of clear definitions and ambiguity (Gendron et al., 2016; Meisner et al., 2024).

While previous research on stereotypes and prejudice against older adults has mostly focused on explicit ageism (Iversen et al., 2009; Meisner et al., 2024), validated approaches for assessing implicit ageism

remain comparatively limited (Benau et al., 2025). Although explicit and implicit processes rely on different psychological mechanisms, they can occur simultaneously and are difficult to distinguish from each other (Bodenhausen et al., 1999). At the same time, explicit and implicit biases appear to be interrelated (Nosek & Smyth, 2007). Nevertheless, both forms, explicit and implicit, have a detrimental impact on the lives of older adults, despite the fact that the implicit ageism is less overt (Meisner et al., 2024). Research has demonstrated that explicit and implicit age stereotypes are expressed differently and vary according to age (Chopik & Giasson, 2017; de Paula Couto et al., 2022). Implicit age stereotypes become stronger as people get older, while explicit age stereotypes become more positive (Chopik & Giasson, 2017). Moreover, prior studies have demonstrated that implicit associations with age and older adults tend to be more negative than explicit associations (e.g., Dasgupta & Greenwald, 2001).

The psychological processes identified by these theories should be considered when developing intervention methods tackling explicit and implicit ageism.

Ageism in digital space

Online ageism manifests itself, for example, in online hate speech against older adults (Levy et al., 2022). Online hate speech occurs in cyberspace and generally targets or belittles socially disadvantaged groups linguistically, discriminating against them based on group characteristics such as age, gender, religion, or origin (Fortuna & Nunes, 2018; Windisch et al., 2022). These discriminating comments incite hatred and can even lead to acts of violence outside cyberspace (Fortuna & Nunes, 2018). Windisch et al. (2022) describe hate speech as systematic and repetitive, used to deliberately foster prejudices, biases, and intolerance towards a particular societal group. This was particularly visible during the COVID-19 pandemic: A content analysis of tweets during this time revealed the prevalence of ageist discourse on social media (Xiang et al., 2021), e.g. #BoomerRemover (Soto-Perez-de-Celis, 2020). These tweets frequently conveyed ageist sentiments, devaluing older adults' lives, presenting false information and downplaying the impact of the pandemic on this demographic (Bacsu et al., 2024; Xiang et al., 2021). Such instances of age discrimination online have not only reinforced ageist stereotypes and prejudices but have also contributed to fears, mistrust, and resulting vaccine hesitancy among older adults (Bacsu et al., 2024).

Online-interventions to combat ageism

Given the widespread use of social media, online intervention methods could be used to counteract online ageism directly at the point where it emerges. For instance, to combat online hate speech approaches like counter-speech interventions (Siegel & Badaan, 2020), message-based methods, bot penalties for harassers, auto-generated responses, or redirects to educational YouTube videos (Windisch et al., 2022) were tested. In the context of ageism, prior work has identified multiple strategies (e.g., Apriceno & Levy, 2023; Chen & Zhang, 2022; Packer & Chasteen, 2006; Robertson & Weiss, 2017). In the current work, we focus on three leading approaches in the field of discrimination intervention research, which are hitherto underexplored in the context of ageism, and compare their short-term effects on explicit vs. implicit ageism in an online setting: (1) perspective taking, (2) exposure to counter-stereotypical traits, and (3) implementation intentions.

It is important to consider, that explicit and implicit attitudes may respond differently to different intervention approaches (FitzGerald et al., 2019; Iversen et al., 2009; Levy & Banaji, 2002; Liao et al., 2023). For instance, explicit prejudices are susceptible to self-presentation controls, whereas implicit ones require associative activation (Gawronski & Bodenhausen, 2006). In the following, we outline each approach and their predicted differential effects on explicit versus implicit ageism.

Exposure to counter-stereotypical traits

Engaging with counter-stereotypical traits is considered one of the most effective methods for reducing stereotypes and prejudices against a group (e.g., Finnegan et al., 2015; FitzGerald et al., 2019; Fraser et al., 2021). Counter-stereotypical traits refer to personal attributes that are considered unexpected or unconventional for a particular group. In the context of the ambivalent stereotypical perception of older adults as warm-hearted and at the same time incompetent (SCM; Fiske, 2015; Fiske et al., 2002), the counter-stereotypical characteristics can be expressed through traits such as self-confidence, assertiveness, resilience and egotism, which are typically associated with coldness and competence (Fraser et al., 2021). These traits challenge the conventional perception and highlight the complexity and inter-individual diversity within the group, deconstructing the stereotype and facilitating the process of forming alternative expectations (Blair & Banaji, 1996; Gociowska & Crisp, 2013; Vailati Riboni & Pagnini, 2022).

Changes in implicit attitudes indicate a restructuring of associative networks, for example through contextual cues that activate stored judgments in different ways (see APE model, Gawronski & Bodenhausen, 2006). Accordingly, exposure to counter-stereotypical traits can operate outside conscious awareness when participants are covertly confronted with corresponding stimuli in the context of a seemingly independent task (Power et al., 1996), and can therefore be regarded as an intervention method that exerts its effects largely unconsciously.

Perspective taking

Another effective method for reducing stereotypes and their accessibility, decreasing outgroup rejection as well as ingroup favoritism and improving intergroup relations is perspective taking (Galinsky & Moskowitz, 2000; Shih et al., 2009; Todd et al., 2011). Perspective taking prompts a person to consider and reflect on the mental states and subjective experiences of others by increasing the overlap between their own and others' cognitive representations (Galinsky & Moskowitz, 2000). Studies have shown that people who empathize with others show signs of stereotype inhibition or reduced stereotype accessibility (Galinsky & Moskowitz, 2000) as well as fewer prejudices, a more positive assessment of the person in question, and increased sensitivity (Todd et al., 2011). This suggests that perspective taking may be an effective strategy for controlling stereotype activation. Furthermore, this method may implicitly activate the individual's self-concept, which in turn increases the likelihood of applying the self-concept to the outgroup triggering a psychological preference and positive evaluation (see SIT; Galinsky, 2002). Consequently, also perspective taking can be classified as an unconsciously effective intervention method with potential effects on implicit ageism.

Implementation intention

The literature on reducing ageism suggests that direct and positive contact with older adults in particular has a positive impact on attitudes towards them (Cadieux et al., 2019; World Health Organization, 2021). According to the Intergroup Contact Theory (Allport, 1954), intergroup interactions can lead to the reduction of prejudice and stereotyping. In line with this, prior studies have shown that contact with older adults can positively shape attitudes (Braithwaite et al., 1993).

Moreover, research indicates that even imagined contact can have positive effects on intergroup relations, prejudice reduction towards the outgroup as a whole, and future behavior towards outgroup members (see Imagined Contact Hypothesis; Crisp & Turner, 2009). A meta-analysis has quantitatively tested these effects and demonstrated a reduction in intergroup prejudice (Miles & Crisp, 2014). The intervention method to imagine positive intergenerational contact is similar to the implementation intentions approach ("if-then" plans), where individuals develop a positive and non-discriminatory behavioral alternative for interacting with a person from the discriminated group (Mendoza et al., 2010). Since explicit ageism can be specifically

influenced by conscious processes and interaction goals (Gawronski & Bodenhausen, 2011), this method should prove particularly effective. In addition, people pursue certain goals when implementing their intentions, which also influences explicit stereotyping (Bodenhausen et al., 1999). Hence, implementation intention can be classified as intervention method particularly suitable to target explicit ageism.

Hypotheses

This study takes a two-pronged approach to examine both the explicit and implicit components of age discrimination, particularly focusing on the question which intervention methods are most effective respectively.

Against this background, we propose the following hypotheses:

H1. Online intervention methods (exposure to counter-stereotypical traits/perspective taking/intention implementation) effectively reduce

- a) explicit ageism.
- b) implicit ageism.

H2. Explicit ageism reduction methods (implementation intention) are more effective in reducing explicit ageism compared to implicit ageism reduction methods (exposure to counter-stereotypical traits and perspective taking).

H3. Implicit ageism reduction methods (exposure to counter-stereotypical traits and perspective taking) are more effective in reducing implicit ageism compared to explicit ageism reduction methods (Implementation Intention).

Since prior research suggests that intergroup contact can meaningfully influence ageist attitudes, participants' contact with older adults was included as additional influencing variable for H1-H3.

So far, only a few studies dealing with interventions against ageism have considered the fear of aging (Apriceno & Levy, 2023). The present study aims to address this research gap by examining age-related anxiety as a moderating variable on intervention measures. Examining aging anxiety as a moderator links interventions to the central gerontological concern of determining how fears about one's own aging process shape perceptions of older people, and helps to identify for whom scalable interventions are most or least effective in real-life aging contexts. Therefore, the following hypothesis is proposed:

H4. The impact of intervention methods in reducing a) explicit and b) implicit ageism is moderated by aging anxiety.

In the context of online ageism, numerous factors may contribute (see Marques et al., 2020), of which we will investigate the following four as part of additional exploratory analyses:

- 1) country of residence (geographical region was shown to be a significant moderating factor; North & Fiske, 2015)
- 2) own age (observed to influence perception and evaluation of older adults; Horhota et al., 2019)
- 3) perception of an "old person" (the perception of what is considered "old" can influence societal behavior and expectations towards older adults; Löckenhoff et al., 2009)
- 4) social media use (active and passive social media use can play a role; e.g., via habituation to hate speech; Schmid et al., 2024; Soral et al., 2018; or increased likelihood of engaging with hate speech; Hawdon et al., 2014)

Method

An online study with a between-subjects design including one factor (intervention method) with four levels (exposure to counter-stereotypical traits, perspective taking, implementation intentions, and

a control condition) was conducted. The study was approved by the Ethics Committee of the Faculty of Computer Science of the University of Duisburg-Essen (ID: 2404SPSL5902). Preregistration, data, and materials are available online (<https://osf.io/fps6d/>).

Sample

Participants were recruited via various channels, including the participant-exchange platforms *SurveyCircle* and *SurveySwap* as well as the EU-wide network of a research project addressing ageism. To enable an initially planned EU-level comparison, the survey was provided in German and English; eligibility required being at least 18 years old and fluent in one of these languages. The participants did not receive monetary compensation. A total of $N = 258$ participants completed the questionnaire. Because recruitment primarily reached German-speaking networks, the sample included substantially more German than English speaking respondents ($n = 213$ vs. $n = 45$). During data screening we observed a language-linked difference in the manipulation check for hate speech items (English set: $M = 3.76$, $SD = 0.61$; German set: $M = 4.42$, $SD = 0.53$). Given unequal group sizes, potential linguistic confounds (e.g., differential connotations, translation nuances), and the priority to ensure measurement equivalence within the main analyses, we restricted all primary analyses to German language cases. The exclusion was statistically substantiated by an ANOVA, Welch's $F(1, 59.04) = 45.725$, $p < .001$, $\eta^2 = 0.17$. Further exclusion criteria were applied: reporting of major issues (2), insufficient text quality and length as in lower than 15% of the requested text length in the intervention task (27) and failure of manipulation checks (15). The total exclusion of 74 cases resulted in a final sample size of $N = 184$.

The final sample comprised 133 females (72.3%), 50 males (27.2%), and one individual of diverse gender identity (0.5%). The age range was between 18 and 64 years ($M = 27.42$, $SD = 7.74$). 56% of respondents reported a bachelor's degree or diploma as their highest qualification, 19% a secondary school leaving certificate, 17.9% a master's degree, 5.4% a completed apprenticeship and 0.5% a doctorate; 1.1% indicated another qualification. Regarding their main occupation, 22.8% were in full-time employment, 7.1% in part-time employment, 68.5% students, 0.5% unemployed/seeking work, 0.5% pupils and 0.5% other.

Experimental procedure

Following an initial briefing and informed consent, participants were told that the study aimed to examine the cognitive processing of digital content. After providing sociodemographic information, participants were randomly assigned to one of four experimental groups, each of which received a specific intervention task (exposure to counter-stereotypical traits, perspective taking, implementation intention, control group). Depending on the intervention task, participants were asked to read and/or write a short text. To ensure comparability of the four groups, all test subjects were assigned five minutes (Galinsky & Moskowitz, 2000). After the five-minute period, the questionnaire automatically advanced to the subsequent section. Test subjects could elect to proceed to the next section after three minutes if they wished to complete the questionnaire more expeditiously (e.g., Ramasubramanian & Oliver, 2007). Subsequently, participants were asked to engage in a modified version of an Implicit Association Test (IAT; Greenwald et al., 1998) to assess the prevalence of implicit ageism. Following the IAT, a manipulation check was conducted to ensure that participants perceived the six age-discriminatory hate comments presented during the task as intended. Then, respondents provided ratings assessing their explicit ageism and aging anxiety. The final page of the questionnaire addressed participants' perception of a person as being old and their contact with older adults. Finally, respondents were thanked for their participation and debriefed.

Experimental manipulations

The test subjects were assigned to one of four experimental groups. All intervention tasks were tested in a pilot study ($N = 26$).

Group 1: Exposure to counter-stereotypical traits

The first intervention method was based on the method of Power et al. (1996). Participants were asked to read a text from a news section of a company newsletter and summarize it in 300–500 characters. In the text, a 69-year-old female employee was described in a way that ran counter to the age-stereotypical portrayal. This portrayal was based on opposing stereotypes (Hummert, 2011). Accordingly, the person was portrayed as competent, mentally agile, cheerful, socially connected, friendly, open, adventurous and worldly.

Group 2: perspective taking

The second experimental group included an intervention task, analogous to previous studies (e.g., Galinsky & Moskowitz, 2000; Todd et al., 2011), in which the participants had to imagine themselves to be the older person depicted in a photo and writing a short 600–800-character narrative about the day from this person's perspective. The number of characters required was higher in groups 2 and 3, as the intervention process was not initiated by reading a newsletter text. Instead, it was triggered by creating a text.

Group 3: implementation intention

The test subjects assigned to the third group were also asked to write 600–800 characters of text relating to the older person in the same photo, but here the task was to imagine a positive encounter with the person depicted (Crisp & Turner, 2009; Kuchenbrandt et al., 2013), which corresponds to the principle of the implementation intention method (Mendoza et al., 2010). It was pointed out that the participants should think of an everyday situation in which they could talk to the person and avoid stereotypical thinking. Additionally, they were asked to identify the personality traits and shared interests that characterize the older person in question.

Group 4: control condition

The control group received the task from group one, only that the person described in the newsletter was 39 years old. Therefore, no counter-stereotypical traits were primed, given that the described characteristics are not atypical for a 39-year-old individual (Hummert, 2011).

Measurements

Implicit ageism

The IAT is used to determine the strength of cognitive associations between two target concepts and an assessment dimension (Greenwald et al., 2022). To investigate the implicit associations in the specific context of online ageist hate speech, a new version of the IAT (Greenwald et al., 1998) was created for this study: The Ageist Hate Speech Implicit Association Test (AHS-IAT). It adheres to the latest recommendations of Greenwald et al. (2022) and is based on the implementations by Chopik and Giasson (2017) as well as Giner-Sorolla et al. (1999). The AHS-IAT measures the strength of associations between prime stimuli (e.g., old face) and subsequent comments (e.g., age-discriminatory hate speech) using the so-called D-score (see OSF for calculation, <https://osf.io/fps6d/>). Therefore, the reaction speed at which individuals categorize hate speech (e.g. “senile old git”) and friendly commentary (e.g. “vibrant charm”) as *hateful* or *friendly* after seeing either an old face, a young face, a positive or a negative image is assessed. The generation of the hate speech comments was inspired by studies and datasets on (ageist) hate speech (e.g., Bacsu et al., 2024; Goldzycher et al., 2024; Jimenez-Sotomayor et al., 2020; Mandl et al., 2019; Sipocz et al., 2021; Wiegand et al., 2018; Wilhelm & Joeckel,

2019) as well as comments found on social media platforms. From the fifty comments tested in the pilot study, twelve were selected, six of which were classified as strongly friendly ($M = 5.41$, $SD = 0.84$) and six as strongly hateful on a 6-point Likert scale ($M = 1.99$, $SD = 0.8$). The prime stimuli comprised 12 prime pictures (illustrated in Fig. 1). Half of the images were employed as age-independent control primes, comprising three negative and three positive images analogous to those used by Giner-Sorolla et al. (1999) and in accordance with the minimum number of examples recommended by Greenwald et al. (2022). These age-independent images were retrieved from the copyright-free image databases Unsplash (2026) and Pixabay (2026). The facial primes, comprising three images of older faces and three images of younger faces, were selected from the prime image set of Nosek et al. (2007) for the purpose of measuring ageism.

Technical implementation details (block structure, prime durations, key assignment, D-score calculation, stimulus sources) are documented in the OSF (<https://osf.io/fps6d/>).

The test procedure is illustrated in Fig. 2.

Before analyzing participants' implicit ageism, their evaluation of the hate speech comments was examined. Adapted from Weber et al. (2020), participants rated each comment regarding seven adjectives (“factual”, “aggressive”, “hateful”, “derogatory”, “positive”, “norm-violating”, “mood-changing”) on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*; $\alpha = 0.95$). Participants with a tendency to positively evaluate hate speech comments (with a rating of less than 2.5) and participants who explicitly rated them as “positive” were excluded from the analysis of the IAT (3 cases, $M = 4.44$, $SD = 0.48$). Further, seven cases were excluded due to failure to meet the inclusion criteria for the IAT as outlined by Greenwald et al. (2022). Thus, the sample size for the analysis of implicit ageism was $N = 174$ (94.6%).

Explicit ageism

To assess explicit ageism an adapted version of the Prescriptive Intergenerational-Tension Ageism Scale: Succession, Identity, and Consumption (SIC) by North and Fiske (2013) was employed. 20 items are rated on a 6-point Likert scale (e.g., “Older people are often a burden on their families”, 1 = *strongly disagree* to 6 = *strongly agree*; $\alpha = 0.88$). As no validated German version of the scale was identified, the items were translated for the German-speaking respondents using a translation and back-translation procedure.

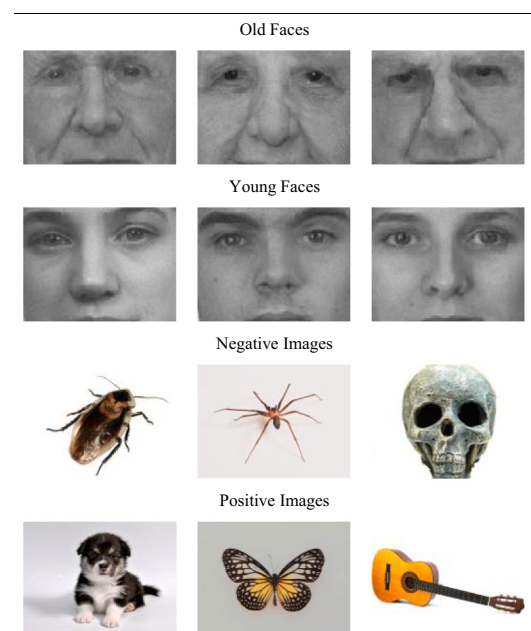


Fig. 1. Picture primes used in the AHS-IAT.

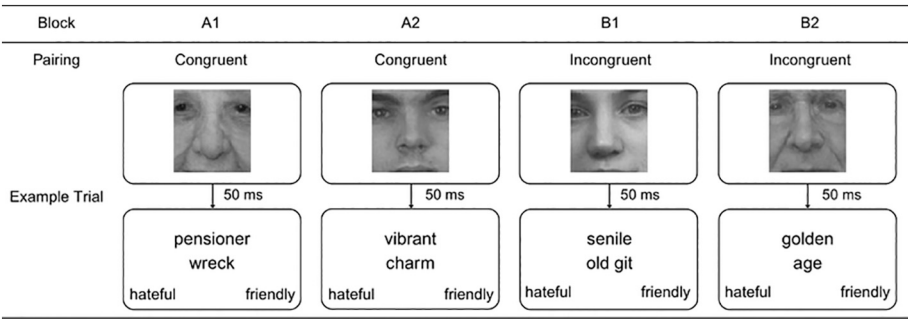


Fig. 2. AHS-IAT procedure.

Aging anxiety

An adapted version of the Anxiety about Aging Scale (AAS; Lasher & Faulkender, 1993) was used, which divides aging anxiety in four dimensions: fear of old people, physical appearance, psychological concerns and fear of loss. 20 items such as “I will have plenty to occupy my time when I am old” are measured on a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*; $\alpha = 0.82$). Since the AAS also lacked a validated German version, its items likewise underwent translation and back-translation. One item was excluded to improve the physical appearance subscale’s reliability from below 0.70 to 0.74.

Social media use, contact with older adults, age and perception of age

To capture participants’ social media use, they were asked to assess the time they use social media actively and passively (two questions, see Ernala et al., 2020) using the following categories: Less than 10 min per day, 10 to 30 min per day, 31 to 60 min per day, 1 to 2 h per day, 2 to 3 h per day, and 3 or more hours per day. All items were translated into German for German-speaking respondents. The two variables, contact with older friends and family and professional contact with older adults, were adapted from Kessler and Warner (2023): “Now think about people with whom you have regular contact, i.e. friends and family members with whom you meet/phone at least once a month. What percentage of them are older than 65?” and “Now think about the people you deal with regularly at work. What percentage of them are older than 65?” To contextualize the responses regarding the professional contact, an additional question was asked: “Is it your main job to provide professional services for older people? Examples: Care, escort services, physiotherapy” (with an open text input for specification). Perception of age was assessed by asking the participants about the age at which they would describe a person as old (Kessler & Warner, 2023).

Analysis plan

Given the disparate sample sizes for explicit ($N = 184$) and implicit ageism ($N = 174$), two one-way ANCOVAs were conducted to test H1–H3, with intervention method as the factor. In addition, planned contrasts were calculated for both dependent variables to compare the intervention methods (exposure to counter-stereotypical traits, perspective taking, implementation intention, control group). This allowed us to examine whether online interventions reduce both explicit (H1a) and implicit ageism (H1b) and whether the effectiveness differs between explicit reduction methods (implementation intention) and implicit reduction methods (exposure to counter-stereotypical traits and perspective taking), as predicted in H2 and H3. Contact with older friends and family members as well as professional contact with older adults were included as additional influencing variables. To contextualize the main effects and identify further factors relevant for future intervention work, we also conducted exploratory analyses to assess whether additional variables (participants’ age, perceptions of old age, social-media use) further influenced explicit and implicit ageism.

Results

The descriptive statistics for explicit and implicit ageism (D-Score) across intervention conditions 1–4 can be found in Table 1.

Effects of intervention methods on ageism

The results showed no significant main effect of condition for explicit ageism, $F(3, 178) = 2.11, p = .101, \eta_p^2 = 0.034$. The calculation of contrasts to compare the intervention conditions, both jointly and separately, with the control group to assess their effects on explicit ageism showed a significant difference compared to the control group only for perspective taking (see Table 2 for the results of the contrast analyses). This contrast accounted for 3% of the variance in explicit ageism, indicating a small to medium effect size (Cohen, 1988). Thus, H1a can be partially accepted, while H2, which assumed a stronger effect of implementation intention on explicit ageism compared to the other two methods, was not supported. There was a significant effect of contact with older friends and family members ($M = 10.77, SD = 12.41$) for explicit ageism, indicating that higher contact was associated with lower levels of explicit ageism, $F(1, 178) = 9.16, p = .003, \eta_p^2 = 0.05$. For the contact with older adults in a professional context ($M = 7.82, SD = 15.28$), no significant effect was detected, $F(1, 178) = 1.39, p = .240, \eta_p^2 = 0.008$.

For implicit ageism, there was neither a significant main effect, $F(3, 168) = 0.39, p = .758, \eta_p^2 = 0.007$, nor significant contrasts. Accordingly, H1b and H3 must be rejected. Moreover, neither contact with older friends and family members, $(1, 168) = 0.76, p = .383, \eta_p^2 = 0.005$, nor

Table 1
Descriptive statistics for explicit and implicit ageism for the different intervention method conditions 1–4.

Variable	Group	M	SD	n
Explicit Ageism	1	2.56	0.59	45
	2	2.37	0.66	46
	3	2.66	0.80	36
	4	2.70	0.70	60
	1,2,3	2.52	0.69	127
	Overall	2.58	0.69	184
Implicit Ageism	1	−0.54	0.56	44
	2	−0.47	0.47	43
	3	−0.59	0.44	36
	4	−0.60	0.49	51
	1,2,3	−0.53	0.49	123
	Overall	−0.55	0.49	174

Note. Explicit ageism is measured on a 5-point Likert scale. Implicit ageism is measured by the D-score for the IAT. A D-score between −0.14 to 0.14 indicates little to no difference, while scores less than −0.14 or greater than 0.14 indicates negative/positive automatic association between old faces and hate speech/young faces and friendly comments. 1 = Exposure to Counter-Stereotypical Traits, 2 = Perspective Taking, 3 = Implementation Intention 4 = Control Group. $N = 184$ (explicit ageism). $N = 174$ (implicit ageism).

Table 2

Results of contrast analyses from the ANCOVAs investigating the impact of intervention conditions on explicit and implicit ageism.

Explicit Ageism	$F(1, 178)$	p	η_p^2
1, 2, 3 vs. 4	1.83	0.178	0.01
1 vs. 4	0.79	0.375	< 0.01
2 vs. 4	5.27	0.023*	0.03
3 vs. 4	0.01	0.936	< 0.01
1, 2 vs. 3	2.41	0.123	0.01
Implicit Ageism	$F(1, 168)$	p	η_p^2
1, 2, 3 vs. 4	0.25	0.62	< 0.01
1 vs. 4	0.16	0.69	< 0.01
2 vs. 4	0.83	0.36	< 0.01
3 vs. 4	0.01	0.92	< 0.01
1, 2 vs. 3	0.64	0.424	< 0.01

Note. 1 = Exposure to Counter-Stereotypical Traits, 2 = Perspective Taking, 3 = Intention Implementation, 4 = Control Group. * $p < .05$. $N = 184$ (explicit ageism). $N = 174$ (implicit ageism).

professional contact, $F(1, 168) = 1.20$, $p = .274$, $\eta_p^2 = 0.007$, showed significant effects for implicit ageism.

For additional exploration of H1, a Pearson correlation analysis was calculated between implicit and explicit ageism to test whether these two variables were related. There was a very weak and non-significant negative correlation between explicit ageism and implicit ageism, $r(174) = -0.018$, $p = .813$.

Furthermore, the results for implicit ageism showed a negative D value across all experimental groups, which suggests that the responses to the incongruent pairings in the B blocks were faster than those in the A blocks with the congruent pairings. We therefore analyzed the associations of the individual prime-target pairings as intra-individual factors (old face vs. young face vs. negative images vs. positive images) in an additional mixed MANCOVA, using Wilks' Lambda (Steyn & Ellis, 2009).

Mauchly's test showed a violation of sphericity for the prime-target interaction, $p < .05$; Greenhouse-Geisser correction was applied ($\epsilon = 0.77$). Levene's test confirmed homogeneity of variances ($p > .05$), but Box's test indicated unequal covariance matrices ($p < .001$), which should be considered when interpreting the results. A significant interaction effect was observed between the target comments and the type of

prime picture, $F(2.28, 382.64) = 39.69$, $p < .001$, $\eta^2 = 0.19$. This indicates that there was a notable difference between the response times of participants to both hate speech and friendly comments, with a large effect size. Moreover, the analysis revealed no significant interaction effect between the target comments, the type of prime picture and the experimental group, $F(6.83, 382.64) = 0.36$, $p = .920$, $\eta^2 = 0.01$. This suggests that there was no significant difference between the intervention methods in terms of the participants' reaction times for the varying priming images, neither for hate speech nor for friendly target comments. The mean values of the D-scores for the respective prime stimuli all demonstrate faster responses for the incongruent pairings in the B-blocks, indicating stronger incongruent associations (see Fig. 3 for visualization of the response time).

Bonferroni multiple comparative analyses were performed to explore those differences further (see Table 3). The contrasts for the target comments (friendly vs. hate speech) revealed that in the case of old faces and negative images participants demonstrated a greater speed in rating friendly comments compared to hateful comments, $p < .001$. Conversely, when presented with young faces and positive images, the subjects exhibited a significantly faster response time in assigning hateful comments, while responses to friendly comments were slower, $p < .001$. The fastest response was observed in incongruent pairings, such

Table 3

Results of Bonferroni Multiple Comparisons for Prime and Target Conditions.

Prime	Target (I)	Target (J)	MD (I-J)	SE	95% CI	
					LL	UL
Old	Hate Speech	Friendly	139.68**	26.36	87.63	191.73
Young	Hate Speech	Friendly	-306.71**	31.03	-367.97	-245.46
Positive	Hate Speech	Friendly	-293.09**	27.93	-348.23	-237.95
Negative	Hate Speech	Friendly	158.56**	25.57	108.08	209.04

Note. Adjustments for multiple comparisons: Bonferroni. MD = Mean Difference; CI = confidence interval; LL = lower limit; UL = upper limit. $N = 174$. ** $p < .001$.

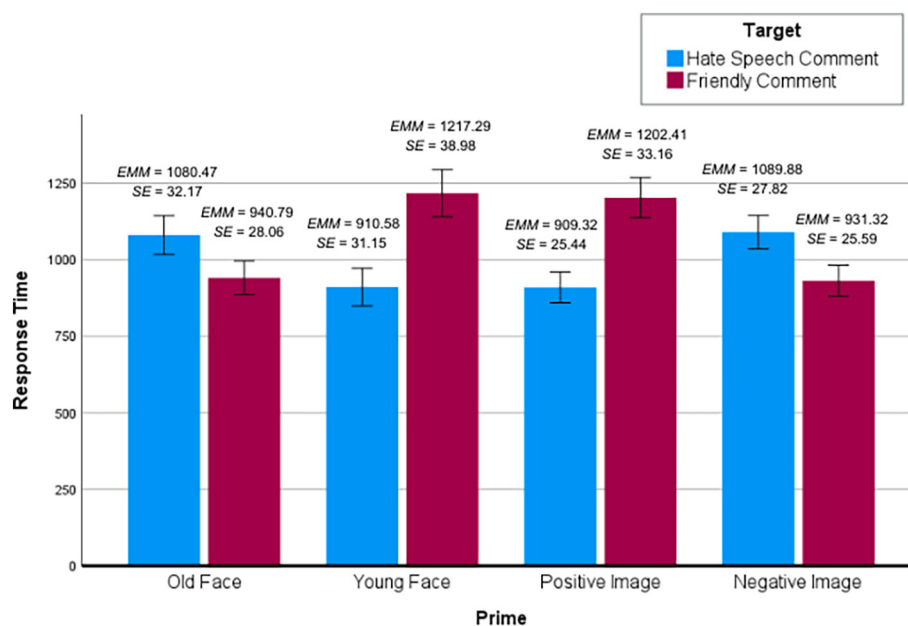


Fig. 3. Response time for implicit ageism for each prime-target pair.

Note. Error Bar 95% CI. $N = 174$.

as when a positive image was paired with a hateful comment, while the slowest response was found when a young face was paired with a friendly comment. The results of the contrast analysis for the priming images can be found in the OSF (<https://osf.io/fps6d/>).

The moderating effect of aging anxiety on the impact of intervention methods on reducing ageism

To test hypothesis H4 (the influence of intervention methods on the reduction of explicit and implicit ageism is moderated by aging anxiety), Andrew Hayes' PROCESS macro was used to perform two moderation analyses (see Table 4 for descriptive statistics for aging anxiety). A LOESS-smoothed scatter plot inspection confirmed the linearity assumption for residuals (Schmidt & Finan, 2018).

The overall model for explicit ageism was not significant, $F(3,180) = 2.14$, $p = .097$, $R^2 = 0.039$, indicating that the influencing factors including the interaction had no significant effect on explicit ageism (see Table 5). However, a small, statistically significant main effect of aging anxiety on explicit ageism was found, which explains 2.8% of the variance in explicit ageism, $F(1, 182) = 5.21$, $p = .024$, $R^2 = 0.028$. For each unit increase in aging anxiety, explicit ageism exhibited a mean increase of 0.22 units. For implicit ageism, the overall model was also not significant, $F(3, 170) = 0.83$, $p = .477$, $R^2 = 0.012$ (see Table 5). Further investigation of the main effect of aging anxiety on implicit ageism showed no significance, $F(1, 172) = 1.52$, $p = .219$, $R^2 = 0.009$. Thus, H4a and H4b are not supported.

To investigate H4 further, the most effective intervention method of perspective taking was subjected to another moderation analysis. The overall model for explicit ageism was significant and explained 10.96% of the variance in the dependent variable, $R^2 = 0.110$, $F(3,99) = 4.36$, $p = .006$ (see Table 5). However, the inclusion of the interaction term did not significantly improve the model. Aging anxiety again showed a small positive main effect on explicit ageism, $R^2 = 0.060$, $F(1,101) = 6.40$, $p = .013$. Accordingly, aging anxiety explained a small part of 6% of the variance. For each unit increase in aging anxiety the explicit ageism level increased by an average of 0.32 units. No significant effects were found for implicit ageism, neither for the overall model, $R^2 = 0.028$, $F(3,90) = 0.98$, $p = .407$, nor for the main effect of aging anxiety, $R^2 = 0.012$, $F(1, 92) = 1.09$, $p = .300$.

Exploratory analysis

The exploratory analysis examined the influence of participants' own age, age perception and passive and active social media use on explicit and implicit ageism (see Table 6). The overall model was significant, $F(4, 179) = 6.80$, $p < .001$, explaining 13.2% of the variance in explicit ageism ($R^2 = 0.132$). Participants' age negatively predicted explicit ageism ($\beta = -0.273$, $p < .001$), indicating that older participants expressed less ageist attitudes. Perceived age for categorizing someone as "old" also showed a significant negative effect ($\beta = -0.154$, $p = .035$), suggesting that individuals who set a lower threshold for "old" were more likely to hold ageist views. Active and passive social media use did not significantly predict explicit ageism ($\beta = -0.073$, $p = .301$; $\beta =$

0.079 , $p = .260$). For implicit ageism, the model was not significant, $F(4, 169) = 0.73$, $p = .730$, $R^2 = 0.012$. None of the predictors reached significance ($p > .05$), indicating that participants' age, age perception, and social media use were not associated with implicit ageism.

Discussion

The current study compares three brief online intervention methods (exposure to counter-stereotypical traits, perspective taking and implementation intention) to reduce both explicit and implicit ageism in a randomized controlled experiment. It is noteworthy that the study examines both the explicit and implicit dimensions of ageism, which are often studied in isolation. By incorporating an IAT with ageist hate speech stimuli, the present study sheds light on this previously under-represented form of ageism in digital spaces. This dual focus allows for a more comprehensive understanding of how ageist attitudes manifest themselves and can be combated through online interventions.

Key findings

The results show that short, online-based intervention approaches have the potential to reduce age-related prejudices and offer valuable starting points for the further development of more effective interventions. Perspective taking led to a significant decrease in explicit age stereotypes, while exposure to counter-stereotypical traits and implementation intention had no effect in our setting. Therefore, short modules, which presumably trigger fewer affective-relational processes, appear to be less suitable for explicit evaluations. Accordingly, the data suggest that particularly perspective taking can be used as a low-threshold and easily implementable intervention method (e.g., Devine et al., 2012), potentially as component in online training or platform-based awareness-raising measures. Since none of the intervention methods were found to have an impact on implicit ageism, implicit biases may require more intensive, repeated, and varied engagement (Devine et al., 2012; FitzGerald et al., 2019).

Our findings underscore that explicit and implicit facets of ageism need to be addressed differently and confirm previous literature suggesting that they are based on different psychological mechanisms (Bodenhausen et al., 1999; Gawronski & Bodenhausen, 2011). Implicit biases are typically more profound and operate automatically and unconsciously. This could explain why brief online interventions do not directly influence implicit stereotypes. In general, there is uncertainty in the research on effective methods for reducing implicit biases and the conditions under which they work (FitzGerald et al., 2019). The reduction of implicit biases thus appears to be a significant challenge, as a number of intricate conditions must be satisfied for the interventions to be efficacious.

In addition, our results suggest that both aging anxiety and contact with older adults are meaningful contextual factors that shape how participants respond to intervention methods. A higher level of age anxiety can impair the effectiveness of perspective shifts or counter-stereotypical impulses, while positive intergenerational contacts appear to promote more favorable changes in the assessment of age, particularly by breaking down negative stereotypes and reducing tensions between groups. These findings show that effective strategies to combat ageism should explicitly address aging anxiety and provide opportunities for positive contact between generations in order to maximize their impact.

Role of the self-concept and empathy

In contrast to the other two methods, the perspective taking method activates the self-concept (Galinsky & Moskowitz, 2000) and disrupts stereotype formation processes (see Social Identity Theory; Tajfel & Turner, 2004). This finding suggests that methods which aim to reduce ageism while activating the self-concept are more effective than

Table 4
Descriptive statistics for aging anxiety.

Group	<i>M</i>	<i>SD</i>	<i>n</i>
1	2.73	0.45	45
2	2.67	0.58	46
3	2.62	0.54	36
4	2.79	0.50	57
1,2,3	2.67	0.52	127
Overall	2.71	0.52	184

Note. 1 = Exposure to Counter-Stereotypical Traits, 2 = Perspective Taking, 3 = Intention Implementation, 4 = Control Group. 1,2,3 = all groups in intervention condition; *N* = 184.

Table 5

Moderation and regression analyses predicting explicit and implicit ageism.

Dependent Variable	Predictor	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI	ΔR^2
Explicit Ageism	Aging Anxiety x Moderator	0.06	0.25	0.22	0.823	[−0.45, 0.52]	<0.001
	Aging Anxiety	0.22	0.10	2.28	0.024*	[0.03, 0.41]	0.028
Implicit Ageism	Aging Anxiety x Moderator	−0.05	0.14	−0.37	0.710	[−0.33, 0.23]	<0.001
	Aging Anxiety	−0.09	0.07	−1.23	0.219	[−0.23, 0.05]	0.009
Explicit Ageism (Perspective Taking only)	Aging Anxiety x Moderator	−0.11	0.13	−0.84	0.404	[−0.38, 0.15]	0.008
	Aging Anxiety	0.32	0.13	2.53	0.013*	[0.07, 0.56]	0.060
Implicit Ageism (Perspective Taking only)	Aging Anxiety x Moderator	0.04	0.08	0.50	0.619	[−0.12, 0.19]	0.002
	Aging Anxiety	−0.10	0.09	−1.04	0.300	[−0.28, 0.09]	0.012

Note. CI = confidence interval. * $p < .05$.

Table 6

Descriptive statistics for the examined variables of the exploratory analysis.

Variable	<i>M</i>	<i>SD</i>	Min.	Max.	<i>p</i>	
					Expl.	Impl.
Social media use actively	2.66	1.38	1	6	0.301	0.615
Social media use passively	3.71	1.30	1	6	0.260	0.776
Age	27.42	6.74	18	64	<0.001**	0.825
Perception of “old age”	63.59	13.80	21	100	0.035*	0.250

Note. Expl. = Significance for explicit ageism. Impl. = Significance for implicit ageism. $N = 174$. * $p < .05$. ** $p < .001$.

other intervention methods which do not address the self-concept. However, this can only be substantiated in the case of explicit ageism.

Additionally, empathy has been identified as an influencing variable for the reduction of discrimination in several research studies through the lens of perspective taking (e.g., [Chen & Ibasco, 2023](#); [Shih et al., 2009](#); [Vescio et al., 2003](#)). Although implementation intentions can also elicit empathic responses when the imagined situation concerns another person, empathy is not an inherent or necessary mechanism of if-then planning. Implementation intentions work primarily through increased accessibility of cues and automated triggering of actions ([Rees et al., 2019](#); [Turner et al., 2007](#)), rather than through the merging of self and others or through affective resonance, which distinguishes them from perspective taking. Hence, interventions that activate empathy and self-understanding can help to challenge and redefine these stereotypical dimensions, thereby reducing explicit ageism instantly. Since the two non-effective intervention methods, exposure to counter-stereotypical traits and implementation intention, do not encompass an empathy-activating aspect, it can be argued that this aspect is another decisive factor. Accordingly, it seems reasonable to encourage further research on the role of empathy and self-concept, particularly regarding implicit ageism.

Effects of aging anxiety

Although aging anxiety did not emerge as moderator for the effectiveness of online-interventions against ageism, its consistently significant main effect indicates that individuals with higher aging anxiety tend to exhibit stronger explicit age stereotypes, irrespective of the specific intervention exposure. This aligns with previous gerontological research highlighting that concerns about one's own aging process are linked to more pronounced negative evaluations of older adults ([Apriceno & Levy, 2023](#); [Kikuchi et al., 2026](#)). This effect indicates that individuals with higher aging anxiety tend to exhibit stronger explicit age stereotypes, irrespective of the specific intervention exposure.

In contrast, we did not observe a corresponding association with implicit ageism, indicating that aging anxiety may exert a greater influence on consciously perceived stereotypes than on unconscious prejudice. This could be again explained by the differences in cognitive processing between explicit and implicit ageism ([Fazio & Olson, 2003](#);

[Sritharan & Gawronski, 2010](#)). This may also be related to the complications involved in measuring implicit ageism, which will be discussed in more detail later in the discussion.

Effects of contact with older adults

The results suggest that contact with older friends and family members is beneficial for reducing stereotypes and prejudices towards older adults. In contrast, there was no discernible impact of professional contact with older adults. This may indicate a difference in quality of contact between professional interactions with older individuals and potentially more intimate and bonding interactions with older family members or friends. This aligns with previous research showing that the quality of contact is crucial in determining its effectiveness in reducing ageism ([Cadieux et al., 2019](#); [Green, 1981](#)).

Effects of age and identification with older adults

The rather young age of the sample and their subjective identification with older adults may have impacted the effects of the intervention measures. Moreover, the generally low baseline levels of both explicit and implicit ageism suggest potential floor effects, which likely constrained detectable change. Consequently, it is possible that the interventions were unable to further reduce the expression of ageism. This could be due to the composition of the sample, which we further outline in the *Limitations and future directions* section.

Group identification is likely a central determinant of how participants engage with age-bias interventions. Building on SIT ([Tajfel & Turner, 2004](#)), identification can shape both openness to perspective taking prompts and the interpretation of counter-stereotypical information. For instance, perspective taking may be more effective for individuals with strong identification ([Galinsky, 2002](#)). Complementing this, a study by [Long et al. \(2022\)](#) demonstrates that younger adults generally find it more difficult to take the perspective of older individuals compared with same-age peers. Additionally, counter-stereotypical traits may be rejected or subtyped by individuals seeking dissociation within the group, which limits category level change and can leave the superordinate stereotype intact ([Deutsch & Fazio, 2008](#)). Conversely, strong identification may also elicit in-group favoritism/self-serving bias, potentially reinforcing pro-older ratings regardless of the module (e.g., [Everett et al., 2015](#); [Kleissner & Jahn, 2020](#)). Although these mechanisms could plausibly have shaped responses in the present study, we did not explicitly measure age-group identification.

In line with that, participants' own age proved to be a significant influencing factor on explicit ageism. This reflects the effect of ingroup preference and outgroup derogation predicted by SIT ([Chonody & Teater, 2016](#); [Tajfel & Turner, 2004](#)). Accordingly, older participants showed a reduced tendency to hold explicit ageism, potentially due to an ingroup preference. This confirms previous findings ([Marques et al., 2020](#)) and supports the assumption that young adults do not identify with older adults, or identify less with older adults, and are therefore more likely to tolerate negative behavior towards this group ([Horhota et al., 2019](#)).

Our study further suggests that how people define “old” is important: participants who classified younger people as “old” tended to express more ageist stereotypes. Given the relatively young sample, it is plausible that these effects were particularly pronounced here, as one’s own distance from the age category influences perception and evaluation. In line with [Kessler and Warner \(2023\)](#), older respondents set the threshold for classification as “old” higher, illustrating that perceptions of age shift with increasing age. The results are consistent with research findings suggesting that an earlier perception of the transition to old age can increase fear of aging and reinforce stereotypes ([Chonody & Teater, 2016](#)).

Methodological requirements for online-interventions

The data also highlight several methodological requirements relevant to designing effective online interventions. Exposure to counter-stereotypical traits ([Blair & Banaji, 1996](#); [Vailati Riboni & Pagnini, 2022](#)) and implementation intention ([Stewart & Payne, 2008](#); [Webb et al., 2012](#)) may require more time to achieve the desired effect. Compared to perspective taking, they may rely more heavily on learning processes and multiple exposure or implementation, while perspective taking directly involves observing and reflecting on the mental states and subjective experiences of others ([Galinsky & Moskowitz, 2000](#)). This is particularly relevant in connection with the Stereotype Content Model (SCM), which assumes ambivalent age-related stereotypes: warm-hearted but incompetent ([Fiske et al., 2002](#)).

Other factors in the online-interventions may have been also relevant; for example, participants in the counter-stereotypical condition may have perceived the description as an exception rather than a representative example of a member of an outgroup. Furthermore, additional, unmeasured mechanisms may be at play, requiring a change in the methodology used in interventions to combat unconscious bias (e.g., [Fazio & Olson, 2003](#); [Liao et al., 2023](#); [Tam et al., 2006](#)).

Limitations and future directions

The ineffectiveness of the intervention methods can potentially be attributed to their brief, one-time implementation. It would be insightful to investigate the potential long-term consequences of repeated intervention techniques with longitudinal studies, particularly in light of the possibility that its favorable representation of older individuals in the media could also contribute to a reduction in ageism (e.g., [Fuente-Hernández et al., 2025](#); [Mahmood, 2023](#)).

A further limitation concerns the composition of our sample. It was small and relatively homogeneous, with almost 70% students, which likely limited additional downward movement in the measurement of ageism ([Chopik & Giasson, 2017](#)). This composition probably reflects our use of student-oriented participant-exchange platforms. Because we did not log recruitment channels at the case level, channel-specific checks were not possible. Future studies could benefit from a more diverse sample in terms of age and educational background, as this could mitigate floor effects and help potential intervention effects become more apparent.

The online setting of the study precluded the possibility of controlling the test conditions ([Gosling & Mason, 2015](#)). This applies particularly to the IAT version, which ideally should be carried out in a laboratory environment to avoid potential falsifications due to external influences such as technical issues ([Gosling & Mason, 2015](#)). The moderate internal consistency of the AHS-IAT variant also indicates limited measurement accuracy and may have contributed to the lack of significant intervention effects. The online-related reduction (fewer trials, reduced practice phases) may have further reduced sensitivity and reliability ([Greenwald et al., 2022](#)). In addition, semantic peculiarities of individual stimuli, such as positively connoted, age-related comments and newly constructed hate speech items, may have distorted response latencies (e.g., [Kinoshita & Peek-O’Leary, 2005](#); [Ottaway et al., 2001](#)).

Overall, this underscores the need to methodologically refine and validate the AHS-IAT for online use. Future research should therefore incorporate more extensive trial numbers, standardized exercise blocks, and prevalidated stimuli.

The additional factors included in our analyses (own age, perception of an “old person”, social media use) were examined as a first step towards understanding the contextual factors that contribute to ageism in online environments. Since these variables were not part of the primary theoretical model, their analysis is exploratory, and future research is needed to examine these factors more comprehensively, ideally using designs specifically tailored to test their mechanisms and relevance to different population groups.

In this context, group identification emerges as another potentially important moderator, especially given its centrality in social identity processes. As stated in the discussion, we did not measure group identification. Future studies should include or manipulate identification with the age group to examine whether it moderates the effects of the intervention. Another research approach could involve examining how individuals who identify as older members of society respond to ageist hate speech.

Moreover, our findings focus on other-directed ageism, and we did not examine self-directed (internalized) ageism, which plays an important role in later life and is related to health and well-being in old age ([Lyons et al., 2018](#); [Rothermund et al., 2021](#)). Future studies should include parallel measures of self-directed and other-directed ageism and test whether brief online modules influence these constructs differently across different age groups.

Finally, sex and gender dimensions were not considered in the present analysis, representing an additional limitation and potentially restricting the generalizability of the findings.

Conclusions

This study provides valuable insights into ageism in digital spaces and the development of effective online intervention strategies. By directly comparing three online intervention methods—exposure to counter-stereotypical traits, perspective taking, and implementation intention—in a controlled randomized experiment, it fills a significant gap in the existing literature on combating ageism. At the same time, it makes a much-needed distinction between implicit and explicit age discrimination and how they are measured. The results suggest that perspective taking is the most promising intervention method for reducing explicit ageism. Consequently, integrating perspective taking interventions into online training programs could be an effective strategy for deconstructing stereotypical thinking. Furthermore, aging anxiety proved to be a significant predictor of explicit ageism, underscoring the relevance of considering fears associated with aging when designing interventions. Contact with older friends and family members, as well as the age and age perception of participants, were also identified as relevant factors that should be considered in online intervention strategies. Measuring and combating implicit ageism remains a major challenge. Future research should focus on developing more robust methods for measuring implicit ageist biases. Similarly, further research should examine the specific contexts in which intervention methods such as perspective taking can effectively reduce both implicit and explicit ageism.

Authors contribution

Conceptualization, L.S., A.H.; methodology, L.S., A.H.; software, validation and formal analysis, L.S.; investigation, L.S.; resources, L.S.; A.H.; data curation, L.S.; writing—original draft preparation, L.S.; writing—review and editing, L.S.; A.H. All authors have read and agreed to the published version of the manuscript.

Ethical approval and informed consent statements

Informed consent was obtained from all subjects involved in the study. The study was approved by the Ethics Committee of the Faculty of Computer Science of the University of Duisburg-Essen (ID: 2404SPSL5902).

Credit authorship contribution statement

Lucie Stecker: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Aike C. Horstmann:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgments

We acknowledge support by the Open Access Publication Fund of the University of Duisburg-Essen.

Data availability

Preregistration, data, and materials are available on the Open Science Framework (osf.io/fps6d/).

References

- Allport, G. W. (1954). *The nature of prejudice*. Addison-Wesley.
- Apriceno, M., & Levy, S. R. (2023). Systematic review and meta-analyses of effective programs for reducing ageism toward older adults. *Journal of Applied Gerontology*, 42(6), 1356–1375. <https://doi.org/10.1177/07334648231165266>
- Bacsu, J. D. R., Andrew, M. K., Azizi, M., Berger, C., Cammer, A., Chasteen, A. L., ... O'Connell, M. E. (2024). Using twitter to understand COVID-19 vaccine-related ageism during the pandemic. *The Gerontologist*, 64(2), Article gnad061. <https://doi.org/10.1093/geront/gnad061>
- Benau, E. M., Jung, S., Vaughan, C. R., & Cooper, M. A. (2025). Implicit biases toward aging-related stimuli correspond with anxiety about aging and ageism: Evidence from a crowdsourced Go/No-Go association task. *Social Cognition*, 43(1), 17–39. <https://doi.org/10.1521/soco.2025.43.1.17>
- Blair, I. V., & Banaji, M. R. (1996). Automatic and controlled processes in stereotype priming. *Journal of Personality and Social Psychology*, 70(6), 1142–1163. <https://doi.org/10.1037/0022-3514.70.6.1142>
- Bodenhausen, G. V., Macrae, C. N., & Sherman, J. W. (1999). Dual processes in social stereotyping. In S. Chaiken, & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 271–292). Guilford Press.
- Bodner, E., Shrira, A., Bergman, Y. S., Cohen-Fridel, S., & Grossman, E. S. (2015). The interaction between aging and death anxieties predicts ageism. *Personality and Individual Differences*, 86, 15–19. <https://doi.org/10.1016/j.paid.2015.05.022>
- Boudjemadi, V., & Gana, K. (2012). Effect of mortality salience on implicit ageism: Implication of age stereotypes and sex. *European Review of Applied Psychology*, 62(1), 9–17. <https://doi.org/10.1016/j.erap.2011.11.002>
- Braithwaite, V., Lynd-Stevenson, R., & Pigram, D. (1993). An empirical study of ageism: From polemics to scientific utility. *Australian Psychologist*, 28(1), 9–15. <https://doi.org/10.1080/00050069308258857>
- Burnes, D., Sheppard, C., Henderson, C. R., Jr., Wassel, M., Cope, R., Barber, C., & Pillemer, K. (2019). Interventions to reduce ageism against older adults: A systematic review and meta-analysis. *American Journal of Public Health*, 109(8), e1–e9. <https://doi.org/10.2105/AJPH.2019.305123>
- Cadieux, J., Chasteen, A. L., & Packer, D. J. (2019). Intergenerational contact predicts attitudes toward older adults through inclusion of the outgroup in the self. *The Journals of Gerontology: Series B*, 74(4), 575–584. <https://doi.org/10.1093/geronb/gbx176>
- Chen, V. H. H., & Ibasco, G. C. (2023). All it takes is empathy: How virtual reality perspective-taking influences intergroup attitudes and stereotypes. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1265284>
- Chen, Z., & Zhang, X. (2022). We were all once young: Reducing hostile ageism from younger adults' perspective. *Frontiers in Psychology*, 13, Article 793373. <https://doi.org/10.3389/fpsyg.2022.793373>
- Chonody, J. M., & Teater, B. (2016). Why do I dread looking old?: A test of social identity theory, terror management theory, and the double standard of aging. *Journal of Women & Aging*, 28(2), 112–126. <https://doi.org/10.1080/08952841.2014.950533>
- Chopik, W. J., & Giasson, H. L. (2017). Age differences in explicit and implicit age attitudes across the life span. *The Gerontologist*, 57(suppl_2), S169–S177. <https://doi.org/10.1093/geront/gnx058>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>
- Crisp, R. J., & Turner, R. N. (2009). Can imagined interactions produce positive perceptions?: Reducing prejudice through simulated social contact. *American Psychologist*, 64(4), 231–240. <https://doi.org/10.1037/a0014718>
- Cuddy, A. J. C., & Fiske, S. T. (2002). Doddering but dear: Process, content, and function in stereotyping of older persons. In T. D. Nelson (Ed.), *Ageism: Stereotyping and prejudice against older persons* (pp. 3–26). The MIT Press. <https://doi.org/10.7551/mitpress/10679.001.0001>
- Cuddy, A. J. C., Fiske, S. T., & Glick, P. (2008). Warmth and competence as universal dimensions of social perception: The stereotype content model and the BIAS map. In M. P. Zanna (Ed.), *Vol. 40. Advances in experimental social psychology* (pp. 61–149). Elsevier Academic Press. [https://doi.org/10.1016/S0065-2601\(07\)00002-0](https://doi.org/10.1016/S0065-2601(07)00002-0)
- Cuddy, A. J. C., Norton, M. I., & Fiske, S. T. (2005). This old stereotype: The pervasiveness and persistence of the elderly stereotype. *Journal of Social Issues*, 61(2), 267–285. <https://doi.org/10.1111/j.1540-4560.2005.00405.x>
- Dasgupta, N., & Greenwald, A. G. (2001). On the malleability of automatic attitudes: Combating automatic prejudice with images of admired and disliked individuals. *Journal of Personality and Social Psychology*, 81(5), 800–814. <https://doi.org/10.1037/0022-3514.81.5.800>
- Deutsch, R., & Fazio, R. H. (2008). How subtyping shapes perception: Predictable exceptions to the rule reduce attention to stereotype-associated dimensions. *Journal of Experimental Social Psychology*, 44(4), 1020–1034. <https://doi.org/10.1016/j.jesp.2008.03.001>
- Devine, P. G., Forscher, P. S., Austin, A. J., & Cox, W. T. L. (2012). Long-term reduction in implicit race bias: A prejudice habit-breaking intervention. *Journal of Experimental Social Psychology*, 48(6), 1267–1278. <https://doi.org/10.1016/j.jesp.2012.06.003>
- Dolberg, P., Sigurdardóttir, S. H., & Trummer, U. (2018). Ageism and older immigrants. In *Contemporary perspectives on ageism* (pp. 177–191). Springer International Publishing. https://doi.org/10.1007/978-3-319-73820-8_12
- Ernala, S. K., Burke, M., Leavitt, A., & Ellison, N. B. (2020). How well do people report time spent on Facebook? An evaluation of established survey questions with recommendations. In *Proceedings of the 2020 CHI Conference on human factors in computing systems* (pp. 1–14). <https://doi.org/10.1145/3313831.3376435>
- Everett, J. A. C., Faber, N. S., & Crockett, M. (2015). Preferences and beliefs in ingroup favoritism. *Frontiers in Behavioral Neuroscience*, 9, 15. <https://doi.org/10.3389/fnbeh.2015.00015>
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology*, 54(1), 297–327. <https://doi.org/10.1146/annurev.psych.54.101601.145225>
- Finnegan, E., Oakhill, J., & Garnham, A. (2015). Counter-stereotypical pictures as a strategy for overcoming spontaneous gender stereotypes. *Frontiers in Psychology*, 6, 1291. <https://doi.org/10.3389/fpsyg.2015.01291>
- Fiske, S. T. (2015). Intergroup biases: A focus on stereotype content. *Current Opinion in Behavioral Sciences*, 3, 45–50. <https://doi.org/10.1016/j.cobeha.2015.01.010>
- Fiske, S. T., Cuddy, A. J. C., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology*, 82(6), 878–902. <https://doi.org/10.1037/0022-3514.82.6.878>
- Fiske, S. T., & Taylor, S. E. (2017). *Social cognition: From brain to culture* (3rd ed.). Sage.
- FitzGerald, C., Martin, A., Berner, D., & Hurst, S. (2019). Interventions designed to reduce implicit prejudices and implicit stereotypes in real world contexts: A systematic review. *BMC Psychology*, 7(1), 29. <https://doi.org/10.1186/s40359-019-0299-7>
- Fortuna, P., & Nunes, S. (2018). A survey on automatic detection of hate speech in text. *ACM Computing Surveys*, 51(4), 1–30. <https://doi.org/10.1145/3232676>
- Fragoso, A., & Fonseca, J. (2022). Combating ageism through adult education and learning. *Social Sciences*, 11(3), 110. <https://doi.org/10.3390/socsci11030110>
- Fraser, K. C., Nejadgholi, I., & Kiritchenko, S. (2021). Understanding and countering stereotypes: A computational approach to the stereotype content model (arXiv: 2106.02596). *arXiv*. <https://doi.org/10.48550/arXiv.2106.02596>. preprint.
- Frey, K. T., & Bisconti, T. L. (2023). “Older, entitled, and extremely out-of-touch”: Does “OK, boomer” signify the emergence of a new older adult stereotype? *Journal of Applied Gerontology*, 42(6), 1200–1211. <https://doi.org/10.1177/07334648231154044>
- Fuente-Hernández, L., de la Fuente-Ruiz, E., Gracia-García, P., et al. (2025). Using social media-based positive education to challenge negative stereotypes of aging: A quasi-experimental approach. *BMC Public Health*, 25, 533. <https://doi.org/10.1186/s12889-025-21327-0>
- Galinsky, A. D. (2002). Creating and reducing intergroup conflict: The role of perspective-taking in affecting out-group evaluations. In H. Sondak (Ed.), *Vol. 4. Toward phenomenology of groups and group membership (research on managing groups and teams)* (pp. 85–113). Emerald Group Publishing Limited. [https://doi.org/10.1016/S1534-0856\(02\)04005-7](https://doi.org/10.1016/S1534-0856(02)04005-7)
- Galinsky, A. D., & Moskowitz, G. (2000). Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology*, 78(4), 708–724. <https://doi.org/10.1037/0022-3514.78.4.708>
- Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change.

- Psychological Bulletin, 132(5), 692–731. <https://doi.org/10.1037/0033-2909.132.5.692>
- Gawronski, B., & Bodenhausen, G. V. (2011). The associative-propositional evaluation model: Theory, evidence, and open questions. In M. P. Zanna (Ed.), 44. *Advances in experimental social psychology* (pp. 59–127). Elsevier Academic Press. <https://doi.org/10.1016/B978-0-12-385522-0.00002-0>
- Gendron, T. L., Welleford, E. A., Inker, J., & White, J. T. (2016). The language of ageism: Why we need to use words carefully. *The Gerontologist*, 56(6), 997–1006. <https://doi.org/10.1093/geront/gnv066>
- Giner-Sorolla, R., García, M. T., & Bargh, J. A. (1999). The automatic evaluation of pictures. *Social Cognition*, 17(1), 76–96. <https://doi.org/10.1521/soco.1999.17.1.76>
- Gocłowska, M. A., & Crisp, R. J. (2013). On counter-stereotypes and creative cognition: When interventions for reducing prejudice can boost divergent thinking. *Thinking Skills and Creativity*, 8, 72–79. <https://doi.org/10.1016/j.tsc.2012.07.001>
- Goldzycher, J., Röttger, P., & Schneider, G. (2024). Improving adversarial data collection by supporting annotators: Lessons from GAHD, a German hate speech dataset (arXiv: 2403.19559). *arXiv*. <https://doi.org/10.48550/arXiv.2403.19559>
- Gosling, S. D., & Mason, W. (2015). Internet research in psychology. *Annual Review of Psychology*, 66(1), 877–902. <https://doi.org/10.1146/annurev-psych-010814-015321>
- Green, S. K. (1981). Attitudes and perceptions about the elderly: Current and future perspectives. *The International Journal of Aging and Human Development*, 13(2), 99–119. <https://doi.org/10.2190/BBCJ-1UB4-X220-F423>
- Greenberg, J., Pyszczynski, T., Solomon, S., & Baumeister, R. F. (1986). The causes and consequences of a need for self-esteem: A terror management theory. In *Public and private self* (pp. 189–192). Springer. https://doi.org/10.1007/978-1-4613-9564-5_10
- Greenwald, A. G., Brendl, M., Cai, H., Cvencek, D., Dovidio, J. F., Friese, M., ... Wiers, R. W. (2022). Best research practices for using the implicit association test. *Behavior Research Methods*, 54(3), 1161–1180. <https://doi.org/10.3758/s13428-021-01624-3>
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, 74(6), 1464–1480. <https://doi.org/10.1037/0022-3514.74.6.1464>
- Hawdon, J., Ryan, J., & Lucht, M. (2014). *The causes and consequences of group violence: From bullies to terrorists*. Lexington Books.
- Horhota, M., Chasteen, A. L., & Crumley-Branyon, J. J. (2019). Is ageism acceptable when it comes from a familiar partner? *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 74(4), 595–599. <https://doi.org/10.1093/geronb/gby066>
- Hummert, M. L. (2011). Age stereotypes and aging. In K. W. Schaie, & S. L. Willis (Eds.), *Handbook of the psychology of aging* (7th ed., pp. 249–262). Academic Press. <https://doi.org/10.1016/B978-0-12-380882-0.00016-4>
- Iversen, T., Larsen, L., & Solem, P. E. (2009). A conceptual analysis of ageism. *Nordic Psychology*, 61(3), 4–22. <https://doi.org/10.1027/1901-2276.61.3.4>
- Jimenez-Sotomayor, M. R., Gomez-Moreno, C., & Soto-Perez-de-Celis, E. (2020). Coronavirus, ageism, and twitter: An evaluation of tweets about older adults and COVID-19. *Journal of the American Geriatrics Society*, 68(8), 1661–1665. <https://doi.org/10.1111/jgs.16508>
- Kang, T., Kwon, E., Lee, J., Nam, Y., Song, J., & Suh, J. (2022). Korean online hate speech dataset for multilabel classification: How can social science improve dataset on hate speech? *arXiv*. <https://doi.org/10.48550/arXiv.2204.03262>
- Keskinen, K., & Nikander, P. (2023). Researching time and ageism: Applications of qualitative longitudinal research to the field. *Journal of Applied Gerontology*, 42(6), 1335–1344. <https://doi.org/10.1177/07334648231160982>
- Kessler, E.-M., & Warner, L. M. (2023). *Ageismus – Altersbilder und Altersdiskriminierung in Deutschland*. Antidiskriminierungsstelle des Bundes. https://www.antidiskriminierungsstelle.de/SharedDocs/forschungsprojekte/DE/Studie_Ageismus_Altersdiskr.Dtl.html
- Kikuchi, A., Martin, P., & Gondo, Y. (2026). The effects of age and cultural differences on the relationship between aging anxiety and ageism: Focusing on social identity theory. *International Journal of Aging & Human Development*, 102(1), 3–21. <https://doi.org/10.1177/00914150241297521>
- Kinoshita, S., & Peek-O'Leary, M. (2005). Does the compatibility effect in the race implicit association test reflect familiarity or affect? *Psychonomic Bulletin & Review*, 12(3), 442–452. <https://doi.org/10.3758/BF03193786>
- Kleissner, V., & Jahn, G. (2020). Implicit and explicit measurement of work-related age attitudes and age stereotypes. *Frontiers in Psychology*, 11, Article 579155. <https://doi.org/10.3389/fpsyg.2020.579155>
- Kuchenbrandt, D., Eyssel, F., & Seidel, S. K. (2013). Cooperation makes it happen: Imagined intergroup cooperation enhances the positive effects of imagined contact. *Group Processes & Intergroup Relations*, 16(5), 635–647. <https://doi.org/10.1177/1368430212470172>
- Lasher, K. P., & Faulkender, P. J. (1993). Measurement of aging anxiety: Development of the anxiety about aging scale. *The International Journal of Aging and Human Development*, 37(4), 247–259. <https://doi.org/10.2190/1U69-9AU2-V6LH-9Y11>
- Levin, J. (2005). Aged as a minority group. In E. B. Palmore, L. Branch, & D. K. Harris (Eds.), *Encyclopedia of ageism* (pp. 18–20). Haworth Pastoral Press.
- Levy, B. R. (2009). Stereotype embodiment. *Current Directions in Psychological Science*, 18(6), 332–336. <https://doi.org/10.1111/j.1467-8721.2009.01662.x>
- Levy, B. R., & Banaji, M. R. (2002). Implicit ageism. In T. D. Nelson (Ed.), *Ageism: Stereotyping and prejudice against older persons* (pp. 49–75). The MIT Press. <https://doi.org/10.7551/mitpress/1157.003.0006>
- Levy, S. R., Lytle, A., & Macdonald, J. (2022). The worldwide ageism crisis. *Journal of Social Issues*, 78(4), 743–768. <https://doi.org/10.1111/josi.12568>
- Liao, T., Zhuoga, C., & Chen, X. (2023). Contact with grandparents and young people's explicit and implicit attitudes toward older adults. *BMC Psychology*, 11(1), 289. <https://doi.org/10.1186/s40359-023-01344-7>
- Lichtenstein, B. (2021). From “coffin dodger” to “boomer remover”: Outbreaks of ageism in three countries with divergent approaches to coronavirus control. *The Journals of Gerontology. Series B*, 76(4), e206–e212. <https://doi.org/10.1093/geronb/gbaa102>
- Löckenhoff, C. E., De Fruyt, F., Terracciano, A., McCrae, R. R., De Bolle, M., Costa, P. T., ... Yik, M. (2009). Perceptions of aging across 26 cultures and their culture-level associates. *Psychology and Aging*, 24(4), 941–954. <https://doi.org/10.1037/a0016901>
- Long, Y., Jiang, X., Wang, Y., Zhou, X., & You, X. (2022). You are old, but are you out? Intergenerational contact impacts on out-group perspective-taking and on the roles of stereotyping and intergroup anxiety. *Frontiers in Psychology*, 13, Article 781072. <https://doi.org/10.3389/fpsyg.2022.781072>
- Lyons, A., Alba, B., Heywood, W., Fileborn, B., Minichiello, V., Barrett, C., Hinchliff, S., Malta, S., & Dow, B. (2018). Experiences of ageism and the mental health of older adults. *Aging & Mental Health*, 22(11), 1456–1464. <https://doi.org/10.1080/13607863.2017.1364347>
- Mahmood, H. M. A. (2023). Filtering out ageism: Unveiling Instagram's reinforcement of negative stereotypes of ageing. *Journal of Philology and Educational Sciences*, 2(1), 12–28. <https://doi.org/10.53898/jpes2023212>
- Mandl, T., Modha, S., Majumder, P., Patel, D., Dave, M., Mandlia, C., & Patel, A. (2019). Overview of the HASOC track at FIRE 2019: Hate speech and offensive content identification in indo-European languages. In *Proceedings of the 11th annual meeting of the forum for information retrieval evaluation* (pp. 14–17). <https://doi.org/10.1145/3368567.3368584>
- Marques, S., Mariano, J., Mendonça, J., De Tavernier, W., Hess, M., Naegle, L., Peixeiro, F., & Martins, D. (2020). Determinants of ageism against older adults: A systematic review. *International Journal of Environmental Research and Public Health*, 17(7), 2560. <https://doi.org/10.3390/ijerph17072560>
- Martens, A., Goldenberg, J. L., & Greenberg, J. (2005). A terror management perspective on ageism. *Journal of Social Issues*, 61(2), 223–239. <https://doi.org/10.1111/j.1540-4560.2005.00403.x>
- Meisner, B. A., Vervaecke, D., & Le, M. (2024). Virtual spaces: Ageism on social media - representations, reinforcement and resistance. In S. Westwood, & N. J. Knauer (Eds.), *Research handbook on law, society and ageing* (pp. 200–215). Edward Elgar Publishing. <https://doi.org/10.4337/9781803925295.00023>
- Mendoza, S. A., Gollwitzer, P. M., & Amodio, D. M. (2010). Reducing the expression of implicit stereotypes: Reflexive control through implementation intentions. *Personality and Social Psychology Bulletin*, 36(4), 512–523. <https://doi.org/10.1177/0146167210362789>
- Miles, E., & Crisp, R. J. (2014). A meta-analytic test of the imagined contact hypothesis. *Group Processes & Intergroup Relations*, 17(1), 3–26. <https://doi.org/10.1177/1368430213510573>
- Nelson, T. D. (2019). Reducing ageism: Which interventions work? *American Journal of Public Health*, 109(8), 1066–1067. <https://doi.org/10.2105/AJPH.2019.305195>
- North, M. S., & Fiske, S. T. (2013). A prescriptive intergenerational-tension ageism scale: Succession, identity, and consumption (SIC). *Psychological Assessment*, 25(3), 706–713. <https://doi.org/10.1037/a0032367>
- North, M. S., & Fiske, S. T. (2015). Modern attitudes toward older adults in the aging world: A cross-cultural meta-analysis. *Psychological Bulletin*, 141(5), 993–1021. <https://doi.org/10.1037/a0039469>
- Nosek, B. A., & Smyth, F. L. (2007). A multitrait-multimethod validation of the implicit association test. *Experimental Psychology*, 54(1), 14–29. <https://doi.org/10.1027/1618-3169.54.1.14>
- Nosek, B. A., Smyth, F. L., Hansen, J. J., Devos, T., Lindner, N. M., Ranganath, K. A., ... Banaji, M. R. (2007). Pervasiveness and correlates of implicit attitudes and stereotypes. *European Review of Social Psychology*, 18(1), 36–88. <https://doi.org/10.1080/10463280701489053>
- Ottaway, S. A., Hayden, D. C., & Oakes, M. A. (2001). Implicit attitudes and racism: Effects of word familiarity and frequency on the implicit association test. *Social Cognition*, 19(2), 97–144. <https://doi.org/10.1521/soco.19.2.97.20706>
- Packer, D. J., & Chasteen, A. L. (2006). Looking to the future: How possible aged selves influence prejudice toward older adults. *Social Cognition*, 24(3), 218–247. <https://doi.org/10.1521/soco.2006.24.3.218>
- Palmore, E. B. (1999). *Ageism: Negative and positive* (2nd ed.). Springer Publishing Company.
- Palmore, E. B. (2005). Stereotypes. In L. Branch, D. K. Harris, & E. B. Palmore (Eds.), *Encyclopedia of ageism* (pp. 301–303). Haworth Pastoral Press.
- de Paula Couto, M. C., Huang, T., & Rothermund, K. (2022). Age specificity in explicit and implicit endorsement of prescriptive age stereotypes. *Frontiers in Psychology*, 13, Article 820739. <https://doi.org/10.3389/fpsyg.2022.820739>
- Pixabay. (2026). Pixabay. Retrieved 9 May, 2024, from <https://pixabay.com/>.
- Power, J. G., Murphy, S. T., & Coover, G. (1996). Priming prejudice: How stereotypes and counter-stereotypes influence attribution of responsibility and credibility among ingroups and outgroups. *Human Communication Research*, 23(1), 36–58. <https://doi.org/10.1111/j.1468-2958.1996.tb00386.x>
- Previtali, F., Keskinen, K., Niska, M., & Nikander, P. (2022). Ageism in working life: A scoping review on discursive approaches. *The Gerontologist*, 62(2), e97–e111. <https://doi.org/10.1093/geront/gnaa119>
- Ramasubramanian, S., & Oliver, M. B. (2007). Activating and suppressing hostile and benevolent racism: Evidence for comparative media stereotyping. *Media Psychology*, 9(3), 623–646. <https://doi.org/10.1080/15213260701283244>
- Rees, H. R., Rivers, A. M., & Sherman, J. W. (2019). Implementation intentions reduce implicit stereotype activation and application. *Personality and Social Psychology Bulletin*, 45(1), 37–53. <https://doi.org/10.1177/0146167218775695>

- Robertson, D. A., & Weiss, D. (2017). In the eye of the beholder: Can counter-stereotypes change perceptions of older adults' social status? *Psychology and Aging*, 32(6), 531–542. <https://doi.org/10.1037/pag0000186>
- Rothermund, K., Klusmann, V., & Zacher, H. (2021). Age discrimination in the context of motivation and healthy aging. *The Journals of Gerontology: Series B*, 76(Suppl. 2), S167–S180. <https://doi.org/10.1093/geronb/gbab081>
- Schmid, U. K., Kumpel, A. S., & Rieger, D. (2024). How social media users perceive different forms of online hate speech: A qualitative multi-method study. *New Media & Society*, 26(5), 2614–2632. <https://doi.org/10.1177/14614448221091185>
- Schmidt, A. F., & Finan, C. (2018). Linear regression and the normality assumption. *Journal of Clinical Epidemiology*, 98, 146–151. <https://doi.org/10.1016/j.jclinepi.2017.12.006>
- Shepherd, B. F., & Brochu, P. M. (2021). How do stereotypes harm older adults? A theoretical explanation for the perpetration of elder abuse and its rise. *Aggression and Violent Behavior*, 57, Article 101435. <https://doi.org/10.1016/j.avb.2020.101435>
- Shih, M. J., Wang, E., Trahan Bucher, A., & Stotzer, R. (2009). Perspective taking: Reducing prejudice towards general outgroups and specific individuals. *Group Processes & Intergroup Relations*, 12(5), 565–577. <https://doi.org/10.1177/1368430209337463>
- Siegel, A. A., & Badaan, V. (2020). #No2Sectarianism: Experimental approaches to reducing sectarian hate speech online. *American Political Science Review*, 114(3), 837–855. <https://doi.org/10.1017/S0003055420000283>
- Sipocz, D., Freeman, J. D., & Elton, J. (2021). "A toxic trend?": Generational conflict and connectivity in twitter discourse under the #BoomerRemover hashtag. *The Gerontologist*, 61(2), 166–175. <https://doi.org/10.1093/geront/gnaa177>
- Skipper, A. D., & Rose, D. J. (2021). #BoomerRemover: COVID-19, ageism, and the intergenerational twitter response. *Journal of Aging Studies*, 57, Article 100929. <https://doi.org/10.1016/j.jaging.2021.100929>
- Soral, W., Bilewicz, M., & Winiewski, M. (2018). Exposure to hate speech increases prejudice through desensitization. *Aggressive Behavior*, 44(2), 136–146. <https://doi.org/10.1002/ab.21737>
- Soto-Perez-de-Celis, E. (2020). Social media, ageism, and older adults during the COVID-19 pandemic. *eClinicalMedicine*, 29, Article 100634. <https://doi.org/10.1016/j.eclinm.2020.100634>
- Sritharan, R., & Gawronski, B. (2010). Changing implicit and explicit prejudice: Insights from the associative-propositional evaluation model. *Social Psychology*, 41(3), 113–123. <https://doi.org/10.1027/1864-9335/a000017>
- Stewart, B. D., & Payne, B. K. (2008). Bringing automatic stereotyping under control: Implementation intentions as efficient means of thought control. *Personality and Social Psychology Bulletin*, 34(10), 1332–1345. <https://doi.org/10.1177/0146167208321269>
- Steyn, H. S., & Ellis, S. M. (2009). Estimating an effect size in one-way multivariate analysis of variance (MANOVA). *Multivariate Behavioral Research*, 44(1), 106–129. <https://doi.org/10.1080/00273170802620238>
- Swift, H. J., Abrams, D., Marques, S., Vauclair, C.-M., Bratt, C., & Lima, M.-L. (2018). Ageism in the European region: Findings from the European social survey. In L. Ayalon, & C. Tesch-Römer (Eds.), *Contemporary perspectives on ageism* (pp. 441–459). Springer International Publishing. https://doi.org/10.1007/978-3-319-73820-8_27
- Tajfel, H., & Turner, J. C. (2004). The social identity theory of intergroup behavior. In J. T. Jost, & J. Sidanius (Eds.), *Political psychology: Key readings* (pp. 276–293). Psychology Press. <https://doi.org/10.4324/9780203505984-16>
- Tam, T., Hewstone, M., Harwood, J., Voci, A., & Kenworthy, J. (2006). Intergroup contact and grandparent–grandchild communication: The effects of self-disclosure on implicit and explicit biases against older people. *Group Processes & Intergroup Relations*, 9(3), 413–429. <https://doi.org/10.1177/1368430206064642>
- Todd, A. R., Bodenhausen, G. V., Richeson, J. A., & Galinsky, A. D. (2011). Perspective taking combats automatic expressions of racial bias. *Journal of Personality and Social Psychology*, 100(6), 1027–1042. <https://doi.org/10.1037/a0022308>
- Turner, R. N., Crisp, R. J., & Lambert, E. (2007). Imagining intergroup contact can improve intergroup attitudes. *Group Processes & Intergroup Relations*, 10(4), 427–441. <https://doi.org/10.1177/1368430207081533>
- Unsplash. (2026). Unsplash. Retrieved 9, May 2024, from <https://unsplash.com/>.
- Vailati Riboni, F., & Pagnini, F. (2022). Age-based stereotype threat: A scoping review of stereotype priming techniques and their effects on the aging process. *Aging & Mental Health*, 26(7), 1444–1450. <https://doi.org/10.1080/13607863.2021.1932741>
- Vescio, T., Sechrist, G., & Paolucci, M. (2003). Perspective taking and prejudice reduction: The mediational role of empathy arousal and situational attributions. *European Journal of Social Psychology*, 33(4), 455–472. <https://doi.org/10.1002/ejsp.163>
- Webb, T. L., Sheeran, P., & Pepper, J. (2012). Gaining control over responses to implicit attitude tests: Implementation intentions engender fast responses on attitude-incongruent trials. *British Journal of Social Psychology*, 51(1), 13–32. <https://doi.org/10.1348/014466610X532192>
- Weber, M., Viehmann, C., Ziegele, M., & Schemer, C. (2020). Online hate does not stay online – How implicit and explicit attitudes mediate the effect of civil negativity and hate in user comments on prosocial behavior. *Computers in Human Behavior*, 104, Article 106192. <https://doi.org/10.1016/j.chb.2019.106192>
- Wiegand, M., Siegel, M., & Ruppenhofer, J. (2018). Overview of the GermEval 2018 shared task on the identification of offensive language. In *14th Conference on natural language processing - KONVENS 2018*, Vienna, Austria. <https://doi.org/10.1553/0x003a105d>
- Wilhelm, C., & Joeckel, S. (2019). Gendered morality and backlash effects in online discussions: An experimental study on how users respond to hate speech comments against women and sexual minorities. *Sex Roles*, 80(7), 381–392. <https://doi.org/10.1007/s11199-018-0941-5>
- Windisch, S., Wiedlitzka, S., Olaghere, A., & Jenaway, E. (2022). Online interventions for reducing hate speech and cyberhate: A systematic review. *Campbell Systematic Reviews*, 18(2), Article e1243. <https://doi.org/10.1002/cl2.1243>
- World Health Organization. (2021). Global report on ageism. <https://www.who.int/teams/social-determinants-of-health/demographic-change-and-healthy-ageing/combating-ageism/global-report-on-ageism>
- Xiang, X., Lu, X., Halavanau, A., Xue, J., Sun, Y., Lai, P. H. L., & Wu, Z. (2021). Modern senicide in the face of a pandemic: An examination of public discourse and sentiment about older adults and COVID-19 using machine learning. *The Journals of Gerontology: Series B, Psychological Sciences and Social Sciences*, 76(4), e190–e200. <https://doi.org/10.1093/geronb/gbaa128>