Full length article

Virtually old: Embodied perspective taking and the reduction of ageism under threat

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ABSTRACT

Intergroup threat harms attitudes toward the outgroup, leading to greater levels of prejudice and outgroup derogation (Rothgerber, 1997). Two experiments were conducted to examine (1) if perspective taking mitigates the negative influence of threat on explicit and implicit intergenerational attitudes and, if so, (2) whether this buffering effect would be stronger for participants who embodied an elderly person in an immersive virtual environment (IVE) compared to those who engaged in a traditional perspective taking exercise via mental simulation (MS). When intergroup threat was presented without intergroup contact (Study 1), the negative effect of threat on ageism dissipated when participants engaged in a perspective taking exercise. Differential effects were found depending on the perspective taking medium. However, when participants were exposed to a concrete and experiential intergroup threat (Study 2), neither modality of perspective taking (IVE and MS) buffered negative intergenerational attitudes.

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1. Introduction

In the wake of modern medical innovations, people are living longer than ever before. According to Pew Research Center (2014), one-in-five U.S. residents will be 65 or older by 2050. Despite this major demographic shift, the elderly still face implicit and explicit forms of age-based discrimination (i.e., ageism). Existing research suggests that ageism expresses itself in various forms, including prejudicial attitudes toward the elderly, perceived dissimilarity between younger and older people, and decreased willingness to communicate with the elderly (Butler, 1980; Galinsky, Ku, & Wang, 2005; Harwood et al., 2015). Notwithstanding the emotional distress caused by such discrimination, these prejudicial attitudes also have practical ramifications; in 2013, approximately two-thirds of current and prospective American employees between ages 45 and 74 reported witnessing or experiencing age discrimination at work (AARP, 2014). Despite the pressing nature of this issue, there is very little research on ageism compared to other forms of prejudice such as sexism and racism (Nelson, 2005; North & Fiske, 2012).

Ageism is a form of *intergroup bias*, the systematic tendency to favor the ingroup over an outgroup. Intergroup bias can be exacerbated by certain features of the intergroup dynamic, such as the perception of threat from an outgroup. There is persuasive evidence that hostile outgroup attitudes are not automatic, but highly contingent on the intergroup context, such as the presence of intergroup threat (Riek, Mania, & Gaertner, 2006). The seemingly objective depiction of the elderly as a 'looming burden to the younger generation' or a 'financial threat', can thus aggravate intergenerational tension. Inciting intergroup animosity is detrimental to efforts to combat prejudice; recent studies suggest that even interventions that typically encourage positive attitudes toward outgroup members (e.g., perspective taking) can backfire in hostile intergroup contexts, leading to antisocial behavior (Pierce, Kilduff, Galinsky, & Sivanathan, 2013).

Despite the growing literature that explores the negative effects of intergroup threat on prejudice-reducing interventions, there is still little work that examines how social identity-based intergroup contexts can influence efforts to reduce intergroup bias. While the elderly are typically stereotyped as "doddering but dear" (i.e., incompetent but warm; Cuddy & Fiske, 2002), the exponential increase in longevity is triggering concerns about the practical difficulties that can accompany an aging society. Japanese finance

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minister Taro Aso made headlines in 2013 when he argued that old people should be allowed to "hurry up and die" (Bennett-Smith, 2013). However, the ageism literature has yet to fully consider the impact of these shifting intergenerational dynamics (for a notable exception, see North & Fiske, 2012). Thus, the present study aims to (1) address how the portrayal of the elderly as a threat influences the younger generation's intergenerational attitudes and (2) explore the possibility of using an immersion-based perspective taking technique as a novel method of reducing age-based prejudice, especially in hostile intergroup contexts.

1.1. Prejudice in context: intergroup threat

A number of situational factors can lead to the avoidance of empathy with others (Zaki, 2014). While prejudice is often conceptualized as a fixed attitude one holds toward an outgroup, studies show that intergroup attitudes heavily depend on the intergroup context. Perception of intergroup threat is one of the primary drivers of prejudice toward certain minority groups and immigrants (Blumer, 1958; Florack, Piontkowski, Rohmann, Balzer, & Perzig, 2003), and increases the inferred influence of social categories among children (Rhodes & Brickman, 2011).

In their efforts to synthesize previous research that focused on the influence of threat and fear on prejudice, Stephan and Stephan (2000) developed Integrated Threat Theory (ITT). According to this theoretical framework, there are four types of threat (i.e., realistic, intergroup anxiety, symbolic, and negative stereotyping) that influence prejudice toward the outgroup, and these threats are triggered by factors including the quality or amount of contact with the outgroup. Since its introduction, ITT has been revised to offer more conceptual clarity (Stephan & Renfro, 2002). However, the core ideas that threat leads to prejudice and that different types of threat have different levels of impact on intergroup attitudes remains the same.

There is a wealth of empirical evidence that points to the negative effect of threat on intergroup relationships. For example, German participants who had read a newspaper article that portrayed Turkish immigrants as a threat to their society exhibited more explicit prejudice than those who read an irrelevant article or one that depicted Turkish immigrants in a positive light. Survey data also indicated that intergroup threat, and not group identification, predicted participant's attitudes toward immigrant acculturation (Florack et al., 2003; Studies 1 & 2). Rudman, Moss-Racusin, Phelan, and Nauts (2012) similarly found that participants sabotaged female leaders, a form of sexism, but only when they were perceived as a threat to the status quo (Experiment 5).

In a related study, outgroup threat influenced feelings of similarity toward ingroup members. University students were more likely to feel similar to their ingroup and different from their outgroup when they were told that students from their rival university were biased against them, but this tendency did not exist for participants in the control condition or those who were led to believe their outgroup held benevolent attitudes toward them. Removing threat eliminated group-based differences in perceptions of similarity (Rothgerber, 1997). Similarly, Diekmann, Samuels, Ross, and Bazerman (1997) showed that in the absence of threat to their ingroup, students leaned toward the equal allocation of scholarship funds between their university and another local university instead of automatically favoring their ingroup (Diekmann et al., 1997; Study 2).

Drawing from 95 studies that explored the relationship between intergroup threat and outgroup attitudes, Riek et al. (2006) identified five different types of threat (i.e., realistic threat, symbolic threat, intergroup anxiety, negative stereotypes, and group esteem threat) and found that they all predicted negative outgroup views.

Taken together, these studies offer cogent evidence that individuals attempt to derogate the value of an outgroup when their social identity is under threat (Rothgerber, 1997) in order to maintain a positive social identity (Tajfel & Turner, 1979).

1.2. Perspective taking & prejudice reduction

A number of interventions have been introduced to improve intergroup relationships. Perspective taking, or the process of imagining the world from another person's perspective, is a powerful intervention technique that has been used to reduce the accessibility of stereotypes and negative outgroup attitudes (Galinsky et al., 2005). There is still an ongoing debate regarding the mechanism of how perspective taking encourages prosocial behavior and empathy; some scholars theorize that perspective taking leads to a prosocial response due to the desire to alleviate the negative affect experienced by seeing someone in distress or the perceived 'oneness' with the perspective taking target (Maner et al., 2002), while others argue that perspective taking leads to prosocial tendencies by suppressing one's egocentric vantage point (Hodges, 2008). In a more recent review, Todd and Galinsky (2014) identified two affective and two cognitive mechanisms of perspective taking, arguing that each mechanism operated under different circumstances. Regardless of the exact mechanism, however, researchers have found an overall positive relationship between perspective taking and positive interpersonal attitudes.

Multiple studies that aimed to improve intergroup relationships demonstrate the effectiveness of perspective taking in reducing bias. For example, Batson, Chang, Orr, and Rowland (2002) found that participants who had been induced to feel empathy for a member of a stigmatized group (i.e., hard drug addicts) were more likely to have positive attitudes towards the group and allocate more funds to help the group. Similarly, Galinsky and Moskowitz (2000) showed that writing a narrative essay from the perspective of an outgroup member reduced stereotype accessibility and increased self-other overlap. In addition to explicit forms of bias, perspective taking can also reduce automatic expressions of bias (Todd, Bodenhausen, Richeson, & Galinsky, 2011).

Galinsky et al. (2005) argue that one of the strongest implications of perspective taking is increased self-other overlap, or greater overlap between mental representations of the self and other people. People were more likely to ascribe their traits to a target person when they had previously engaged in a perspective taking exercise (Davis, Conklin, Smith, & Luce, 1996) and taking the perspective of an elderly person led to an increased overlap between traits that undergraduate students associated with themselves and those they associated with the elderly (Galinsky & Moskowitz, 2000; Study 2).

1.3. Reconsidering perspective taking

While perspective taking is an effective measure against intergroup bias, it is also an effortful and highly controlled process. Davis et al. (1996, Study 2) found that participants who engaged in a perspective taking exercise while simultaneously performing a memory task (i.e., under high cognitive load) showed significantly less self-other overlap compared to perspective takers who were not given a distracting task. Similarly, participants were successful at tailoring their instructions on how to assemble a machine model to meet the needs of their addressees (i.e., take the perspective of their addressees) when they were not under cognitive load, but were unable to do so under high cognitive load (Roxβnagel, 2000).

Furthermore, an increasing body of research suggests that perspective taking is not a panacea to outgroup prejudice and, in some cases, can yield hostile outgroup attitudes and behaviors.

Well-meaning interventions that attempt to create a common identity between groups may backfire, leading to resistance against intergroup contact or the confirmation of intergroup differences (Dovidio & Gaertner, 2010). Because outgroup bias is often dependent on the presence of intergroup threat, it is crucial to consider the effects of perspective taking on outgroup attitudes in the face of intergroup threat. However, most of the studies that demonstrated positive effects of perspective taking were conducted in contexts that evoked low levels of self-threat with clear behavior options, which are not typical of everyday intergroup exchanges (Vorauer, 2013). Recent studies suggest that prejudice-reduction strategies may trigger negative intergroup behavior, particularly within zero-sum situations. For example, Pierce et al. (2013) found that perspective taking *increased* negotiators' willingness to employ unethical tactics (i.e., deception and cheating) in competitive contexts. Perspective taking even encouraged egoistic behavior in the context of competitive groups, while reducing selfish behavior in cooperative groups (Epley, Caruso, & Bazerman, 2006).

A study conducted by Groom, Bailenson, and Nass (2009) also offers some support for this claim. In their study, participants were asked to take the perspective of their virtual avatar who was either Black or White, after which they completed a mock job interview. Somewhat surprisingly, participants who had taken the perspective of the Black avatar exhibited higher levels of racial prejudice than their White avatar counterparts. While there are multiple explanations for these results, the job interview task is likely to have induced feelings of self-threat stemming from performance anxiety. This, in turn, may have led participants to endorse attitudes that would help them restore a positive social identity. The fact that people were more likely to display stereotype-consistent beliefs when their self-esteem had been threatened by negative feedback on an 'intelligence test' (Fein & Spencer, 1997; Study 2) lends some support to this conjecture. Furthermore, in a separate study wherein participants were not given such a task and simply asked to observe their virtual reflection and environment, those who had embodied a dark-skinned avatar showed less implicit bias compared to those who had not been assigned a virtual body or had been assigned a light- or purple-skinned avatar (Peck, Seinfeld, Aglioti, & Slater, 2013).

1.4. Perspective taking in immersive virtual environments

Because they offer a more tangible experience, perspective taking in an immersive virtual environment (IVE) may require less cognitive effort than traditional perspective taking exercises that rely on mental simulation (MS; e.g., Galinsky & Moskowitz, 2000; Vescio, Sechrist, & Paolucci, 2003). Furthermore, because people in IVEs tend to be less 'present' in the physical world and more so in the virtual world, they may feel less self-aware when engaging in a perspective taking exercise via IVE compared to MS. This is particularly meaningful as studies suggest that perspective taking can trigger negative reactions when people become self-conscious about how they are being viewed by the outgroup (Vorauer, 2013).

Previous studies note that the perception of task difficulty is contingent on the characteristics of the modality. For example, students who watched a silent film on television reported that it was easier to understand and more realistic than a comparable text. Conversely, they perceived print to require more effort than television (Salomon, 1984). If the modality influences the perceived or actual difficulty of a task, one can conjecture that the perceived difficulty of perspective taking (or the ease with which one engages in perspective taking) may also differ depending on the media platform.

IVEs can facilitate perspective taking in threatening situations by offering a compelling experience of what it feels like to 'be in someone else's shoes' (Ahn, Le, & Bailenson, 2013). An IVE is a digitally created 3D virtual environment that surrounds an individual. Once they are in an IVE, individuals can navigate as freely as they would in the physical world in a three-dimensional space. For the user, IVEs are attractive because they offer vivid multi-sensory experiences that can aid his or her imagination. For the social scientist, IVEs offer a unique opportunity to achieve an ideal balance between experimental control and mundane realism (Blascovich et al., 2002). Notable studies have successfully shown that IVEs can be used to measure intergroup attitudes and prejudice. For example, Dotsch and Wigboldus (2008) found that native Dutch participants showed increased skin conductance levels and maintained a greater distance from Moroccan virtual humans (avatars) compared to White virtual humans.

Even prior to the advent of VR, researchers theorized that communication media varied in their ability to reproduce social cues. Social presence theory (Short, Williams, & Christie, 1976) posits that each communication medium offers different levels of social presence, which is defined as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (Short et al., 1976, p. 65). According to this theory, media that can portray more social cues (e.g., gestures) tend to offer a warmer and more intimate interaction experience. Media richness theory (Daft & Lengel, 1986) similarly postulates that rich media (determined by the number of cues, immediate feedback, language variety, and personalization) are generally more effective than lean media at achieving communication goals.

There is some empirical evidence that suggests that IVEs yield greater cognitive and behavioral changes than MS. In a series of studies, Ahn and colleagues (e.g., Ahn et al., 2013; Ahn, Bailenson, & Park, 2014) demonstrated that IVEs were generally more effective than MS in fostering prosocial behaviors including altruism and environment-friendly behaviors. For example, participants who had embodied a colorblind person in an IVE were more likely to help an actual color blind person in the physical world compared to those who had completed a traditional perspective taking exercise (i.e., MS; Ahn et al., 2013). Similarly, participants who embodied a tree-cutting experience in an IVE were more likely to demonstrate pro-environmental behavior and feel higher levels of presence and control compared to those who were asked to imagine cutting down a tree (Ahn et al., 2014).

Because of the vividness of experiences in IVEs, they may also be more difficult to "escape" from than MS. While it wouldn't be challenging to avoid thinking about something when you do not feel motivated to do so, it would be more difficult to effectively ignore stimuli that are being projected in front of your eyes. IVEs thus have the potential to be a more powerful medium of attitude and/or behavioral change, particularly within demanding contexts. Clinical psychology studies show that receiving exposure therapy in IVEs can be more effective than MS in encouraging patients to effectively mentalize their fears, which, in turn, enables trauma victims to think about and discuss their fears in a more profound manner (e.g., Gerardi, Cukor, Difede, Rizzo, & Rothbaum, 2010). These studies offer evidence that IVEs offer less escapability than MS, which may render them a more powerful tool in contexts that are less favorable to perspective taking.

If IVEs provide vivid visceral experiences in a cognitively effortless manner, completing a perspective taking exercise in an IVE may buffer the negative effects of intergroup threat more effectively than MS. At the same time, however, forcing a vivid image of a threatening outgroup member could also lead to stronger stereotype activation. Indeed, some researchers purport that the effects of increasing the salience of an interactant are likely to be contingent on prior attitudes. For example, higher levels of

salience, or social presence, in an online environment led to more agreement with a politician, but only when participants had positive prior attitudes toward the political candidate (Lee & Shin, 2012).

Acknowledging these two conflicting possibilities, Study 1 examined (1) if perspective taking could overcome the negative effects of intergroup threat in an intergenerational context and, if so, (2) whether this buffering effect would be different for participants who completed the perspective taking task in an IVE compared to those who completed it via MS. Specifically, we focused on the effects of perspective taking on explicit ageism, self-other overlap and intention to communicate with the elderly. We consider communication intention to be an important component of prejudice reduction because it may help compound the short-term effects of the intervention into long-lasting attitudes by encouraging positive contact experiences with outgroup members (Harwood et al., 2015). We present the following hypotheses and research questions:

H1a-c. Participants who feel threatened by the elderly will express (a) more explicit ageism, (b) less self-overlap, and (c) less willingness to communicate with the elderly compared to those who do not feel threatened by the elderly.

RQ1a-b. Will engaging in a perspective taking exercise (a) mitigate the negative influence of threat on explicit ageism, self-overlap, and willingness to communicate with the elderly, and if so, (b) will this effect be stronger for participants in the IVE condition compared to those in the MS condition?

2. Study 1

2.1. Participants

A total of 148 participants (53 men, 95 women) were recruited from a medium-sized western university. Of these, 64 (43.2%) were White, 47 (31.8%) were Asian, 16 (10.8%) were Latino, 11 (7.4%) were Black, and 10 (6.8%) reported another ethnicity. The mean age of the participants was 21.03 ($SD = 2.00$).

2.2. Materials & apparatus

To manipulate perceived threat, participants were given a newspaper article. In the high threat condition, participants read an article titled "Elderly Pose Immediate Threat to Young Americans". In the low threat condition, they read an article titled "America Prepared for Changing Demographics". The two articles that were used in the study are included in Appendix A. Both articles were equal in length to prevent potential confounds due to cognitive load (268 words). To strengthen the manipulation, participants were asked to write a detailed paragraph supporting what they had just read. Two participants who explicitly stated that they had not read the threat manipulation article in their essays were excluded from all analyses.

Depending on the condition, some of the participants wore a virtual reality headset. We used a lightweight head-mounted display (HMD) with a resolution of 960 × 1080 and a refresh rate of 75 frames per second for each eye. The HMD used was an Oculus Rift DK2. An optical tracking system (Worldviz PPT E, update rate of 180hz with a 20 ms latency rate) and a 3-axis orientation sensor (Oculus VR™ Sensor, update rate of 1000hz with a 30 ms latency rate) were used to track the participant's physical head translation (x, y, z) and orientation (pitch, yaw, roll) to appropriately update the rendered viewpoint. The translation data were also tracked via optical sensors (Worldviz PPT E, update rate of 180hz with 20 ms

latency rate) for the participant's hands, and inverse kinematics were used to infer the angle of the elbow and shoulder joints based on the tracking data. The software used to generate and program the world was Vizard 5.0 (Fig. 1).

2.3. Procedure

The study adopted a 2 Threat (high, low) x 3 Immersion (IVE, MS, control) between-subjects design. Upon giving consent to participate in the experiment, participants were told that they would read a newspaper article and write a brief essay about what they had read. After reading the article appropriate to the threat condition (high vs. low), participants were given 5 min to write a paragraph that supported the views expressed in the article they had read and answer two questions designed to test the threat manipulation. After writing the paragraph, participants were assigned to the embodied IVE ($N = 48$), MS ($N = 50$), or control condition ($N = 50$).

Participants in the embodied IVE condition were led into a lab room and were shown how to wear and adjust the HMD. Once they put on the HMD, participants saw that they were in a digital version of the physical lab room. Participants were then asked to turn around and to confirm that they saw a mirror in front of them. Participants saw themselves as an elderly avatar that matched their gender (Fig. 2). The faces of the elderly avatars were used in a previous study (Yee & Bailenson, 2006) and had been pre-tested for perceived age and neutrality in terms of attractiveness. After completing a few exercises to establish that the avatar in the mirror was their reflection, participants were told, "*For the next minute, look closely at your reflection in the mirror. This is what you look like to*
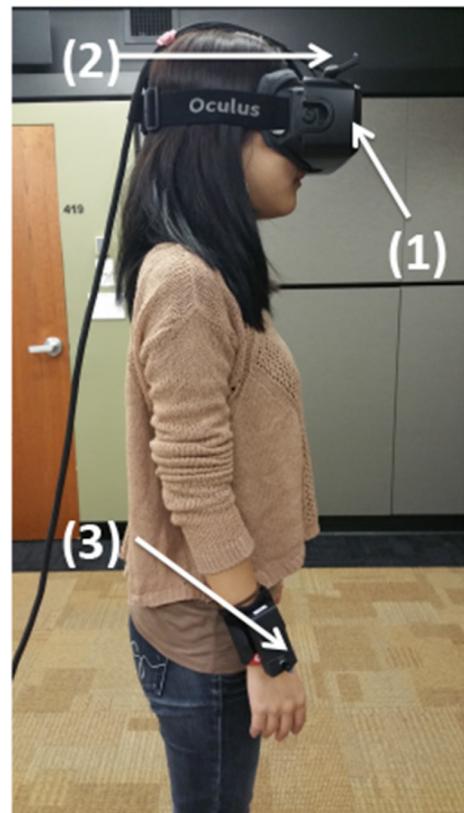

Fig. 1. Virtual reality equipment: (1) head-mounted display; (2) head tracking system, which tracks head position (x, y, z) and orientation (pitch, yaw, roll); and (3) arm tracking system, which tracks arm position (x, y, z).
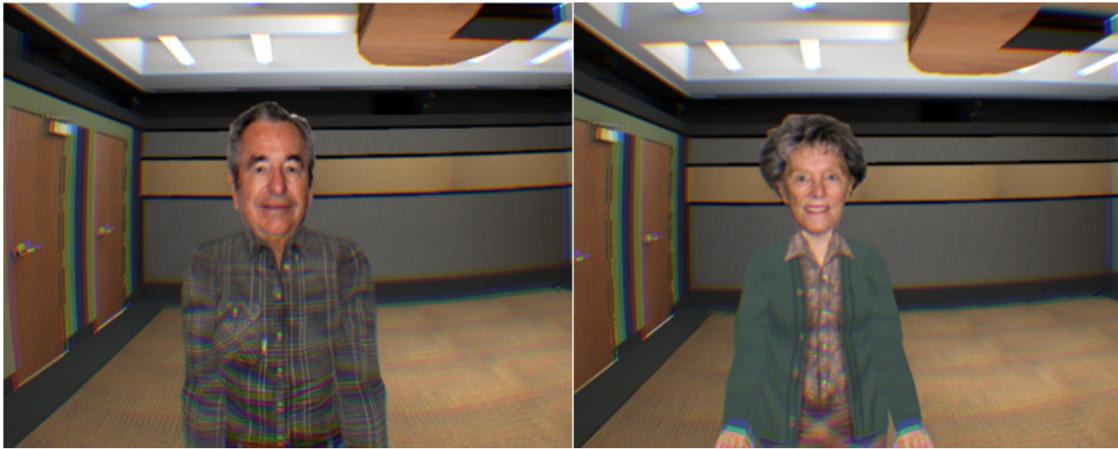
Fig. 2. Participant's point of view when he/she is facing the mirror in the virtual room.

others in the virtual world. Imagine a day in the life of this individual, looking at the world through her/his eyes and walking through the world in her/his shoes." These instructions closely mirror those given in classic perspective taking interventions (e.g., Galinsky & Moskowitz, 2000).

Participants in the MS condition were presented with a screenshot of the avatar in the embodied IVE condition. That is, participants saw a picture of the same elderly person in the same environment, which is portrayed in Fig. 2. In line with traditional perspective taking exercises (Galinsky & Moskowitz, 2000), participants were told, "*For the next minute, take the perspective of the individual in the photograph. Imagine a day in the life of this individual as if you were that person, looking at the world through her/his eyes and walking through the world in her/his shoes.*" Once again, the gender of the person in the picture was matched to the participant's gender. After completing the perspective taking exercise, participants in the IVE and MS conditions engaged in a short activity[1] that separated the post survey from the intervention. They then completed a questionnaire that measured their attitudes toward the elderly.

Participants in the control condition were asked to wait for 1 min after reading the newspaper article and were not given further instructions on what to do. After waiting for 1 min, participants in the control condition proceeded to the post-questionnaire.

2.4. Measures

2.4.1. Perceived threat

Two items were used to assess whether the threat manipulation had been successful: "The elderly are causing socioeconomic problems for young Americans" and "The elderly are a socioeconomic threat to young Americans". Participants were asked to rate how strongly they agreed with each statement on a 7 point Likert-type scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*). The scale was reliable, Cronbach's α = .75 (M = 3.98, SD = 1.31); the minimum was 1 and the maximum was 6.5.

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[1] Participants played a virtual ball toss game with two partners. The virtual partners threw the ball to the participant half of the time and to the other partner during the other half. Overall, participants distributed the ball toss equally between the two virtual partners. The ball toss game was later modified to induce intergroup threat in Study 2.

2.4.2. Explicit ageism

Explicit ageism was measured with 16 items selected from Kogan's Attitudes towards Older People Scale (KOP) (Kogan, 1961), one of the most frequently used scales to measure bias toward older adults (Liu, Norman, & While, 2013). The items comprised 8 pairs of positive and negative statements about older people (16 statements total). Sample items include "Most old people get set in their ways and are unable to change" and "Most old people are cheerful, agreeable, and good humored". Participants were asked to rate how strongly they agreed with each statement on a 7 point Likert-type scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*). Positive statements were reverse coded. The reliability the scale was good, Cronbach's α = .79. Greater values indicated greater bias (M = 3.28, SD = .62); the minimum was 1.63 and the maximum was 2.88. The wording for all items can be found in Appendix B.

2.4.3. Self-other overlap

The extent to which the participants felt close to the elderly was measured using the Inclusion of Other in the Self (IOS) Scale, which is a pictorial single-item measure of closeness. The IOS scale has been cross-validated with various measures of closeness including Berscheid, Snyder, and Omoto (1989) Relationship Closeness Inventory (Aron, Aron, & Smollan, 1992). Pictures were coded in +1 intervals (from 1 to 7) such that greater values indicated greater self-other overlap (M = 2.98, SD = 1.24); the minimum was 1 and the maximum was 7.

2.4.4. Future communication intentions

To assess their intentions to interact with the elderly in the future, participants were asked 3 questions that were derived from Harwood et al. (2015). Specifically, participants were asked how strongly they agreed with the following statements on a 7 point Likert-type scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*): "I intend to interact frequently with the elderly", "I plan to learn about the elderly", and "I think it is important to interact with the elderly in the future". The reliability of the scale was acceptable, Cronbach's α = .66 (M = 4.54, SD = .97); the minimum was 2 and the maximum was 6.67. Greater values indicated stronger intentions of engaging in future communication with the elderly.

2.5. Results

A manipulation check confirmed that participants in the high threat condition perceived the elderly to be more threatening to young Americans than participants in the low threat condition

Table 1
Means and standard deviations of all dependent variables by condition (Study 1).

	Bias M (SD)	Self-other overlap M (SD)	Future communication intentions M (SD)
IVE High Threat	3.16 (.66)	3.76 (1.33)	4.95 (1.01)
IVE Low Threat	3.3 (.50)	2.61 (1.12)	4.32 (1.06)
MS High Threat	3.34 (.68)	3.28 (1.17)	4.52 (.82)
MS Low Threat	3.36 (.60)	2.92 (1.22)	4.27 (.88)
Control High Threat	3.35 (.71)	2.28 (.98)	4.31 (.98)
Control Low Threat	3.19 (.57)	3.00 (1.13)	4.90 (.92)

$(t(144) = -2.68, p < .01)$. The means and standard deviations of the outcome variables according to each of the six conditions are depicted in Table 1. To test the joint and independent effects of perceived threat and immersion on various attitudes toward the elderly (i.e., bias, self-other overlap, future communication attention), 2 × 3 analyses of covariance (ANCOVA) tests were performed. Gender and race were included as covariates. Race was included as a covariate because the race of the target elderly person was fixed for all participants (White). Although this measure was taken to minimize differences in facial features (Yee & Bailenson, 2007), we included race (White vs. Non-White) as a covariate to account for potential confounds.

There was a significant interaction effect between immersion and threat for self-other overlap with the elderly: $F(2, 138) = 8.12$, $p < .001$, partial $\eta^2 = .11$. Simple effects tests using a Bonferroni adjusted alpha-value as the rejection criterion $(p = \alpha/k)^2$ revealed that for the IVE condition, participants in the high threat condition felt higher levels of self-other overlap with the elderly ($M = 3.76$, $SD = 1.33$) compared to those in the low threat condition ($M = 2.61$, $SD = 1.12$): $F(1, 44) = 10.93$, $p < .01$ partial $\eta^2 = .20$. In contrast, there was no difference in self-other overlap between the high and low threat conditions for participants in the MS condition ($M = 3.28$, $SD = 1.17$ vs. $M = 2.92$, $SD = 1.22$): $F(1, 46) = 1.08$, $p = .30$ partial $\eta^2 = .02$. Participants in the control condition who were in the high threat condition felt marginally lower levels of self-other overlap

with the elderly compared to those in the low threat condition ($M = 2.28$, $SD = .98$ vs. $M = 3.00$, $SD = 1.13$): $F(1, 44) = 5.05$, $p = .03$, partial $\eta^2 = .10$ (RQ2a-b) (Fig. 3). The marginally significant main effect of immersion, $F(2, 138) = 2.61$, $p = .08$, partial $\eta2 = .04$, should be understood in light of the interaction between immersion and threat. No other main effects were significant (H1b); Threat: $F(1, 138) = 1.91$, $p = .17$, partial $\eta2 = .01$; Gender: $F(1, 138) = .00$, $p = 1.00$, partial $\eta2 = .00$; Race: $F(1, 138) = 1.20$, $p = .27$, partial $\eta2 = .01$.

Similarly, a significant interaction pattern emerged for participants' future communication intent with the elderly: $F(2, 138) = 4.55$, $p < .05$, partial $\eta^2 = .06$. While not significant, simple effects tests using a Bonferroni adjusted alpha-value (α/k) as the rejection criterion showed that, for the IVE condition, participants in the high threat condition tended to show a stronger intention to interact with the elderly in the future ($M = 4.95$, $SD = 1.01$) compared to their low threat counterparts ($M = 4.32$, $SD = 1.06$), $F(1,44) = 3.68$, $p = .06$, partial $\eta^2 = .08$. The level of threat did not influence participant's future communication intent with the elderly in the MS condition ($M = 4.52$, $SD = .82$ vs. $M = 4.27$, $SD = .88$), $F(1, 46) = 1.03$, $p = .32$, partial $\eta^2 = .02$, while control participants in the high threat condition tended to be less willing to interact with the elderly in the future compared to their low threat counterparts ($M = 4.31$, $SD = .98$ vs. $M = 4.90$, $SD = .92$), $F(1, 44) = 4.05$, $p = .050$, partial $\eta^2 = .08$ (RQ3a-b) (Fig. 3). None of the
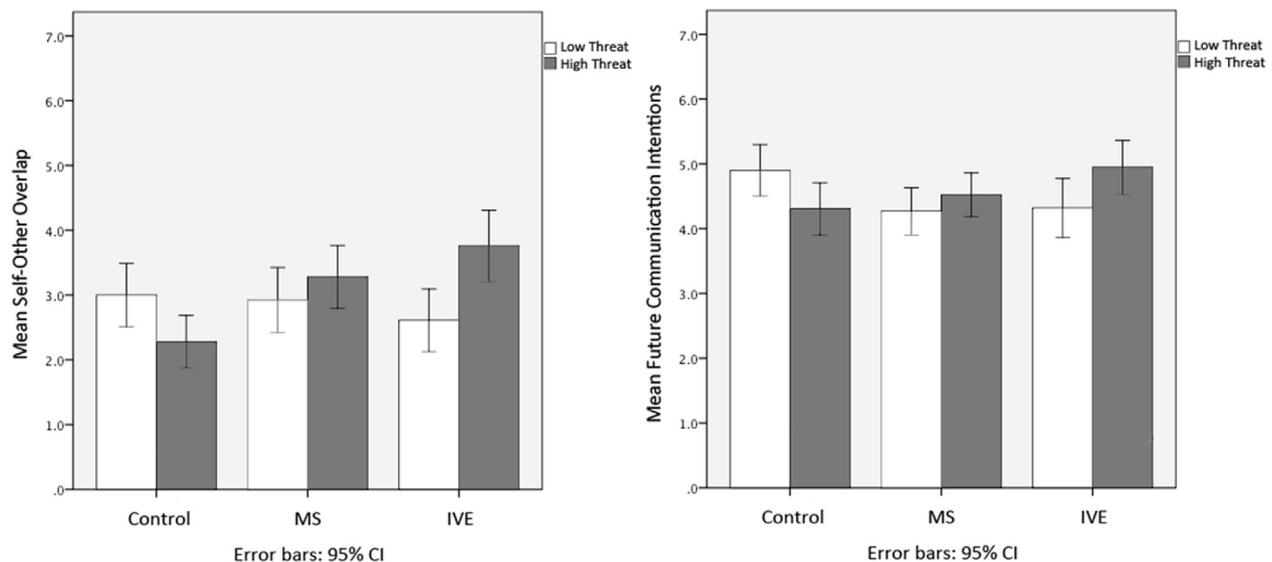

Fig. 3. Interaction between threat and immersion on self-other overlap and future communication intentions with the elderly.

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[2] We used a Bonferroni adjusted alpha-value as the rejection criterion to account for potential Type I errors that can result from multiple tests. Alpha-values were corrected over three tests (i.e., simple effect of threat in IVE, MS, and control conditions).

main effects were significant (H1c); Threat: $F(1, 138) = .37$, $p = .55$, partial $\eta2 = .00$; Immersion: $F(2, 138) = .72$, $p = .49$, partial $\eta2 = .01$; Gender: $F(1, 138) = .09$, $p = .76$, partial $\eta2 = .00$; Race: $F(1, 138) = 1.48$, $p = .23$, partial $\eta2 = .01$.

Contrary to expectations, perceived threat did not have a significant effect on participants' explicit ageism, $F(1, 138) = .00$, $p = 1.00$, partial $\eta^2 = .00$ (H1a). The interaction term was not significant, $F(2, 138) = .68$, $p = .51$, partial $\eta^2 = .01$ (RQ1a-b), and none of the other main effects were significant; Immersion: $F(2, 138) = .47$, $p = .63$, partial $\eta^2 = .01$; Gender: $F(1, 138) = .07$, $p = .79$, partial $\eta^2 = .00$; Race: $F(1, 138) = .09$, $p = .77$, partial $\eta^2 = .00$.

2.6. Study 1 discussion

Study 1 found a significant interaction between perceived threat and immersion on self-other overlap and future communication intent with the elderly. The simple effects tests and conditional means for each of the experimental groups (Table 1) suggest that while perceived threat reduced self-other overlap with the elderly for the control group, this was not the case when participants engaged in a perspective taking exercise. Furthermore, this difference was greater for the IVE than the MS group, such that participants in the high threat-IVE group tended to exhibited *more* self-other overlap with the elderly after the intervention than their low threat counterparts; participants in the MS condition reported relatively similar levels of self-other overlap with the elderly in the high and low threat conditions. Albeit less pronounced, this trend was also found in participants' intent to interact with the elderly in the future.

One possible explanation for these results is that it may have been easier for participants to take the perspective of an elderly person when they were in the IVE compared to when they were relying entirely on their imagination (MS). Just as participants exhibited more positive attitudes toward outgroup members after completing an imagined contact exercise when perceptual fluency was high but not when it was low (West & Bruckmüller, 2013), the perceived difficulty of the perspective taking task may have influenced participants' motivation and ability to truly 'walk in the shoes' of the other person. If such a conjecture is true, IVEs may be particularly beneficial when the intergroup context makes it difficult for people to engage in perspective taking.

Another important point is that participants in the IVE perspective taking condition actually felt *higher* self-other overlap and future communication intentions with the elderly in the high threat condition than in the low threat condition. Participants may have tried harder to compensate for their prior negative attitudes toward the elderly after vividly embodying an older person in an IVE. That is, they may have been more motivated to try to take the perspective of the elderly person when the IVE was serving as a facilitator. There is evidence that people show more empathy toward a disadvantaged outgroup when they experience feelings of collective (group) guilt (e.g., Miron, Branscombe, & Schmitt, 2006). One study found that perspective taking led participants to feel guilty about their previous mistreatment of outgroup members, albeit only among those who did not identify strongly with their ingroup (Zebel, Doosje, & Spears, 2009). If perspective taking triggers feelings of guilt, and the IVE condition facilitated perspective taking more than the MS condition, participants in the IVE condition may have felt guiltier about their prior negative attitudes toward the elderly (i.e., describing/perceiving the elderly as a threat) than those in the MS condition. As such, they may have been more motivated to look for similarities between themselves and the elderly (e.g., self-other overlap) and to engage in intergroup contact.

Contrary to expectations, none of the main or interaction terms influenced participants' explicit bias toward the elderly (Kogan, 1961). This finding stands in contrast to previous studies that found that perspective taking led to a decrease in negative attitudes toward the outgroup, stereotyping, and overall bias (e.g., Aberson &

Haag, 2007; Galinsky & Moskowitz, 2000; Vescio et al., 2003). These results suggest that our intervention may not have been sufficient to influence biases toward the elderly. However, because these items explicitly asked participants how biased they were toward the elderly, the social desirability to appear unbiased may have been too strong to yield meaningful results.

In conclusion, while threat reduced self-other overlap in the absence of perspective taking, this was not the case for participants who took the perspective of the outgroup member. More importantly, Study 1 shows that perspective taking via IVEs can be more beneficial than MS in countering the negative effects of threat on self-other overlap with the elderly. This interaction pattern was also seen in one's intention to engage in intergroup communication, suggesting that the effect of threat differed depending on the perspective taking modality. However, while IVEs tended to show more benefits than MS, the results were less clear due to the non-significant simple effects. The fact that perspective taking was effective despite the presence of intergroup threat is interesting when considering the body of research that shows that perspective taking within hostile intergroup contexts can trigger antisocial behavior (Epley et al., 2006; Gilin, Maddux, Carpenter, & Galinsky, 2013; Pierce et al., 2013). An important difference between this line of research and Study 1 is the nature of intergroup threat. In Study 1, the intergroup threat was indirect and presented verbally; the participants' immediate socioeconomic well-being was not in jeopardy or in competition with that of the elderly. Furthermore, while the threat manipulation article postulated the growth of the elderly population would threaten the socioeconomic stability of the participant, the elderly did not intend to threaten the younger generation. As such, despite its statistical significance, the threat manipulation may not have been very strong. Indeed, the small effect size of the threat manipulation (Pearson's r = .21) lends support to this conjecture.

Albeit from a slightly different vein, research on metastereotypes (i.e., perceptions of how one's ingroup is viewed by members of an outgroup) also offer evidence that engaging in an empathy exercise is beneficial in the context of *intra*group, but not direct intergroup interaction (Vorauer & Sasaki, 2009). To account for the potential role of threat type, the follow-up experiment adopted a more experiential and intentional form of threat—interpersonal rejection—to see if perspective taking could lend additional benefits in the face of direct and concrete[3] forms of threat, and if the perspective taking modality would make a difference.

3. Study 2

In contrast to Study 1, Study 2 adopted an experiential and ostensibly intentional form of threat manipulation, social rejection, using Cyberball (Williams, Cheung, & Choi, 2000). In Cyberball, the participant plays a ball toss game with two other players who can either include or exclude the participant from the game. Multiple studies offers robust evidence that being rejected in Cyberball is an effective way of inducing feelings of threat toward needs of belonging and self-esteem (Jamieson, Harkins, & Williams, 2010). To further activate intergroup threat, participants in the threat condition were also told that their outgroup partners did not favor members of their ingroup (i.e., young adults). Finally, to account for social desirability biases inherent in self-report measures, the second study also adopted two additional measures: one implicit

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[3] We used the term 'concrete threat' to refer to a direct and experiential form of intergroup threat, in contrast to an 'abstract threat' which is presented outside of direct intergroup contact.

and one behavioral measure of bias (i.e., Affect Misattribution Procedure (AMP) and Empathic Listening Task). The following hypotheses and research questions were posed for the two additional dependent measures of bias:

H2a-b. Participants who feel threatened by the elderly will (a) exhibit greater implicit ageism and (b) less empathic effort to listen to the elderly compared to those who do not feel threatened by the elderly.

RQ4a-b. Will engaging in a perspective taking exercise (a) mitigate the negative influence of threat on implicit ageism and empathic listening, and if so, (b) will this effect be stronger for participants in the IVE condition than those in the MS condition?

3.1. Participants

A total of 84 undergraduates (38 men, 46 women) were recruited from a medium-sized western university. Of these, 45 (53.57%) were White, 10 (11.90%) were Asian, 7 (8.33%) were Latino, 11 (13.10%) were Black, and 11 (13.10%) reported another ethnicity. All participants were under the age of 35.

3.2. Procedure

Study 2 adopted a 2 Threat (high, low) x 2 Immersion (IVE, MS) between-subjects design. Upon giving consent to participate in the experiment, participants were told that they would be participating in two separate studies. They were told that they would play a ball toss game with two partners in an IVE for the first study. To manipulate perceived threat, participants played a ball toss game (Cyberball) with two ostensibly elderly partners in an IVE. In the high threat condition, participants received a total of 3 tosses out of 30 tosses. In the low threat condition, participants received a total of 10 tosses.

To bolster the threat manipulation, participants were given short bios of their partners prior to the ball toss game. In both the 'threat' and 'no threat' conditions, participants were given the ages and pictures of their virtual partners in addition to feeling thermometers that represented their partners' feelings toward 4 groups of people (young adults, older adults, females, and males). The bios were identical across conditions, with the exception of the feeling thermometer information for young adults and older adults. In the high threat condition, participants saw bios that indicated that their partners felt 'cold' toward young adults and 'warm' toward older adults. In the low threat condition, the virtual partners' bios showed equally neutral feelings toward both young and older adults.

After the ball toss game, participants took off the HMD and were asked to wait while the experimenter prepared the second study. They then completed a perspective taking task that closely mirrored that of Study 1. Once again, participants in the IVE condition embodied an elderly avatar, while participants in the MS condition viewed a picture of the same avatar. Participants in both conditions were asked "to imagine a day in the life of this individual". After completing the perspective taking task, participants completed a questionnaire, the AMP, and an Empathic Listening Task (explained in *Measures*).

3.3. Measures

3.3.1. Perceived threat

Two items that were used in a previous study to assess the level of intergroup threat in the context of intergroup contact (Rothgerber, 1997) examined whether the threat manipulation had

been successful: "I feel angry." and "I feel offended". Participants were asked to rate how strongly they agreed with each statement on a 7 point Likert-type scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*). The reliability the scale was good, Cronbach's α = .77 ($M = 1.96, SD = 1.21$); the minimum was 1 and the maximum was 5.

3.3.2. Self-other overlap

As in Study 1, the extent to which the participants felt close to the elderly was measured using the Inclusion of Other in the Self (IOS) Scale ($M = 3.18, SD = 1.19$); the minimum was 1 and the maximum was 6.

3.3.3. Future communication intentions

Future communication intentions were also measured using the same items as Study 1, Cronbach's α = .78 ($M = 4.51, SD = 1.09$); the minimum was 2.33 and the maximum was 7.

3.3.4. Affect misattribution procedure

The Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005) is an implicit measure of attitudes that "measures automatically activated responses based on the misattributions people make about the sources of their affect or cognitions" (Payne & Lundberg, 2014, p. 672). The AMP was cited over 170 times within the first six years of its publication (Nosek, Hawkins, & Frazier, 2011) and is the only indirect measure that has an internal consistency comparable to the Implicit Association Test (Blaison, Imhoff, Hühnel, Hess, & Banse, 2012). During the AMP, participants are presented with multiple trials of a prime stimulus (75 ms) followed by a brief blank screen (125 ms) and an ambiguous target item, for example, a Chinese ideograph (100 ms). Participants are explicitly asked to ignore the prime stimulus and judge whether the target item is pleasant or not. The judgments of the target item are used to assess the participant's attitudes toward the prime stimuli (e.g., flowers, insects, etc.). In the present study, pictures of old and young adults were used as the prime stimuli[4] and participants were asked to judge the visual pleasantness of the target Chinese ideograph that followed each picture. To compute implicit preferences, the mean positivity scores for young face primes were subtracted from the mean positivity scores for old face primes (Gawronski & Ye, 2014) , $M = .04, SD = .29$; the minimum was −.57 and the maximum was .92. Data collected from students who reported that they could read Chinese characters (n = 11) were not included in the analysis.

3.3.5. Empathic Listening Task

Empathic listening was used in a previous study to assess one's motivation to empathize with the speaker (Schumann, Zaki, & Dweck, 2014). In our study, participants were asked to listen to two audio recordings of people describe a personal and emotional experience in their lives. Each speaker started by giving a brief introduction of himself, which included his age. One of the speakers was an older adult (over 70), while the other was young (under 30). The older adult described his life after being diagnosed with Alzheimer's disease, while the young adult described his struggle with post-traumatic stress disorder. The order of the presentation was counterbalanced across all conditions. Participants were told that the recordings were fairly long, and that they could skip some parts of the recording if they wished. Relative empathy for the elderly was computed by subtracting the amount of time (in minutes) participants spent listening to the young speaker from the amount of time they spent listening to the old speaker ($M = −.76$,

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[4] Pictures were from the Project Implicit group, which was founded by Tony Greenwald, Mahzarin Banaji, and Brian Nosek.

$SD = 1.52$); the minimum was -5.38 and the maximum was 3.13.

3.4. Results

A manipulation check following the virtual ball toss game confirmed that participants in the high threat condition felt angrier and more offended compared to those in the low threat condition ($t(82) = -5.89$, $p < .001$). In addition, the effect size of the manipulation (Pearson's r = .55) was significantly larger than the .21 observed in Study 1 (Fisher's $Z = -2.85$, $p < .01$). The means and standard deviations of the outcome variables according to each of the four conditions are in Table 2. To test the joint and independent effects of perceived threat and immersion on various attitudes toward the elderly (i.e., self-other overlap, future communication intentions, AMP, Empathic Listening Task), 2 × 2 analyses of covariance (ANCOVA) tests were performed with gender and race as covariates.

Threat had a significant main effect on one's self-other overlap with the elderly that was not moderated by immersion. Participants in the high threat condition reported lower levels of self-other overlap ($M = 2.88$, $SD = .88$) compared to those in the low threat condition ($M = 3.49$, $SD = 1.40$), $F(1, 78) = 4.82$, $p < .05$, partial $\eta 2 = .06$. Neither the main effect of immersion ($F(1, 78) = 1.70$, $p = .20$, partial $\eta 2 = .02$) nor the interaction term was significant ($F(1, 78) = .10$, $p > .70$, partial $\eta 2 = .001$). Gender had a marginally significant effect on one's self-other overlap with the elderly ($F(1, 78) = 3.91$, $p = .05$, partial $\eta 2 = .05$). Race did not significantly influence self-other overlap with the elderly ($F(1, 78) = .12$, $p > .70$, $\eta^2 = .002$.)

Threat also had a significant main effect on the extent to which participants implicitly preferred young people over the elderly (High: $M = -.04$, $SD = .29$ vs. Low: $M = .12$, $SD = .27$), $F(1, 67) = 4.37$, $p < .05$, partial $\eta 2 = .06$. However, neither the main effect of immersion ($F(1, 67) = .96$, $p > .30$, partial $\eta 2 = .01$) nor the interaction term ($F(1, 67) = .55$, $p > .45$, partial $\eta 2 = .01$) was significant. Similarly, neither gender ($F(1, 67) = .49$, $p > .45$, partial $\eta 2 = .01$) nor race ($F(1, 67) = .05$, $p > .80$, partial $\eta 2 = .001$) had a significant main effect on implicit preference.

The system failed to record the listening time for 5 participants, and their data were not available for the final analysis. Participants in the high threat condition tended to spend relatively more time listening to the older (vs. younger) speaker than their low threat counterparts ($M = -.49$, $SD = 1.48$ vs. $M = -1.02$, $SD = 1.53$), $F(1, 73) = 4.08$, $p < .05$, partial $\eta 2 = .05$. The main effect of immersion ($F(1, 73) = .03$, $p > .85$, partial $\eta 2 = .00$) and the interaction term between immersion and threat ($F(1, 73) = .06$, $p > .80$, partial $\eta 2 = .001$) were not significant. Among the covariates, race had a significant effect on listening time ($F(1, 73) = 6.92$, $p = .01$, partial $\eta 2 = .09$), but gender did not ($F(1, 73) = .02$, $p > .85$, partial $\eta 2 = .00$).

Neither threat ($F(1, 78) = .43$, $p > .50$, partial $\eta 2 = .01$) nor immersion ($F(1, 78) = .24$, $p > .60$, partial $\eta 2 = .003$) had a significant effect on future intentions to communicate with the elderly. The interaction term was not significant ($F(1, 78) = 1.52$, $p > .20$, partial

$\eta 2 = .02$). The covariates also did not have a significant main effect on future intentions (gender: $F(1, 78) = 2.26$, $p = .14$, partial $\eta 2 = .03$, race: $F(1, 78) = .15$, $p > .65$, partial $\eta 2 = .002$).

3.5. Study 2 discussion

In contrast to the promising results in Study 1, when the threat manipulation was more experiential and intentional, increasing immersion was not enough to overcome empathic avoidance. Rather, when under threat, participants consistently showed negative attitudes toward the elderly along two dimensions, namely self-other overlap and implicit preference of young people over the elderly. These results suggest that perspective taking via IVEs can be more effective than MS at fostering positive behaviors toward the outgroup when the intergroup threat is indirect, but not when the threat becomes more concrete and direct. The direct nature of the threat in Study 2 may also have rendered the experience of threat to feel more personally relevant compared to the indirect form of threat in Study 1. These results also resonate with previous research that show the contextual boundaries of the benefits of perspective taking; when facing direct intergroup threat, perspective taking may not be enough to overcome bias.

Contrary to our expectations, participants in the high (vs. low) threat condition spent *more* time listening to an older adult's emotional story (i.e., personal story about Alzheimer diagnosis) rather than that of a young person (i.e., personal story about post-traumatic stress disorder). While puzzling, when coupled with the fact that high threat participants (1) reported lower levels of self-other overlap and (2) displayed implicit preference for young adults, these results may be interpreted in two ways. One possibility is that the results imply a passive form of *schadenfreude*. That is, listening to the difficulties experienced by a disliked outgroup member simply may have been less emotionally painful than listening to the hardships of an ingroup member. Such an interpretation is in line with studies that demonstrate that individuals feel less empathy toward (and sometimes even enjoy) the misfortunes of outgroup members compared to those of ingroup members (Cikara, Botvinick, & Fiske, 2011; Cikara, Bruneau, & Saxe, 2011). Another possibility is that the presence of intergroup threat increased participants' attentiveness to outgroup members. Hackel and colleagues (2014) offer cogent evidence that people can be more motivated to monitor threatening (vs. non-threatening) outgroups because of the potential implications of their intentions and actions. While we cannot directly test these conjectures with the data from our present study, future studies should explore this possibility by measuring physiological responses and/or asking participants about their emotional state after listening to the audio clips.

It is also worth noting that being ostracized by two ostensibly older avatars led to negative attitudes toward the elderly, even outside of the virtual interaction. These findings resonate with research that demonstrates that virtual interactions can have powerful real world implications (Williams et al., 2000; Williams & Jarvis, 2006; Wirth & Williams, 2009). To the best of our

Table 2
Means and standard deviations of all dependent variables by condition (Study 2).

	Future communication intentions	Self-other overlap	AMP	Empathic listening
	M (SD)	M (SD)	M (SD)	M (SD)
IVE High Threat	4.52 (1.16)	2.77 (.75)	−.03 (.38)	−.38 (1.60)
IVE Low Threat	4.42 (1.06)	3.30 (1.08)	.18 (.29)	−1.07 (1.15)
MS High Threat	4.32 (1.01)	3.00 (1.00)	−.04 (.21)	−.59 (1.4)
MS Low Threat	4.79 (1.13)	3.67 (1.65)	.06 (.24)	−.98 (1.84)

knowledge, this is the first study to show that virtual ostracism can lead to intergenerational hostility.

4. General discussion

The present study is the first to examine how the level of immersion afforded by different media platforms can facilitate perspective taking in demanding (presence of intergroup threat) or less demanding (absence of intergroup threat) contexts. When the intergroup threat was indirect (Study 1), threatened participants felt greater self-other overlap with the elderly compared to non-threatened participants in the IVE condition, but not in the MS or control condition. This trend was also present, albeit weaker, for participants' intentions to interact with the elderly in the future. While we did not expect participants to feel more affinity toward threatening outgroup members than nonthreatening members in the IVE condition, the results suggest that IVEs were more effective than MS in encouraging individuals with more negative outgroup attitudes to take the perspective of the outgroup member. These results are in line with studies that suggest that perspective taking helps high prejudice individuals improve outgroup attitudes, but not low prejudice individuals (Vorauer, 2013). In addition, these results lend support to previous research that showed that the rich experience afforded by IVEs bolsters the effects of perspective taking (e.g., Ahn et al., 2013). That is, while perspective taking did mitigate the negative effects of threat compared to the control condition regardless of the method, IVEs were even more effective than MS in protecting participants against the negative effects of intergroup threat on intergroup attitudes, namely self-other overlap and future communication intentions.

However, when the intergroup threat was ostensibly intentional and concrete (Study 2), IVEs did not offer any benefits over MS. Rather, hostile feelings toward the elderly persisted in two of the four outcome measures, namely self-other overlap with the elderly and implicit attitudes toward the elderly. These results suggest that when the level of intergroup threat is direct and concrete, increasing the level of immersion alone is not enough to overcome low levels of motivation to empathize with outgroup members. This impact of inferred intentionality also closely echoes Segovia and Bailenson (2012) study that showed that participants were more aggressive toward virtual ostracizers when they were told that the ostracizer had intentionally chosen an avatar as a 'disguise' compared to when they were told that the ostracizer had been randomly assigned an avatar. It is also likely that the perceived intentionality of the threat in Study 2 made the negative experience feel more personally relevant compared to the threat manipulation used in Study 1.

Our study contributes to both research and practice in the following ways: first, we extended the literature on ageism and perspective taking, and connected these to each other by highlighting the boundary effects of perspective taking in the presence of intergroup threat. Furthermore, we were able to show the varying influence of different types of intergroup threat on ageism, offering additional support for the integrated threat framework (Stephan & Stephan, 2000). Our findings are especially significant for the implementation of prejudice-reducing interventions, as they underscore the significance of taking the intergroup context into account. Finally, contrary to what media richness theory or social presence theory may predict, we found that IVEs do not automatically yield stronger effects than imagination. Put simply, more is not always better. While a number of technology companies as well as media outlets (e.g., New York Times) are enthusiastically pursuing VR as a novel form of storytelling, our study shows that VR may not always be the superior medium. More work is needed to determine when VR does (and doesn't) have a stronger impact than traditional forms of media.

5. Limitations and future directions

While we postulated that the IVE condition was more effective than the MS condition at facilitating perspective taking in Study 1, it is also possible that the IVE condition was more effective than the MS condition at mitigating bias due to its novelty, rather than its unique affordances. However, repeated use of IVEs may lead to desensitization toward the effects of virtual immersion. If this is the case, IVEs may lose their power once they become an everyday experience. Future studies should address this possibility by examining if the effects of IVEs vary depending on the extent to which people are familiar with IVE technology.

In addition, the control group in Study 1 was different from the two treatment groups (MS and IVE) in that the participants did not engage in an exercise in lieu of perspective taking. Instead they were asked to wait for some time in front of the computer prior to answering the post-survey. While this decision has its limitations in terms of experimental control, we chose to do so as it also provides a higher level of external validity, and would closely mirror what actually happens after people are exposed to articles that either suggest or don't suggest that the elderly are a threat to one's future.

We also need to consider that the measures in Study 2 were not identical to those used in Study 1. While we measured self-other overlap and future communication intention using the same measures in both Studies 1 and 2, we replaced the explicit ageism measure used in Study 1 with implicit ones, to account for participants' reticence to provide socially undesirable answers. However, it is possible that the change in the dependent variables can partially account for the differential results in the two studies.

Finally, we did not measure participants' pre-existing attitudes toward the elderly prior to the study. Participants were randomly assigned to our experimental conditions, which in principle should control for any initial variance in attitudes. That said, there is a small chance that participants across conditions may nonetheless have varied in their initial level of bias toward the elderly. This could, in turn, have influenced the impact of threat on outgroup attitudes or motivation to engage in a perspective taking task. Although this is an unlikely possibility, future studies should examine variance in initial group identification as a potential moderator on the effects of threat or perspective taking on attitudes.

Despite these limitations, however, it is encouraging that IVEs were more effective than MS in producing positive outgroup attitudes when the threat was presented outside of direct intergroup contact. Considering the fact that intergenerational threat usually arises from verbal forms of threat rather than direct intergroup conflict, our study offers a promising method of overcoming age-based prejudice within potentially hostile contexts.

6. Conclusion

The present study found that embodied perspective taking in an IVE was a more effective means than MS in overcoming the negative effects of threat on ageism when the threat was presented outside of intergroup contact (and thus abstract), but not when the threat was experienced within an intergroup context. However, it is worth noting that intergenerational tension is typically caused by the notion that the elderly is inconveniencing the youth (North & Fiske, 2012) rather than by hostile intergenerational contact. Our study offers evidence that IVEs can yield greater benefits than MS for people who are in situations that make it difficult for them to take the perspective of an outgroup member. While more follow-up research is needed, our findings suggest that perspective taking in

IVEs have the potential to offer an advantage over MS in overcoming intergroup threat.

Appendix A. Articles used in study

Elderly pose immediate threat to young Americans

"The most serious threat to young Americans is not someone hiding in a cave in Afghanistan or Pakistan, but anyone over the age of 60," government official Evan J. Kruzic said to CBS 60 Minutes. The rapid increase of seniors poses an immediate threat to the younger generation. Dr. Patricia Rutherfield, author of a recent report on Social Security, argued that seniors could even bankrupt the country based on current trends in Social Security and Medicare. "We are facing an inevitable economic crisis that is projected to be much worse than the 2008 financial crisis," said Dr. Rutherfield. While there is some debate on how this crisis will unfold, one thing is clear: older Americans did not prepare for retirement and are leaving the younger generation with an unsustainable economy. "Under these circumstances, the mantra of hard work and responsibility almost seems unfair to the younger generation," said Kruzic. Their hard work will just end up being used to support the ever-growing needs of the elderly at the cost of education, childcare, and job creation. This phenomenon is not unique to America and countries such as Japan offer an alarming preview of what is to come. Economists and government officials say that Japan has increased taxes and trimmed spending on everything from education to defense, all to care for its elderly. Decades of good policy "might prevent immediate chaos," said Masatoshi Katagiri, an economist at Chuo University, but living standards will erode severely. "Either way," he said, "the younger generation is facing a gloomy future because of the growing elderly population."

America prepared for changing demographics

"Thanks to the efforts made for sustainable aging, both young and old Americans are facing a stable future" government official Evan J. Kruzic said to CBS 60 Minutes. Over the next few decades, the number of people in America who are older than 65 is expected to more than double, according to a recent report published by the Pew Research Center. This shift is happening as a result of steadily rising longevity. With medical advances, people are not only living longer; they are living much longer. Seniors are leading much healthier and active lifestyles than ever before. Of course, the aging of the population has been underway for some time now. Dr. Patricia Rutherfield, lead author of the Pew report, said, "a number of companies have already taken steps to adapt to these demographic changes." For example, automaker Ford made low-cost tweaks to its workplace ergonomics for its older employees, such as providing custom shoes and easier-to-read computer screens. Other companies have introduced training programs that help older employees to transition into jobs that better suit their experience and skill sets. This policy benefits younger employees as well, by allowing them to advance more smoothly into active managerial positions. "We have many years before the implications of an aging population are felt, but things look pretty good," said Rutherfield.

"We were smart enough to prepare early on for an aging society." Policymakers and businesses have a fairly good grasp of the demographic trends in the world and are providing solutions that appear to be meeting the needs of the younger and older generation.

Appendix B. Items for explicit ageism and future communication intentions

Explicit ageism

1. There is something different about most old people: it's hard to figure out what makes them tick.
2. Most old people get set in their ways and are unable to change.
3. Most old people would prefer to quit work as soon as pensions or their children can support
4. It is foolish to claim that wisdom comes with old age.
5. Most old people make one feel ill at ease.
6. Most old people bore others by their insistence on talking about the "good old days."
7. Most old people are irritable, grouchy, and unpleasant.
8. Most old people are constantly complaining about the behavior of the younger generation.
9. Most old people are really no different from anybody else: they're as easy to understand as younger people.
10. Most old people are capable of new adjustments when the situation demands it.
11. Most old people would prefer to continue working just as long as they possibly can rather than be dependent on anybody.
12. People grow wiser with the coming of old age.
13. Most old people are very relaxing to be with.
14. One of the most interesting and entertaining qualities of most old people is their accounts of their past experiences.
15. Most old people are cheerful, agreeable, and good humored.
16. One seldom hears old people complaining about the behavior of the younger generation.

Future communication intentions

I intend to interact frequently with the elderly.
I plan to learn about the elderly.
I think it is important to interact with the elderly in the future.

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