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**Decreasing anti-elderly discriminatory attitudes:  
Conducting a ‘Stereotype Embodiment Theory’-based intervention**

**Abstract**

Stereotype Embodiment Theory (SET) implies that people who hold negative attitudes towards the elderly are more likely to experience a decline in various cognitive/physical functions themselves. Anti-elderly discriminatory attitudes, which negatively affect the elderly’s health status, could be reduced by communicating the contents of SET to non-elderly people. To weaken anti-elderly discriminatory attitudes, in Study 1, we had participants read about SET and related empirical findings (SET intervention), which intended to increase their self-interested motives for avoiding anti-elderly discrimination. In Study 2, we conducted an ‘integrated intervention’ containing a SET intervention and one selected aspect of educational intervention (i.e. presenting some information about some commonly misunderstood aspects of the elderly). Consequently, the integrated/SET interventions reduced participants’ anti-elderly discriminatory attitudes and these effects persisted for at least one week. Our new interventions will be useful for those who work with the elderly.

*Keywords:* elderly people, discriminatory attitudes, Stereotype Embodiment Theory, intervention, self-involvement

## **Background and Overview**

The world's population is rapidly ageing—the percentage of the world's population aged 65 and over was 5.1% in 1950 and 8.3% in 2015, and is expected to rise to 17.8% in 2060 (United Nations, 2017). This trend is particularly prominent in developed countries, including Germany, Sweden, France and the United Kingdom (United Nations, 2017). In Japan, it is especially remarkable—28.7% of Japanese citizens were aged 65 years and older in 2020 (Japan Ministry of Internal Affairs and Communications, 2020), a proportion that is predicted to increase in the future. Accordingly, past research has focused on various anti-elderly discriminatory attitudes. People often view elderly adults as being incompetent and out-of-date (Kite, Stockdale, Whitley, & Johnson, 2005) and often, they avoid forming any physical and emotional closeness with them (McKenzie & Brown, 2014). People may also hold the discriminatory belief that elderly people should proactively pass down any resources, avoid excessive consumption of any shared resources and not behave as if they were younger (North & Fiske, 2013). Although people in East Asia, including Japan, are generally collectivistic and often emphasize respecting elderly adults (Cuddy, Norton, & Fiske, 2005), general attitudes towards the elderly remain discriminatory (Chino, 2020; Futaki, Watanabe, Sakurai, & Karasawa, 2016; Ishii & Tadooka, 2015). These negative attitudes can create a poorer quality of life for elderly adults (Levy, Ashman, & Dror, 2000), increase neglect towards their decision-making (Chino, 2020; Vitman, Iecovich, & Alfasi, 2014) and hinder intergenerational positive interactions (Ishii & Tadooka, 2015). Thus, it is important to investigate effective strategies for reducing anti-elderly discriminatory attitudes held by non-elderly people (under the age of 65).

To promote the reduction of anti-elderly discriminatory attitudes, this study investigated the effectiveness of a unique intervention, during which the content of Levy's (2009) Stereotype Embodiment Theory (SET) and related empirical findings were presented

to the participants. In addition, this study measured the effect of the intervention immediately after it was conducted, as well as approximately one week later, to assess whether the decrease in anti-elderly discriminatory attitudes was sustained. Previous studies' interventions have overlooked the unique characteristics of the social group of elderly which most people will eventually enter. By focusing on SET, we believe that we can supplement this perspective and develop more effective intervention methods.

### **Interventions Against Anti-Elderly Discriminatory Attitudes**

A wide range of strategies for reducing anti-elderly discriminatory attitudes have been undertaken. For example, in Meshel and McGlynn's (2004) study, which aimed to reduce anti-elderly discriminatory attitudes through direct contact experience with the elderly, elementary and junior high school students' attitudes towards the elderly became more positive after a six-week intergenerational exchange program. Extended contact experiences, during which participants imagine having positive contact with elderly people, have also been shown to be effective in reducing anti-elderly discriminatory attitudes (Drury, Hutchison, & Abrams, 2016; Pekçetin, Hasgül, Düğeroğlu, & Arabacı, 2021). In addition, interventions to encourage participants' perspectives of the elderly; for example, enabling them to experience the impaired physical movements of the elderly (Berthold, Leicht, Methner, & Gaum, 2013) and the appearance of the elderly using virtual reality (Oh, Bailenson, Weisz, & Zaki, 2016), have desirable intervention effects.

Past research has also conducted 'educational interventions' for demystifying certain commonly misunderstood aspects of the elderly (Lytle & Levy, 2019). Such educational interventions are often used in the literature and can increase participants' knowledge about elderly adults and help participants form more positive attitudes towards them (Chonody, 2015). For example, Wurtele and Maruyama (2013) found that, when participants were asked to recall some common behaviours of elderly people and then presented with accurate

information about them, their discriminatory attitudes decreased. Past research has shown that negative and inaccurate portrayals of elderly adults often abound in everyday conversations and mass media (e.g. Donlon, Ashman, & Levy, 2005; Marshall, 2015), which have, in part, sprung from the lack of public education about the elderly (Levy, 2018). In addition, educational intervention has the advantage that it can be conducted easily and quickly for a large number of participants. Lytle and Levy (2019) assessed discriminatory attitudes towards elderly adults not only immediately after their educational intervention but also one week after it. Their results showed that, one week post-intervention, the intervention group showed more positive attitudes towards the elderly than the control group, but such an effect was stronger immediately post-intervention (Lytle & Levy, 2019).

### **The Intervention Based on the Stereotype Embodiment Theory**

The abovementioned educational interventions encouraged people to change their attitudes by presenting them with correct information about the people they ‘do not know well’; this is a perception that implicitly regards the elderly as an ‘outside’ group. However, ‘elderly’ is a social category that most people must eventually enter; this differentiates this social demographic from others such as race and gender (also considered as ‘outside’ groups). Levy’s (2009) SET provides a useful framework for examining the interplay between the eventuality of all human beings becoming ‘elderly’ and persistent anti-elderly discriminatory attitudes. SET assumes that people automatically internalise stereotypes about the elderly throughout their lives (Levy, 2009). It also demonstrates that young people who hold negative views about the elderly will experience undesirable effects when they themselves become elderly. SET suggests that such undesirable effects include poorer mental health states and cognitive/physical functions (Chasteen, Bhattacharyya, Horhota, Tam, & Hasher, 2005; Chasteen, Pichora-Fuller, Dupuis, Smith, & Singh, 2015; Hess, Auman, Colcombe, & Rahhal, 2003; Levy, Hausdorff, Hencke, & Wei, 2000; Sargent-Cox, Anstey, & Luszcz, 2012;

Wurm & Benyamini, 2014), stronger distress and feelings of loneliness (McHugh, 2003) and greater deterioration of physiological indicators including blood pressure and heart rate (Levy et al., 2000b). SET has received increasing attention when discussing the effects of elderly stereotypes on an expansive generation of perceivers (Fawsitt & Setti, 2017). Despite their importance in research on age discrimination (e.g. Levy, 2009), elderly specific perspectives have not been incorporated into practical intervention strategies for reducing discriminatory attitudes. Interventions conducted in previous studies might not have produced sufficient effects due to their lack of focus on the perspective that ‘elderly’ is a social category that most people must eventually enter. Thus, we believe that devising a new intervention strategy incorporating this perspective could more effectively reduce anti-elderly discriminatory attitudes.

Using the contents of SET and related empirical findings, this study aimed to implement a ‘SET intervention’ that would emphasise how anti-elderly discriminatory attitudes could have undesirable effects on the study participants’ own futures. This study’s SET interventions push the perspective that anti-elderly discriminatory attitudes are a highly self-involved issue that can strongly affect participants’ future. While educational interventions are intended to use altruistic motives to encourage avoidance of anti-elderly discrimination (i.e. protect the elderly for their own sake), SET interventions are intended to appeal to self-interested motives (i.e. view the elderly positively for the sake of participants’ own future). Self-interested motives for avoiding anti-elderly discrimination are thought to be consistent with psychological tendencies commonly found in people, such as self-enhancement and self-evaluation. Most people show a tendency towards self-enhancement—the belief that they have more control over surrounding events than they actually do; this attitude can positively affect people’s mental and physical health (Taylor & Brown, 1988; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). People also strive to maintain and

increase their self-evaluation (Tesser, 1980; Tesser & Paulhus, 1983) and often consider themselves socially well-adjusted and valuable (e.g. McQueen & Klein, 2006; Steele 1988). The self-interested motive for avoiding anti-elderly discrimination can thus conform to tendencies for positive self-enhancement and self-evaluation maintenance. Indeed, various other literatures have suggested the effectiveness of appealing to self-interested motives. For example, in recent years, environmental problems have grown in prominence worldwide. Research has shown altruistic motives (e.g. ‘to maintain the earth’s ecosystem’ and ‘for future generations’) as well as self-interested motives (e.g. ‘to save on utility bills’ and ‘for social praise’) (Gifford, 2011; Griskevicius, Tybur, & Van den Bergh, 2010) can strongly promote environment-friendly behaviours (Dietz, Fitzgerald, & Shwom, 2005; Schultz, 2001). Accordingly, we aimed to examine the effect of appealing to self-interested motives in the context of reducing anti-elderly discriminatory attitudes.

The SET intervention also included a ‘threatening’ aspect for participants (i.e. the undesirable effects of anti-elderly discrimination on their own futures). When people perceive a personal threat, they show a stronger tendency to act to eliminate it (Gibbons & Gerrard, 1991; Spencer, Fein, & Lomore, 2001). Similarly, the SET intervention might help participants perceive their own aging as threatening or less aversive and thus, reduce their anti-elderly discriminatory attitudes. In addition, similar to the educational intervention, the SET intervention has the advantage that it can be conducted easily and quickly for a large number of participants.

### **Description and Hypothesis**

This study aimed to examine SET interventions’ effects on decreasing anti-elderly discriminatory attitudes held by non-elderly Japanese participants (under the age of 65) through two studies—Studies 1 and 2. Anti-elderly discriminatory attitudes were measured using the Japanese short version of the Fraboni Scale of Ageism (Harada, Sugisawa,

Sugihara, Yamada, & Shibata, 2004). Study 1 included three intervention groups: (a) the SET intervention group, which was presented with the SET contents and related empirical findings (i.e. ‘your anti-elderly discriminatory attitudes will negatively affect your own future’); (b) the educational intervention group, which received accurate information about certain commonly misunderstood aspects of the elderly; and (c) the control group, which was presented with texts about a completely unrelated topic (i.e. Internet technology). We examined the extent to which participants’ anti-elderly discriminatory attitudes changed after each intervention. Study 2 included an ‘integrated intervention group’ as well as the three Study 1 groups; this group included one aspect of ‘educational intervention’ along with SET interventions and presented accurate information about the common misconception that elderly people are generally unhealthy (Tomabechi, Mita, Horitsu, Nishimura, & Hirasawa, 1994). We believe that the content of the SET and educational interventions would not interfere with each other and could be simultaneously communicated to the participants. In Study 2, we also consider the effects of each intervention and the participants’ youth identity (the degree to which one feels that one belongs to the ‘youth’ social demographic—as opposed to the elderly) and contact experience with the elderly.

Previous studies have overlooked a major perspective; the elderly is a social group most people will eventually enter. This study incorporates this perspective in the reduction of anti-elderly discriminatory attitudes, and to the best of our knowledge, the SET intervention has not been conducted with any target groups, including elderly people. We believe that the SET intervention is highly novel and unique to this study. In addition, it is believed to appeal to people’s self-interested motives for avoiding anti-elderly discrimination, and to help participants perceive their own aging as threatening or less aversive, which are assumed to be effective in reducing discriminatory attitudes. Thus, similar to the educational intervention, the SET intervention (and integrated intervention) may be effective in reducing anti-elderly



discriminatory attitudes, and their effects may be longer lasting. We hypothesise that SET interventions (and integrated interventions) are effective in reducing anti-elderly discriminatory attitudes. Educational interventions are also effective in reducing such attitudes (e.g. Lytle & Levy, 2019). However, SET interventions (and integrated interventions), which incorporate the viewpoint described above and are believed to appeal to people's self-interested motives for avoiding anti-elderly discrimination and to have a 'threatening' aspect and longer-lasting effects (i.e. at least one week after the intervention).

### **Study 1**

Following Lytle and Levy (2019), participants' anti-elderly discriminatory attitudes were measured at one week pre-intervention (Time 1), immediately after the intervention (Time 2) and at one week post-intervention (Time 3). We also measured the degree of participants' self-interested/altruistic motives for avoiding anti-elderly discrimination to confirm that participants' self-interested motives increase within the SET intervention group, while altruistic motives increase within the educational intervention group.

Furthermore, the SET intervention promotes perceptions regarding anti-elderly discrimination as a topic that is characterised by participants' high self-involvement. Thus, it could be related to the participants' age: younger people, who generally tend to be more psychologically distant from the elderly, are less involved in age discrimination (Rupp, Vodanovich, & Credé, 2005). Therefore, when examining each intervention effect, we decided to control the effect of participants' age (while we also report the results of supplementary analyses in the Open Science Framework repository [OSF; [https://osf.io/guq74/?view\\_only=9eb9ccc23ccc47d286896f2d32543401](https://osf.io/guq74/?view_only=9eb9ccc23ccc47d286896f2d32543401)] where we checked on the interactions regarding the participants' age).

### **Method**

#### **Participants**

The participants (361 Japanese individuals including 227 females, 133 males and 1 no answer [mean age: 40.91 years, range: 19–64]) were recruited through the crowdsourcing service CrowdWorks, which has the largest number of registered users in Japan (CrowdWorks, 2021). The participants in this study aligned with the demographic composition of the registered users of CrowdWorks, enabling us to collect a wide range of participants from all regions of Japan. Attrition of participants occurred between Time 1 and 2, and between Time 2 and 3. The details related to this attrition were posted on the OSF. The study was approved by the authors' institutional ethics committee and conducted in November 2020. Each participant received ¥60 for participation.

### **Procedure**

This experiment was conducted online. Participants provided their informed consent through CrowdWorks; they then proceeded to the experiment page. During Time 1, the participants' discriminatory attitudes and demographics were assessed. One week later, the participants were randomly distributed into the SET intervention, educational intervention, or control groups, and each intervention was subsequently implemented.

Each group's participants read a text summarising some latest research findings. No time limit was imposed on the text reading activity, and participants moved on when they fully understood the contents. The text employed for the SET intervention included an overview on SET and stated that most people eventually become an elderly person and that people internalise anti-elderly discriminatory attitudes throughout their lives. In addition, the text conveyed that people who maintain negative views towards the elderly eventually turn such undesirable attitudes against themselves (Levy, 2009). Specifically, people with stronger discriminatory attitudes are more likely to feel stressed and lonely, have poor memory and unhealthy blood pressure and other physiological indicators when they become older (Chasteen et al., 2005; Levy et al., 2000b; McHugh, 2003). In addition, the SET intervention

text emphasized that discriminatory attitudes towards the elderly should be avoided, as it negatively affects the participants themselves. The ‘educational intervention’ text was based on the Facts on Aging Quiz (Palmore, 1988) consisting of some questions about knowledge on the elderly. The text in the educational intervention conveyed that the perceptions that people generally have about the elderly are misconceptions. Specifically, using Breyspraak and Badura’s (2015) explanation, the educational intervention text aimed to correct certain misconceptions about the elderly including ‘older workers cannot work as effectively as younger workers’, ‘most old people are set in their ways and are unable to change’ and ‘most old people are bored’. We chose these three aspects because in Tomabechei et al.’s (1994) survey of Japanese participants, the percentage of correct answers for these was particularly low. In addition, the educational intervention text emphasized that discriminatory attitudes towards the elderly should be avoided, as they negatively affect the elderly people around the participants. The ‘control group’ text was sourced from a text by Ikeda (2010) and included descriptions of changes between people and information, which was unrelated to age discrimination. The content of text for the control group was consistent with the instruction at the beginning and consisted of the latest research findings. The length of the text used in each intervention did not vary greatly. The Appendix of this article includes the full texts used in each intervention.

Then, during Time 2, immediately post-intervention, the participants’ discriminatory attitudes and motives for avoiding anti-elderly discrimination were assessed. Finally, during Time 3, their discriminatory attitudes were assessed. We integrated participants’ data from all three times because we had requested and received the last four digits of participants’ zip codes and mobile numbers during all three measurement times.

### **Measurements (Measurement Timing Shown in Parentheses)**

**Demographics (Time 1).** The demographic information provided by the participants

included gender, age and nationality.

**Anti-elderly discriminatory attitudes (Time 1, Time 2 and Time 3).** These were measured using the Japanese short version of the Fraboni Scale of Ageism (Harada et al., 2004) containing 14 items: three on antilocution (privately expressed prejudice) ( $\alpha = .61$  in Time 1,  $.68$  in Time 2 and  $.73$  in Time 3; e.g. ‘many old people are stingy and hoard their money and possessions’), six on aversion/discrimination ( $\alpha = .72$  in Time 1,  $.73$  in Time 2 and in  $.75$  in Time 3; e.g. ‘I don’t like it when old people try to make conversations with me’) and five on avoidance ( $\alpha = .83$  in Time 1,  $.86$  in Time 2 and  $.88$  in Time 3; e.g. ‘I would prefer not to live with an old person’)<sup>1</sup>. Responses were rated on a five-point Likert scale. Mean scores were calculated, and higher scores indicated more discriminatory attitudes.

**Motives for avoiding anti-elderly discrimination (Time 2).** We used two items to measure participants’ degree of self-interested/altruistic motives for avoiding anti-elderly discrimination: ‘anti-elderly discrimination should be avoided because it can negatively affect my future (self-interested motive)’ and ‘anti-elderly discrimination should be avoided because it can negatively affect the elderly (altruistic motive)’. Responses were rated on a five-point Likert scale and higher scores indicated more self-interested or altruistic motives. The correlation coefficient between the two items was  $r = .45, p < .001$ . Because measuring motives before each intervention would affect the intervention effects, it was avoided and they were measured only in Time 2.

## **Analysis**

Data analysis was conducted using R (ver. 3.6.2). To examine each intervention’s effects, we conducted the analyses of a generalised linear mixed model (GLMM) using the R packages of lme4, lmerTest and lsmeans (Bates, Maechler, Bolker, & Walker, 2015; Kuznetsova, Brockhoff, & Christensen, 2017; Lenth, 2016). In Studies 1 and 2, *t*-tests used the Satterthwaite’s method and multiple comparisons were conducted using the Tukey

correction. The statistical significance level was set at  $p = .05$ . The scale items, original data and R scripts for analysis can be accessed at the OSF.

## Results

### Data Screening

Participants who made any errors while answering the item, ‘Please select “slightly agree” for this item’, were considered to have responded invalidly, and we therefore excluded two such participants from the analysis. Regarding unanswered items, we excluded one participant from the analysis. We analysed data from 358 individuals (226 females and 132 males [mean age: 40.95 years, range: 19–64]). Details regarding the age range of the participants are presented in the OSF. The SET intervention group had 123 participants, the educational intervention group had 123 participants and the control group had 112 participants<sup>2</sup>. The means, standard deviations and correlations of each variable are shown in Table 1.

### Sensitivity Analysis

A sensitivity analysis was performed with  $\alpha = .05$  and  $\beta = .80$ . The degree of discriminatory attitudes was compared among the three groups (SET intervention, educational intervention and control), and it was determined that 53 participants per group were needed to detect a medium effect size ( $f = .25$ ; Cohen, 1992). The sample size of this study was sufficient to meet this criterion.

### Changes in Discriminatory Attitudes

Table 2 and Figure 1 show the changes in discriminatory attitudes within each group. To examine each intervention’s effect, three analyses of GLMM were conducted; anti-elderly discriminatory attitudes (antilocution, aversion/discrimination and avoidance) were the dependent variables. The fixed factors of GLMM were the groups (SET intervention, educational intervention and control), the timings of the measurement (Time 1, Time 2 and

Time 3) and interactions between these factors. The random effects structured by participants and participants' age and gender were included<sup>3</sup>. A summary of the results of the analysis in Studies 1 and 2 is presented in Table 3. We also conducted the analyses of variance (ANOVA) without considering random effects; the results were posted on the OSF<sup>4</sup>.

Regarding antilocution, timing of measurement had a significant effect:  $t(714) = 3.04$ ,  $p = .002$ , but the main effect of group as well as group  $\times$  time interaction were not significant:  $t(884) = 0.85$ ,  $p = .396$ ;  $t(714) = 1.21$ ,  $p = .227$ , respectively. Multiple comparisons were conducted, and participants in the SET intervention group experienced a decrease in antilocution between Times 1 and 3:  $t(710) = 3.61$ ,  $p = .001$ . Participants in the educational intervention group experienced a decrease in antilocution between Times 1 and 2, and Times 1 and 3:  $t(710) = 5.11$ ,  $p < .001$ ;  $t(710) = 3.46$ ,  $p = .002$ . During Time 2, the educational intervention group had a lower score than the control group:  $t(553) = 3.89$ ,  $p = .002$ . During Time 3, the SET intervention group had a lower score than the control group:  $t(551) = 2.44$ ,  $p = .040$ . Based on these considerations, the SET and educational interventions were determined to be effective for reducing antilocution towards the elderly, and these effects persisted for approximately a week after the interventions.

Regarding aversion/discrimination, timing of measurement as well as group  $\times$  time interaction had significant effects:  $t(714) = 2.21$ ,  $p = .027$ ;  $t(714) = 2.69$ ,  $p = .007$ , respectively; however, the main effect of group was not significant:  $t(648) = 0.05$ ,  $p = .960$ . Multiple comparisons were conducted, and participants in the educational intervention group experienced a decrease in aversion/discrimination between Times 1 and 2:  $t(710) = 2.49$ ,  $p = .035$ . Participants in the control group experienced a decrease in aversion/discrimination between Times 1 and 2, and Times 1 and 3:  $t(710) = 2.65$ ,  $p = .022$ ;  $t(710) = 2.74$ ,  $p = .017$ , respectively. Based on these considerations, the SET intervention was not effective for reducing aversion/discrimination towards the elderly. While the educational intervention

reduced aversion/discrimination, its effect diminished after about a week.

Regarding avoidance, timing of measurement as well as group  $\times$  time interaction had significant effects:  $t(714) = 4.21, p < .001$ ;  $t(714) = 2.38, p = .017$ , respectively; however, the main effect of group was not significant:  $t(553) = 1.13, p = .259$ . Multiple comparisons were conducted, and participants in the SET intervention group experienced a decrease in avoidance between Times 1 and 2, and Times 1 and 3:  $t(710) = 2.62, p = .025$ ;  $t(710) = 4.39, p < .001$ , respectively. Participants in the educational intervention group experienced a decrease in avoidance between Times 1 and 2, and Times 1 and 3:  $t(710) = 4.97, p < .001$ ;  $t(710) = 3.86, p < .001$ , respectively. During Time 2, the SET intervention group had a lower score than the control group:  $t(418) = 2.66, p = .022$ . During Time 3, the SET intervention group had a lower score than the control group:  $t(418) = 2.83, p = .013$ . Based on these considerations, the SET and educational interventions were determined to be effective for reducing avoidance towards the elderly, and these effects persisted for at least a week.

### **Motives for Avoiding Anti-elderly Discrimination**

To compare the motives for avoiding anti-elderly discrimination between intervention groups, two analyses of GLMM were conducted; the motives (self-interested and altruistic motives) were the dependent variables. The fixed factor of GLMM was the groups (SET intervention, educational intervention and control). The random effects structured by participants' age and gender were included.

Regarding self-interested motives, the main effect of group was significant:  $t(356) = 2.08, p = .038$ . Multiple comparisons showed that the SET intervention group had a higher score than the educational intervention group:  $t(350) = 2.94, p = .010$ . Regarding altruistic motives, the main effect of group was not significant:  $t(356) = 0.99, p = .321$ . Based on these considerations, the self-interested motives for avoiding anti-elderly discrimination were strong in the SET intervention group immediately after the interventions.

### Discussion

Study 1 included a SET intervention that presented the SET contents and related empirical findings, the educational intervention presented accurate information about the elderly and the control group presented information about some completely unrelated topics. We examined whether anti-elderly discriminatory attitudes changed after each intervention implementation and whether this effect lasted for one week. The results showed that the SET intervention reduced anti-elderly antilocution and avoidance and these effects lasted for at least a week. The educational intervention reduced anti-elderly antilocution, aversion/discrimination and avoidance, and the effects on antilocution and avoidance sustained for at least one week. Furthermore, regarding participants' motives for avoiding anti-elderly discrimination, participants' tendency to adopt a self-interested motive increased within the SET intervention group (according to the intervention's purpose).

To make the SET intervention more effective and revised, we must examine why it could not reduce aversion/discrimination. Although discriminatory attitudes and behaviours towards the elderly is widespread (Martens, Goldenberg, & Greenberg, 2005), one possible cause of such dislike is disease avoidance mechanisms (Schaller & Duncan, 2007). Disease avoidance mechanisms focus on superficial cues, including coughing or wearing a mask, and direct the subject to experience aversion towards such stimuli, regardless of whether the person producing these is actually ill (Curtis, Aunger, & Rabie, 2004; Imada, 2019). Thus, when an object is perceived to be associated with an illness, the target is more likely to be disliked (Pyszczynski, Greenberg, Solomon, Cather, Gat, & Sideris, 1995). Elderly people are actually more susceptible to infections than younger populations due to their weakened immunity, but the perceived association between the elderly and disease tends to be excessive compared to reality (Duncan & Schaller, 2009). For example, Tomabechei et al. (1994) found a participant correct response rate of only 53.8% for the item 'about 80% of the elderly are



healthy and can lead a normal life (answer is True)'; almost half the participants held the misconception that most elderly people were unhealthy. Therefore, to reduce anti-elderly aversion/discrimination within the SET intervention group, making improvements including descriptions for weakening participants' cognitive linking of the elderly with disease, will be effective.

Regarding the relationship between the intervention effects and other individual difference factors, it would be important to focus on youth identity (the degree to which one feels that one belongs to the 'youth' social demographic—as opposed to the elderly) and contact experience with the elderly. People tend to attribute their identity to the in-group where they belong and view their in-group members positively and out-group members negatively (Tajfel, 1981). In general, people tend to place value on staying physically and mentally young (Barnhart & Peñaloza, 2013), and in modern times, this value is particularly emphasized by mass media (Jenull, Frate, & Mayer, 2018). For the participants in this study, especially those in their 50s and early 60s, the concept of youth is distant in terms of actual age; however, they may continue to pursue the value of youth by associating their self-identity with it. In addition, participants with a high sense of youth identity may have lower perceived self-involvement with the problem of age discrimination. Thus, the SET intervention effects could be related to the degree of identification with 'youth'. Conversely, people who have less contact with the elderly tend to be generally more psychologically distant from the elderly (Allan & Johnson, 2008; Meshel & McGlynn, 2004). Contact experience with the elderly could also be related to the intervention effects. Therefore, when examining each intervention effect, we should control the effect of youth identity and contact experience (while we also report the results of supplementary analyses in the OSF where we checked on the interactions regarding these factors).

## Study 2

Using the results of Study 1, we implemented a new intervention in Study 2; this added a statement to the SET intervention (i.e. ‘the elderly is healthy’) to weaken the cognitive link between the elderly and disease. This new intervention was called the ‘integrated intervention’ because it included one aspect of the educational intervention—chiefly, providing accurate information about misconceptions (i.e. statements such as ‘the elderly is generally unhealthy’). In Study 2, we examined the extent to which anti-elderly discriminatory attitudes changed after each of the following interventions: the integrated intervention described above; the SET intervention, which presented the SET contents and related empirical findings; the educational intervention, which presented accurate information about commonly misunderstood aspects of the elderly; and the control group, which presented completely unrelated topics. Discriminatory attitudes were measured at one week before the pre-intervention (Time 1), immediately after the intervention (Time 2) and at one week post-intervention (time 3). We also measured the degree of participants’ self-interested/altruistic motives for avoiding anti-elderly discrimination to confirm that the extent of the self-interested motives increases within the integrated and SET intervention groups and that the extent of the altruistic motive increases within the educational intervention group.

In the Study 1 SET intervention, we presented several empirical findings that people with more discriminatory attitudes were more likely to (1) feel stressed and lonely, (2) have poorer memory and (3) have worse blood pressure and other physiological indicators when they became older (Chasteen et al., 2005; Levy et al., 2000b; McHugh, 2003); however, in terms of generalisability, it is necessary to examine whether similar intervention effects can be obtained using other findings. Therefore, in Study 2, we presented the empirical findings that people with more discriminatory attitudes were more likely to have lower self-efficacy and worse lifestyles and less likely to recover from illnesses when they became older (Levy et al., 2000a; Levy, Slade, May, & Caracciolo, 2006; Westerhof et al., 2014); we also assessed

the robustness of the Study 1 results.

## **Method**

### **Participants**

Participants were recruited using the crowdsourcing service, CrowdWorks. Study 1 Participants were not allowed to participate in Study 2. A total of 516 Japanese individuals (337 females, 177 males, 2 no answer responses [mean age: 39.91 years, range: 18–64]) were recruited through the crowdsourcing service CrowdWorks, which has the largest number of registered users in Japan (CrowdWorks, 2021). The participants in this study aligned with the demographic composition of the registered users of CrowdWorks, enabling us to collect a wide range of participants from all regions of Japan. Attrition of participants occurred between Time 1 and 2, and between Time 2 and 3. The details related to this attrition were posted on the OSF. This study was conducted in January 2021. Each participant received ¥85 for participation.

### **Procedure**

This experiment was conducted online. Participants provided their informed consent through CrowdWorks; they then proceeded to the experiment page. During Time 1, the participants' discriminatory attitudes, youth identity, contact experience and demographics were assessed. One week later, the participants were randomly assigned to the integrated intervention, SET intervention, educational intervention, or control groups, and each intervention was implemented.

The participants of each group were told to read a text summarising the latest research findings. No time limit was imposed on the text reading activity, and the participants moved on when they fully understood the contents. The SET intervention's text was almost identical to the text used in Study 1, but to confirm the robustness of the Study 1 results, we presented participants with the empirical finding that people with more discriminatory attitudes were

more likely to have lower self-efficacy and worse lifestyles and less likely to recover from illnesses when they became older (Levy et al., 2000a; Levy et al., 2006; Westerhof et al., 2014). Similar to Study 1, the SET intervention text emphasized that discriminatory attitudes towards the elderly should be avoided, as they negatively affect the participants themselves. The educational intervention text was almost identical to the text used in Study 1, but we added a statement that corrected the misconception that elderly people are generally unhealthy; this statement was based on an explanation by Breyspraak and Badura (2015). Similar to Study 1, the educational intervention text emphasized that discriminatory attitudes towards the elderly should be avoided, as they negatively affect the elderly people around the participants. The integrated intervention text was a combination of the SET intervention (Study 2) text and the statement correcting the misconception about elderly people being generally unhealthy (educational intervention [Study 2]). Specifically, the integrated intervention text was largely the same as the text of the SET intervention (i.e. discriminatory attitudes towards the elderly should be avoided because such attitudes have negative effects on the participants themselves in the future), with the addition of a statement to correct the common misconception mentioned above. In addition, the text emphasized that discriminatory attitudes towards the elderly should be avoided, as it negatively affects the participants themselves. The control group text was identical to the text used in Study 1 and was unrelated to age discrimination. The content of text for the control group was consistent with the instruction at the beginning and consisted of the latest research findings. The length of the text used in each intervention did not vary greatly. The Appendix of this article includes the full texts used in each intervention.

Then, during Time 2, immediately after the intervention, participants' discriminatory attitudes and motives for avoiding anti-elderly discrimination were assessed. During Time 3, participants' discriminatory attitudes were assessed. We integrated participants' data from all

three times because we had requested and received the last four digits of participants' zip codes and mobile numbers during all three measurement times.

### **Measurements (Measurement Timing Shown in Parentheses)**

The demographics (Time 1), anti-elderly discriminatory attitudes (Time 1, Time 2, and Time 3) and motives for avoiding anti-elderly discrimination (Time 2) were identical to those in Study 1. Reliability coefficients of anti-elderly discriminatory attitudes were: antilocution ( $\alpha = .68$  in Time 1,  $.72$  in Time 2 and  $.79$  in Time 3), aversion/discrimination ( $\alpha = .72$  in Time 1,  $.75$  in Time 2 and  $.76$  in Time 3) and avoidance ( $\alpha = .84$  in Time 1,  $.85$  in Time 2 and  $.86$  in Time 3)<sup>5</sup>. Regarding the motives for avoiding anti-elderly discrimination, the correlation coefficient between the motives was  $r = .21, p < .001$ . Because measuring motives before each intervention would affect the intervention effects, it was avoided and they were measured only in Time 2.

The measurements used only in Study 2 were as follows. In this study, to consider the effects of (1) youth identity and (2) contact experience as individual difference factors, we decided to measure the two variables in Time 1 (before implementing the intervention).

**Youth identity (Time 1).** Youth identity was measured using the Japanese version of the Group Identification Scale (Uemura, 2001), which contained seven items was rated using a seven-point Likert scale. This scale was a modified version of Karasawa (1991) to enable its applicability to any affiliation group (Uemura, 2001). This study replaced the target group with 'youth', as in 'Would you feel good if you were described as a typical person of the youth?' Mean scores were calculated ( $\alpha = .83$ ), and higher scores indicated a stronger sense of youth identity. It should be noted that even among the relatively older participants, youth identity was not extremely low (see the OSF).

**Contact experience with the elderly (Time 1).** We asked participants, 'Do you think you have much contact with elderly people in everyday life?' Their responses were rated

using a five-point Likert scale and higher scores indicated more contact experience.

## Results

### Data Screening

Participants who made any errors regarding the item ‘Please select “slightly agree” for this item’ were considered as responding invalidly, and we therefore excluded five participants from the analysis. Regarding unanswered items, we excluded two participants from the analysis. We analysed data from 509 individuals (333 females, 176 males [mean age: 39.94 years, range: 18–64]). Details regarding the age range of the participants are presented in the OSF. The integrated intervention group had 125 participants, the SET intervention group had 134 participants, the educational intervention group had 120 participants and the control group had 130 participants<sup>6</sup>. The means, standard deviations and correlations of each variable are shown in Table 4.

### Sensitivity Analysis

A sensitivity analysis was performed with  $\alpha = .05$  and  $\beta = .80$ . The degree of discriminatory attitudes was compared among the four groups (integrated intervention, SET intervention, educational intervention and control), and it was shown that 45 participants per group were necessary to detect a medium effect size ( $f = .25$ ; Cohen, 1992). The sample size of this study was sufficient to meet this criterion.

### Changes in Discriminatory Attitudes

Table 5 and Figure 2 show the changes in discriminatory attitudes within each group. To examine each intervention’s effect, three analyses of GLMM were conducted; anti-elderly discriminatory attitudes (antilocution, aversion/discrimination and avoidance) were the dependent variables. The fixed factors of GLMM were the groups (integrated intervention, SET intervention, educational intervention and control), the timings of the measurement (Time 1, Time 2 and Time 3) and interactions between these factors. The random effects

structured by participants and participants' age, gender, youth identity and contact experience were included<sup>7</sup>. A summary of the results of the analysis in Studies 1 and 2 is presented in Table 3.

Regarding antilocution, timing of measurement as well as group  $\times$  time interaction had significant effects:  $t(1016) = 5.89, p < .001$ ;  $t(1016) = 2.24, p = .025$ , respectively; however, the main effect of group was not significant:  $t(1183) = 1.73, p = .083$ . Multiple comparisons were conducted, and participants in the integrated intervention group experienced a decrease in antilocution between Times 1 and 2, and Times 1 and 3:  $t(1010) = 6.72, p < .001$ ;  $t(1010) = 6.41, p < .001$ , respectively. Participants in the SET intervention group experienced a decrease in antilocution between Times 1 and 2, and Times 1 and 3:  $t(1010) = 3.09, p = .006$ ;  $t(1010) = 4.09, p < .001$ , respectively. Participants in the educational intervention group experienced a decrease in antilocution between Times 1 and 2, and Times 1 and 3:  $t(1010) = 7.86, p < .001$ ;  $t(1010) = 6.75, p < .001$ , respectively. During Time 2, the educational intervention group had a lower score than the SET intervention and control groups:  $t(732) = 2.83, p = .025$ ;  $t(731) = 3.41, p = .004$ , respectively. Based on these considerations, the integrated, SET and educational interventions were determined to be effective for reducing antilocution towards the elderly, and these effects lasted for at least a week after the interventions.

Regarding aversion/discrimination—group, timing of measurement and group  $\times$  time interaction did not have significant effects:  $t(945) = 0.60, p = .552$ ;  $t(1016) = 1.75, p = .081$ ;  $t(1016) = 1.38, p = .167$ , respectively. Based on these considerations, the integrated, SET and educational interventions were not effective for reducing aversion/discrimination towards the elderly.

Regarding avoidance, timing of measurement had a significant effect:  $t(1016) = 5.34, p < .001$ , and group  $\times$  time interaction had a marginally significant effect:  $t(1016) = 1.86, p$

= .064. However, group did not have a significant effect:  $t(792) = 1.53, p = .127$ . Because group  $\times$  time interaction had a marginally significant effect, we conducted multiple comparisons. Multiple comparisons showed that participants in the integrated intervention group experienced a decrease in avoidance between Times 1 and 2, and Times 1 and 3:  $t(1010) = 6.82, p < .001$ ;  $t(1010) = 5.88, p < .001$ , respectively. Participants in the SET intervention group experienced a decrease in avoidance between Times 1 and 2, and Times 1 and 3:  $t(1010) = 3.90, p < .001$ ;  $t(1010) = 4.07, p < .001$  respectively. Participants in the educational intervention group experienced a decrease in avoidance between Times 1 and 2, and Times 1 and 3:  $t(1010) = 5.13, p < .001$ ;  $t(1010) = 5.68, p < .001$ , respectively. Based on these considerations, the integrated, SET and educational interventions were determined to be effective for reducing avoidance towards the elderly, and these effects lasted at least a week after the interventions.

### **Motives for Avoiding Anti-elderly Discrimination**

To compare the motives for avoiding anti-elderly discrimination between intervention groups, two analyses of GLMM were conducted; the motives (self-interested and altruistic) were the dependent variables. The fixed factor of GLMM was the groups (integrated intervention, SET intervention, educational intervention and control). The random effects structured by participants' age, gender, youth identity and contact experience were included.

Regarding self-interested motives, the main effect of group was significant:  $t(506) = 3.60, p < .001$ . Multiple comparisons showed that the integrated intervention group had a higher score than the control group:  $t(502) = 3.27, p = .006$ . Regarding altruistic motives, the main effect of group was significant:  $t(502) = 2.13, p = .034$ . Multiple comparisons showed that the educational intervention group had a higher score than the integrated and SET intervention groups:  $t(491) = 3.32, p = .005$ ;  $t(503) = 3.86, p < .001$ , respectively. Based on these considerations, self-interested motives for avoiding anti-elderly discrimination were



strong in the integrated intervention group and altruistic motives were strong in the educational intervention group immediately after the interventions.

### **Discussion**

In Study 2, we examined the extent to which anti-elderly discriminatory attitudes changed after each of the following interventions: an integrated intervention that presented texts based on the SET intervention and included one aspect of the educational intervention; a SET intervention that presented the SET contents and related empirical findings; an educational intervention that presented accurate information about commonly misunderstood aspects of the elderly; and a control group that presented some information about completely unrelated topics. Consequently, antilocution and avoidance were reduced within the integrated, SET and educational intervention groups, and these effects sustained for about one week, respectively. Further improvements to sustain the effects of the integrated intervention will be discussed later. Regarding participants' motives for avoiding anti-elderly discrimination, participants' tendency to adopt a self-interested motive increased within the integrated intervention group, and tendency to adopt an altruistic motive increased within the educational intervention group (according to each intervention's purpose).

In the SET intervention of Study 2, we presented the empirical findings that people with more discriminatory attitudes were more likely to have lower self-efficacy and worse lifestyles and less likely to recover from illnesses when they became older (Levy et al., 2000a; Levy et al., 2006; Westerhof et al., 2014), which differed from those used in Study 1. The Study 1 results were replicated: the SET intervention reduced anti-elderly antilocution and avoidance and these effects lasted for at least a week, while aversion/discrimination could not be reduced. This suggests that the SET intervention had more robust effects regardless of the contents of specific empirical findings. However, this study did not examine what empirical findings were most effective for presentation in the SET (and in the

integrated) intervention. In the future, more effective interventions could be devised by comparing various interventions constructed based on different empirical findings from those employed in this study.

### **General Discussion**

The effects of the SET intervention and its modified version (the integrated intervention) were compared with those of the educational intervention through Studies 1 and 2. The integrated and SET interventions reduced anti-elderly discriminatory attitudes, which might be caused by appealing to participants' self-interested motives; these interventions suggest that the elderly should be viewed positively for the sake of one's own future (e.g. Dietz et al., 2005; Gifford, 2011). Since most people will eventually become 'elderly', it is easy to implement interventions appealing to individuals' self-interested motives for avoiding anti-elderly discrimination. With regard to reducing age discrimination, it would be meaningful to explore the relationship between the self-interested motive and intervention effects, which has not been sufficiently examined. The integrated and SET interventions also included the aspect of posing future threats to the participants—for example, enumerating the undesirable effects of their anti-elderly discriminatory attitudes on their own future. Anti-elderly discriminatory attitudes may have been reduced because participants' aim to reduce these threats were activated (Gibbons & Gerrard, 1991).

In this study, we examined participants' age, gender (, youth identity and contact experience in Study 2) as factors with random effects. However, some other individual difference factors could also be related to the intervention effects—specifically, the degree of fear of death. When fear of death increases, people generally tend to maintain their cultural worldview and self-esteem by acting in the best interests of the in-group and belittling the out-group (e.g. Castano, Yzerbyt, Paladino, & Sacchi, 2002; Solomon, Greenberg, & Pyszczynski, 2004). This could produce anti-elderly discrimination among other generations

(Bodner, 2009). Furthermore, due to their age and negative appearance characteristics (e.g. a crooked spine) (Langlois et al., 2000), elderly people are especially likely to be associated with death (Bodner, 2009). Thus, the intervention effects could be related to the degree of fear of death. In the future, to increase the versatility of the integrated and SET interventions, the impact of individual difference factors should be clarified.

This study had three major limitations. First, we did not conduct manipulation checks in Studies 1 and 2, thus, we cannot confirm that the text used in each intervention was conveyed to the participants as we had intended. In addition, it is possible that some of the participants did not read the text carefully and we may not have detected intervention effects adequately. Based on the above, in future studies, it will be necessary to conduct a manipulation check after the completion of each intervention to confirm whether the interventions intended by the researcher have been successfully implemented. Second, although we measured the intervention effects using an index of anti-elderly discriminatory attitudes, we did not examine whether each intervention also transformed participants' behavioural aspects including communication and helping. In a review of educational interventions for reducing age discrimination (Burnes et al., 2019), although educational interventions reduced discriminatory attitudes, these were not effective enough in changing behavioural aspects. Therefore, it is necessary to measure behavioural indicators and examine the effects of the integrated and SET interventions. Third, we could only measure the sustained effects for one week. In general, people tend to be more motivated to scrutinise and elaborate on the contents of highly self-involved topics (Petty & Cacioppo, 1986); these are more likely to lead to sustained attitude changes (Cialdini, Petty, & Cacioppo, 1981; Petty, Briñol, & Priester, 2009). Based on these findings, the integrated and SET interventions, which enabled people to recognise age discrimination as a highly self-involved topic, may reduce discriminatory attitudes more effectively in the medium to long term. We should

investigate how long these intervention effects last and what improvements can be made to sustain them for longer periods.

Although such limitations exist, this study provides a direction for future research. We discussed the mechanisms through which the SET intervention reduced anti-elderly discriminatory attitudes, including the activation of participants' self-interested motives for avoiding anti-elderly discrimination (e.g. Dietz et al., 2005; Gifford, 2011), the activation of their aim to reduce threats to themselves (e.g. Gibbons & Gerrard, 1991) and the activation of disease avoidance mechanisms (e.g. Schaller & Duncan, 2007) in Study 2's integrated intervention; however, we cannot reasonably conclude that these are indeed part of the mechanisms that produce the intervention effects. In this study, self-interested and altruistic motives for avoiding anti-elderly discrimination were measured, and there was a tendency for self-interested motives to increase in the integrated and SET intervention groups, and for altruistic motives to increase in the educational intervention group. However, in this study, because measuring motives before each intervention would affect the intervention effects, it was avoided and they were measured only in Time 2. Therefore, it is not possible to fully examine whether the increase in these motives significantly contributed to the intervention effects. We should investigate in detail whether the change in the degree of motives for avoiding anti-elderly discrimination contributed to the intervention effects. In addition, the intervention effects may also have been generated by reminding participants of the existence of healthy elderly people around them. It is thus necessary to identify the psychological processes activated by the integrated and SET interventions and the extent of their effect.

We believe that our findings will contribute to future psychological research aimed at reducing anti-elderly discrimination. Study 2's integrated intervention aimed to correct the common misconception that many older people are unhealthy (Tomabechei et al., 1994) and to weaken participants' cognitive linking of them with illness. However, the integrated

intervention did not include the statement about altruistic motives for avoiding age discrimination from the educational intervention's text (i.e. discriminatory attitudes born of such misunderstandings should be avoided because they have some undesirable impacts on the elderly people around you). Regarding Study 2, the integrated intervention group had a lower score in terms of the altruistic motive than the educational intervention group. Therefore, adding manipulations to the integrated intervention, which aims to strengthen participants' altruistic motives, could enhance the intervention effects. Specifically, presenting the undesirable effects of discriminatory attitudes both on one's own future (increasing the self-interested motive) and one's elderly acquaintances (increasing the altruistic motive) could be more effective in the long term.

Furthermore, our new interventions (the integrated and SET interventions) are easy to implement, as the SET contents and related empirical findings are presented to the participants. This suggests that these interventions could be combined with 'intergenerational exchange', which is useful for those who have elderly-related jobs. Regarding intergenerational exchange, Meshel and McGlynn (2004), for example, conducted a six-week programme for elementary/junior-high school students and found that their attitudes towards the elderly became more positive after the programme. Furthermore, people who regularly engage in positive intergenerational interactions with the elderly have less discriminatory attitudes (Knox, Gekoski, & Johnson, 1986; Schwartz & Simmons, 2001). While intergenerational exchanges generally have positive effects, short-term interactions may not produce the desired effect (Christian, Turner, Holt, Larkin, & Cotler, 2014). It may be possible to increase the effects of intergenerational exchanges along with the integrated intervention that presents age discrimination as a highly self-involved problem. Indeed, educational interventions can effectively reduce discriminatory attitudes when combined with intergenerational exchanges (Burnes et al., 2019). We should consider combining this study's

integrated intervention with intergenerational exchange. The integrated intervention in this study is in its infancy and thus subject to many modifications as described above. However, in the future, we hope to devise more effective and practical interventions by exploring and investigating our integrated intervention. We believe that such interventions are useful for those working with the elderly.

### References

- Allan, L. J., & Johnson, J. A. (2008). Undergraduate attitudes toward the elderly: The role of knowledge, contact and aging anxiety. *Educational Gerontology, 35*, 1–14.  
<https://doi.org/10.1080/03601270802299780>
- Barnhart, M., & Peñaloza, L. (2013). Who are you calling old? Negotiating old age identity in the elderly consumption ensemble. *Journal of Consumer Research, 39*, 1133–1153.  
<https://doi.org/10.1086/668536>
- Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*, 1–48.  
<https://doi.org/10.18637/jss.v067.i01>
- Berthold, A., Leicht, C., Methner, N., & Gaum, P. (2013). Seeing the world with the eyes of the outgroup—The impact of perspective taking on the prototypicality of the ingroup relative to the outgroup. *Journal of Experimental Social Psychology, 49*, 1034–1041.  
<https://doi.org/10.1016/j.jesp.2013.07.007>
- Bodner, E. (2009). On the origins of ageism among older and younger adults. *International Psychogeriatrics, 21*, 1003–1014. <https://doi.org/10.1017/S104161020999055X>
- Breytspraak, L. & Badura, L. (2015). Facts on aging quiz. Retrieved from  
<http://info.umkc.edu/aging/quiz/>
- Burnes, D., Sheppard, C., Henderson Jr, C. R., 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), 1–9.  
<https://doi.org/10.2105/AJPH.2019.305123>
- Castano, E., Yzerbyt, V., Paladino, M. P., & Sacchi, S. (2002). I belong, therefore, I exist: Ingroup identification, ingroup entitativity, and ingroup bias. *Personality and Social Psychology Bulletin, 28*, 135–143. <https://doi.org/10.1177/0146167202282001>

- Chasteen, A. L., Bhattacharyya, S., Horhota, M., Tam, R., & Hasher, L. (2005). How feelings of stereotype threat influence older adults' memory performance. *Experimental Aging Research, 31*, 235–260. <https://doi.org/10.1080/03610730590948177>
- Chasteen, A. L., Pichora-Fuller, M. K., Dupuis, K., Smith, S., & Singh, G. (2015). Do negative views of aging influence memory and auditory performance through self-perceived abilities? *Psychology and Aging, 30*, 881–893. <https://doi.org/10.1037/a0039723>
- Chino, K. (2020). Review of literature about factor of the ageism concerned. *Yamanashi Prefectural University Journal of Health Sciences, 6*, 71–80.
- Chonody, J. M. (2015). Addressing ageism in students: A systematic review of the pedagogical intervention literature. *Educational Gerontology, 41*, 859–887. <https://doi.org/10.1080/03601277.2015.1059139>
- Christian, J., Turner, R., Holt, N., Larkin, M., & Cotler, J. H. (2014). Does intergenerational contact reduce ageism: When and how contact interventions actually work? *Journal of Arts and Humanities, 3*, 1–15. <https://doi.org/10.18533/journal.v3i1.278>
- Cialdini, R. B., Petty, R. E., & Cacioppo, J. T. (1981). Attitude and attitude change. *Annual Review of Psychology, 32*, 357–404.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159. <https://doi.org/10.1037/0033-2909.112.1.155>
- Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review, 82*, 407–428. <https://doi.org/10.1037/0033-295X.82.6.407>
- CrowdWorks (2021). One of the largest crowdsourcing services, CrowdWorks, in Japan. <https://crowdworks.jp/>
- 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*, 267–285.



<https://doi.org/10.1111/j.1540-4560.2005.00405.x>

Cunningham, S. J., Turk, D. J., Macdonald, L. M., & Macrae, C. N. (2008). Yours or mine? Ownership and memory. *Consciousness and Cognition, 17*, 312–318.

<https://doi.org/10.1016/j.concog.2007.04.003>

Curtis, V., Aunger, R., & Rabie, T. (2004). Evidence that disgust evolved to protect from risk of disease. *Proceedings of the Royal Society of London. Series B: Biological Sciences, 271*, S131–S133. <https://doi.org/10.1098/rsbl.2003.0144>

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. *Annual Review of Environment and Resources, 30*, 335–372.

<https://doi.org/10.1146/annurev.energy.30.050504.144444>

Donlon, M., Ashman, O., & Levy, B. (2005). Creating a defense against television's ageism. *Journal of Social Issues, 61*, 307–319. <https://doi.org/10.1111/j.1540-4560.2005.00407.x>

Drury, L., Hutchison, P., & Abrams, D. (2016). Direct and extended intergenerational contact and young people's attitudes towards older adults. *British Journal of Social Psychology, 55*, 522–543. <https://doi.org/10.1111/bjso.12146>

Duncan, L. A., & Schaller, M. (2009). Prejudicial attitudes toward older adults may be exaggerated when people feel vulnerable to infectious disease: Evidence and implications. *Analyses of Social Issues and Public Policy, 9*, 97–115.

<https://doi.org/10.1111/j.1530-2415.2009.01188.x>

Fawsitt, F., & Setti, A. (2017). Extending the stereotype embodiment model: A targeted review. *Translational Issues in Psychological Science, 3*, 357–369.

<https://doi.org/10.1037/tps0000136>

Futaki, N., Watanabe, T., Sakurai, R., & Karasawa, K. (2016). The effects of entitativity on behavioral intentions toward an ambivalent group: From the perspective of ageism.

- Japanese Journal of Social Psychology*, 32, 81–91. <https://doi.org/10.14966/jssp.0879>
- Gibbons, F. X., & Gerrard, M. (1991). Downward comparison and coping with threat. In J. Suls & T. A. Wills (Eds.), *Social comparison: Contemporary theory and research* (pp. 317–345). Lawrence Erlbaum Associates, Inc.
- Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66, 290–302. <https://doi.org/10.1037/a0023566>
- Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, 98, 392–404. <https://doi.org/10.1037/a0017346>
- Harada, K., Sugisawa, H., Sugihara, Y., Yamada, Y., & Shibata, Y. (2004). Development of a Japanese short version of the Fraboni scale of ageism (FSA): Measuring ageism among Japanese young men living in urban area. *Japanese Journal of Gerontology*, 26, 308–319.
- Hess, T. M., Auman, C., Colcombe, S. J., & Rahhal, T. A. (2003). The impact of stereotype threat on age differences in memory performance. *Journals of Gerontology: Series B*, 58, 3–11. <https://doi.org/10.1093/geronb/58.1.P3>
- Ikeda, K. (2010). Mass media and the Internet. In K. Ikeda, M. Karasawa, E. Kudo, & Y. Muramoto (Eds.), *Social psychology: Active social animals in multi-layered constraints* (pp. 267–290). Yuhikaku. Tokyo, Japan.
- Imada, S. (2019). Disgust and its function: Based on works by Paul Rozin and his colleagues. *Emotion Studies*, 4, 39–46. [https://doi.org/10.20797/ems.4.Si\\_39](https://doi.org/10.20797/ems.4.Si_39)
- Ishii, K., & Tadooka, Y. (2015). The influence of pathogen threat on ageism in Japan: The role of living with older adults. *The Japanese Journal of Psychology*, 86, 240–248. <https://doi.org/10.4992/jjpsy.86.14020>

- Japan Ministry of Internal Affairs and Communications (2020). Population estimates.  
<https://www8.cao.go.jp/kourei/whitepaper/w-2019/gaiyou/pdf/1s1s.pdf>
- Jenull, B., Frate, N., & Mayer, C. (2018). Forever young? The desire for attractiveness and youthfulness at advanced age. *US-China Foreign Language, 16*, 487–501.  
<https://doi.org/10.17265/1539-8080/2018.09.007>
- Karasawa, M. (1991). Toward an assessment of social identity: The structure of group identification and its effects on in-group evaluations. *British Journal of Social Psychology, 30*, 293–307. <https://doi.org/10.1111/j.2044-8309.1991.tb00947.x>
- Kite, M. E., Stockdale, G. D., Whitley, B. E., & Johnson, B. T. (2005). Attitudes toward younger and older adults: An updated meta-analytic review. *Journal of Social Issues, 61*, 241–266. <https://doi.org/10.1111/j.1540-4560.2005.00404.x>
- Knox, V. J., Gekoski, W. L., & Johnson, E. A. (1986). Contact with and perceptions of the elderly. *The Gerontologist, 26*, 309–313. <https://doi.org/10.1093/geront/26.3.309>
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software, 82*, 1–26.  
<https://doi.org/10.18637/jss.v082.i13>
- Langlois, J. H., Kalakanis, L., Rubenstein, A. J., Larson, A., Hallam, M., & Smoot, M. (2000). Maxims or myths of beauty? A meta-analytic and theoretical review. *Psychological Bulletin, 126*, 390–423. <https://doi.org/10.1037//0033-2909.126.3.390>
- Lenth, R. V. (2016). Least-squares means: The R package lsmeans. *Journal of Statistical Software, 69*, 1–33. <https://doi.org/10.18637/jss.v069.i01>
- Levy, B. R. (2009). Stereotype embodiment: A psychosocial approach to aging. *Current Directions in Psychological Science, 18*, 332–336. <https://doi.org/10.1111/j.1467-8721.2009.01662.x>
- Levy, B. R. (2018). Toward reducing ageism: PEACE (positive education about aging and

- contact experiences) model. *The Gerontologist*, 58, 226–232.  
<https://doi.org/10.1093/geront/gnw116>
- Levy, B. R., Ashman, O., & Dror, I. (2000a). To be or not to be: The effects of aging stereotypes on the will to live. *OMEGA-Journal of Death and Dying*, 40, 409–420.  
<https://doi.org/10.2190/Y2GE-BVYQ-NF0E-83VR>
- Levy, B. R., Hausdorff, J. M., Hencke, R., & Wei, J. Y. (2000b). Reducing cardiovascular stress with positive self-stereotypes of aging. *Journals of Gerontology: Series B*, 55, 205–213. <https://doi.org/10.1093/geronb/55.4.P205>
- Levy, B. R., Slade, M. D., May, J., & Caracciolo, E. A. (2006). Physical recovery after acute myocardial infarction: Positive age self-stereotypes as a resource. *International Journal of Aging and Human Development*, 62, 285–301.  
<https://doi.org/10.2190/EJK1-1Q0D-LHGE-7A35>
- Lytle, A., & Levy, S. R. (2019). Reducing ageism: Education about aging and extended contact with older adults. *The Gerontologist*, 59, 580–588.  
<https://doi.org/10.1093/geront/gnx177>
- Marshall, L. (2015). Thinking differently about aging: Changing attitudes through the humanities. *The Gerontologist*, 55, 519–525. <https://doi.org/10.1093/geront/gnu069>
- Martens, A., Goldenberg, J. L., & Greenberg, J. (2005). A terror management perspective on ageism. *Journal of Social Issues*, 61, 223–239. <https://doi.org/10.1111/j.1540-4560.2005.00403.x>
- McHugh, K. E. (2003). Three faces of ageism: Society, image and place. *Ageing and Society*, 23, 165–185. <https://doi.org/10.1017/S0144686X02001113>
- McKenzie, E. L., & Brown, P. M. (2014). Nursing students' intentions to work in dementia care: Influence of age, ageism, and perceived barriers. *Educational Gerontology*, 40, 618–633. <https://doi.org/10.1080/03601277.2013.863545>

- McQueen, A., & Klein, W. M. (2006). Experimental manipulations of self-affirmation: A systematic review. *Self and Identity*, *5*, 289–354.  
<https://doi.org/10.1080/15298860600805325>
- Meshel, D. S., & McGlynn, R. P. (2004). Intergenerational contact, attitudes, and stereotypes of adolescents and other people. *Educational Gerontology*, *30*, 457–479.  
<https://doi.org/10.1080/03601270490445078>
- North, M. S., & Fiske, S. T. (2013). Act your (old) age: Prescriptive, ageist biases over succession, consumption, and identity. *Personality and Social Psychology Bulletin*, *39*, 720–734. <https://doi.org/10.1177/0146167213480043>
- Oh, S. Y., Bailenson, J., Weisz, E., & Zaki, J. (2016). Virtually old: Embodied perspective taking and the reduction of ageism under threat. *Computers in Human Behavior*, *60*, 398–410. <https://doi.org/10.1016/j.chb.2016.02.007>
- Palmore, E. B. (1988). *The facts on aging quiz: A handbook of uses and results*. Springer Publishing Co. NY.
- Pekçetin, S., Hasgül, E., Düğeroğlu, R. Y., & Arabacı, Z. (2021). The effect of extended contact with community-dwelling older adults on the ageist and helping attitudes of home care students: A single-blind randomised controlled trial. *International Journal of Older People Nursing*, e12382. <https://doi.org/10.1111/opn.12382>
- Petty, R. E., Briñol, P., & Priester, J. R. (2009). Mass media attitude change: Implications of the elaboration likelihood model of persuasion. In J. Bryant & M. B. Oliver (Eds.), *Media effects: Advances in theory and research* (pp. 125–164). New York: Routledge.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Communication and persuasion* (pp. 1–24). Springer, New York, NY.
- Pyszczynski, T., Greenberg, J., Solomon, S., Cather, C., Gat, I., & Sideris, J. (1995).

Defensive distancing from victims of serious illness: The role of delay. *Personality and Social Psychology Bulletin*, 21, 13–20.

<https://doi.org/10.1177/0146167295211003>

Rupp, D. E., Vodanovich, S. J., & Credé, M. (2005). The multidimensional nature of ageism: Construct validity and group differences. *Journal of Social Psychology*, 145, 335–362. <https://doi.org/10.3200/SOCP.145.3.335-362>

Sargent-Cox, K. A., Anstey, K. J., & Luszcz, M. A. (2012). The relationship between change in self-perceptions of aging and physical functioning in older adults. *Psychology and Aging*, 27, 750–760. <https://doi.org/10.1037/a0027578>

Schaller, M., & Duncan, L. A. (2007). The behavioral immune system: Its evolution and social psychological implications. In J. P. Forgas, M. G. Haselton, & W. von Hippel (Eds.), *Evolution and the social mind: Evolutionary psychology and social cognition* (pp. 293–307). New York: Psychology Press.

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, 21, 327–339. <https://doi.org/10.1006/jevp.2001.0227>

Schwartz, L. K., & Simmons, J. P. (2001). Contact quality and attitudes toward the elderly. *Educational Gerontology*, 27, 127–137. <https://doi.org/10.1080/03601270151075525>

Solomon, S., Greenberg, J., & Pyszczynski, T. (2004). The cultural animal: Twenty years of terror management theory and research. In J. Greenberg, S. L. Koole., & T. Pyszczynski. (Eds.), *Handbook of experimental existential psychology* (pp. 13–34). New York: The Guilford Press.

Spencer, S. J., Fein, S., & Lomore, C. D. (2001). Maintaining one's self-image vis-à-vis others: The role of self-affirmation in the social evaluation of the self. *Motivation and Emotion*, 25, 41–65. <https://doi.org/10.1023/A:1010659805978>

- Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. (pp. 261–302). Academic Press.
- Sui, J., & Humphreys, G. W. (2015). The integrative self: How self-reference integrates perception and memory. *Trends in Cognitive Sciences*, *19*, 719–728.  
<https://doi.org/10.1016/j.tics.2015.08.015>
- Tajfel, H. (1981). *Human groups and social categories: Studies in Social Psychology*. Cambridge: Cambridge University Press.
- Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*, *103*, 193–210.
- Taylor, S. E., Kemeny, M. E., Reed, G. M., Bower, J. E., & Gruenewald, T. L. (2000). Psychological resources, positive illusions, and health. *American Psychologist*, *55*, 99–109. <https://doi.org/10.1037/0003-066X.55.1.99>
- Tesser, A. (1980). Self-esteem maintenance in family dynamics. *Journal of Personality and Social Psychology*, *39*, 77–91. <https://doi.org/10.1037/0022-3514.39.1.77>
- Tesser, A., & Paulhus, D. (1983). The definition of self: Private and public self-evaluation management strategies. *Journal of Personality and Social Psychology*, *44*, 672–682.  
<https://doi.org/10.1037/0022-3514.44.4.672>
- Tomabechi, K., Mita, R., Horitsu, K., Nishimura, J., & Hirasawa, N. (1994). Fundamental study on successful old age in human society: Part 2. *Report of Research Institute of Domestic Science of Tokyo Kasei University*, *17*, 21–37.
- Uemura, Z. (2001). Ambiguity tolerance, group identification, and attitudes toward newcomer acceptance. *The Japanese Journal of Personality*, *10*, 27–34.
- United Nations. (2017). *World population prospects: The 2017 revision*. Department of Economic and Social Affairs in United Nations.

Vitman, A., Iecovich, E., & Alfasi, N. (2014). Ageism and social integration of older adults in their neighborhoods in Israel. *The Gerontologist*, *54*, 177–189.

<https://doi.org/10.1093/geront/gnt008>

Westerhof, G. J., Miche, M., Brothers, A. F., Barrett, A. E., Diehl, M., Montepare, J. M., ... & Wurm, S. (2014). The influence of subjective aging on health and longevity: A meta-analysis of longitudinal data. *Psychology and Aging*, *29*, 793–802.

<https://doi.org/10.1037/a0038016>

Wurm, S., & Benyamini, Y. (2014). Optimism buffers the detrimental effect of negative self-perceptions of ageing on physical and mental health. *Psychology and Health*, *29*, 832–848. <https://doi.org/10.1080/08870446.2014.891737>

Wurtele, S. K., & Maruyama, L. (2013). Changing students' stereotypes of older adults. *Teaching of Psychology*, *40*, 59–61. <https://doi.org/10.1177/0098628312465867>



### Footnotes

1. A confirmatory factor analysis, assuming a covariance error in consideration of the correlations between each item within the factors, showed acceptable results:  $\chi^2(46) = 90.95$ ,  $p < .001$ , RMSEA = .05, CFI = .97, AGFI = .92, AIC = 12454.69. Based on the results and the reliability coefficients described above, we concluded that there was no problem in distinguishing between the three factors in our analysis. The results of the analysis, when the three factors were not distinguished and the mean of all 14 items was used as the dependent variable, were included in the OSF.

2. The mean of participants' age was 42.02 ( $SD = 9.79$ ) in the SET intervention group, 40.33 ( $SD = 10.17$ ) in the educational intervention group and 40.45 ( $SD = 9.52$ ) in the control group. A one-factor analysis of variance was conducted, with age as the dependent variable and group (SET intervention, educational intervention and control) as the between-participant independent variable. The main effect of group was not significant:  $F(2, 357) = 1.13$ ,  $p = .325$ ; therefore, age of the participants was not considered to be biased between groups.

3. We have also conducted GLMM wherein the participants' age and gender are included as fixed effects. Consequently, except in a single case, the intervention effects do not significantly differ depending on the degree of the participants' age and gender: regarding only aversion/discrimination, the three-way interaction (group  $\times$  time  $\times$  age) was significant. The details of the results have been posted on the OSF.

4. In addition to the analyses of GLMM, three  $3 \times 3$  two-factor ANOVA were conducted; discriminatory attitudes (antilocution, aversion/discrimination and avoidance) were the dependent variables, the groups (SET intervention, educational intervention and control) were the between-participant independent variables and the timings of the measurement (Time 1, Time 2 and Time 3) were the within-participant independent variables.

A similar ANOVA was conducted for the data of Study 2, and the results were also posted on the OSF.

5. A confirmatory factor analysis, assuming a covariance error in consideration of the correlations between each item within the factors, showed acceptable results:  $\chi^2(46) = 111.13$ ,  $p < .001$ , RMSEA = .05, CFI = .97, AGFI = .93, AIC = 17471.43. Based on the results and the reliability coefficients described above, we concluded that there was no problem in distinguishing between the three factors in our analysis. The results of the analysis, when the three factors were not distinguished and the mean of all 14 items was used as the dependent variable, were included in the OSF.

6. The mean of participants' age was 40.65 ( $SD = 10.41$ ) in the integrated intervention group, 39.04 ( $SD = 9.45$ ) in the SET intervention group, 40.56 ( $SD = 9.65$ ) in the educational intervention group and 39.61 ( $SD = 9.09$ ) in the control group. A one-factor analysis of variance was conducted, with age as the dependent variable and group (integrated intervention, SET intervention, educational intervention and control) as the between-participant independent variable. The main effect of group was not significant:  $F(3, 508) = 0.82$ ,  $p = .481$ . The mean of youth identity was 3.25 ( $SD = 1.04$ ) in the integrated intervention group, 3.33 ( $SD = 0.95$ ) in the SET intervention group, 3.16 ( $SD = 0.94$ ) in the educational intervention group and 3.42 ( $SD = 0.99$ ) in the control group. A one-factor analysis of variance was conducted, with youth identity as the dependent variable and group as the between-participant independent variable. The main effect of group was not significant:  $F(3, 508) = 1.56$ ,  $p = .198$ . The mean of contact experience with the elderly was 2.84 ( $SD = 1.33$ ) in the integrated intervention group, 2.73 ( $SD = 1.26$ ) in the SET intervention group, 2.95 ( $SD = 1.26$ ) in the educational intervention group and 3.02 ( $SD = 1.34$ ) in the control group. A one-factor analysis of variance was conducted, with contact experience as the dependent variable and group as the between-participant independent variable. The main effect of group

was not significant:  $F(3, 508) = 1.22, p = .303$ . Thus, age, youth identity and contact experience were not considered to be biased between the groups.

7. We have also conducted GLMM wherein the participants' age, gender, youth identity and contact experience are included as fixed effects. Consequently, the intervention effects do not significantly differ depending on the degree of each factor. The details of the results have been posted on the OSF.

**Conflict of Interest and Ethics Statement**

We declare that we have no conflicts of interest. The study was approved by the authors' institutional ethics committee and conducted in November 2020.

## Tables

Table 1

*The means, standard deviations and correlations of each variable (Study 1)*

SET intervention group	<i>M</i>	<i>SD</i>	1	2	3	4	5
1 antilocution in Time 1	2.98	0.73	—				
2 aversion/discrimination in Time 1	2.07	0.59	.48 **	—			
3 avoidance in Time 1	2.83	0.80	.36 **	.73 **	—		
4 self-interested motive	4.00	1.02	.05	-.20 *	-.22 *	—	
5 altruistic motive	3.91	0.97	.14	-.12	-.13	.59 **	—
6 age	42.02	9.79	-.18 *	-.01	.01	.06	.14
educational intervention group	<i>M</i>	<i>SD</i>	1	2	3	4	5
1 antilocution in Time 1	3.05	0.73	—				
2 aversion/discrimination in Time 1	2.21	0.60	.42 **	—			
3 avoidance in Time 1	3.05	0.76	.40 **	.62 **	—		
4 self-interested motive	3.59	1.09	-.16	-.16	-.07	—	
5 altruistic motive	4.11	0.93	-.14	-.24 **	-.17	.37 *	—
6 age	40.33	10.17	-.23 *	-.28 **	-.13	.12	.05
control group	<i>M</i>	<i>SD</i>	1	2	3	4	5
1 antilocution in Time 1	3.13	0.76	—				
2 aversion/discrimination in Time 1	2.12	0.64	.47 **	—			
3 avoidance in Time 1	3.02	0.85	.51 **	.62 **	—		
4 self-interested motive	3.71	1.12	.10	-.06	.07	—	
5 altruistic motive	4.03	0.81	-.05	-.29 **	-.25 **	.46 **	—
6 age	40.45	9.52	.05	-.04	.03	.11	.21 *

\*  $p < .05$ , \*\*  $p < .01$ .

Table 2

*Changes in discriminatory attitudes in each group (Study 1)*

		Time 1		Time 2		Time 3	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	SET intervention	2.98	0.73	2.90	0.71	2.78	0.71
antilocution	educational intervention	3.05	0.73	2.77	0.76	2.86	0.78
	control	3.13	0.76	3.11	0.77	3.03	0.85
	SET intervention	2.07	0.59	2.04	0.58	2.03	0.61
aversion/ discrimination	educational intervention	2.21	0.60	2.13	0.57	2.20	0.57
	control	2.12	0.64	2.21	0.67	2.21	0.67
	SET intervention	2.83	0.80	2.74	0.82	2.67	0.90
avoidance	educational intervention	3.05	0.76	2.86	0.80	2.90	0.83
	control	3.02	0.85	3.03	0.84	2.99	0.88

Table 3

*A summary of the results of Studies 1 and 2*

		antilocution	aversion/discrimination	avoidance	
Study 1	group	$t(884) = 0.85$	$t(648) = 0.05$	$t(553) = 1.13$	
	timing	$t(714) = 3.04^{**}$	$t(714) = 2.21^*$	$t(714) = 4.21^{**}$	
	group $\times$ timing	$t(714) = 1.21$	$t(714) = 2.69^{**}$	$t(714) = 2.38^*$	
	random effects	participants, age, gender			
SET intervention		1 week	not effective	1 week	
educational intervention		1 week	only immediately	1 week	
		antilocution	aversion/discrimination	avoidance	
Study 2	group	$t(1183) = 1.73$	$t(945) = 0.60$	$t(792) = 1.53$	
	timing	$t(1016) = 5.89^{**}$	$t(1016) = 1.75$	$t(1016) = 5.34^{**}$	
	group $\times$ timing	$t(1016) = 2.24^*$	$t(1016) = 1.38$	$t(1016) = 1.86$	
	random effects	participants, age, gender, youth identity, contact experience			
	integrated intervention		1 week	not effective	1 week
	SET intervention		1 week	not effective	1 week
educational intervention		1 week	not effective	1 week	

*Note.* ‘1 week’ indicates that intervention effects were sustained for at least a week, ‘only immediately’ indicates that intervention effects diminished after about a week and ‘not effective’ indicates that intervention effects were not significant. \*  $p < .05$ , \*\*  $p < .01$ .

Table 4

*The means, standard deviations and correlations of each variable (Study 2)*

integrated intervention group	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1 antilocution in Time 1	3.12	0.74	—						
2 aversion/discrimination in Time 1	2.11	0.62	.42 **	—					
3 avoidance in Time 1	2.93	0.82	.40 **	.55 **	—				
4 youth identity	3.25	1.04	.11	-.02	-.07	—			
5 contact experience	2.84	1.33	-.09	-.09	-.08	.07	—		
6 self-interested motive	4.15	0.92	.00	-.06	.04	-.13	.01	—	
7 altruistic motive	3.85	1.15	-.13	-.17	-.01	-.01	.03	.07	—
8 age	40.65	10.41	-.19 *	-.14	.09	-.32 **	.13	.13	.14
SET intervention group	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1 antilocution in Time 1	3.04	0.73	—						
2 aversion/discrimination in Time 1	2.19	0.66	.55 **	—					
3 avoidance in Time 1	2.94	0.86	.48 **	.73 **	—				
4 youth identity	3.33	0.95	.23 **	.23 **	.19 *	—			
5 contact experience	2.73	1.26	-.23 **	-.20 *	-.19 *	-.02	—		
6 self-interested motive	4.05	0.90	-.15	-.31 **	-.35 **	-.07	.06	—	
7 altruistic motive	3.80	1.03	-.18 *	-.16	-.08	-.12	.00	.04	—
8 age	39.04	9.45	-.23 **	-.21 *	-.10	-.13	.27 **	.06	.11
educational intervention group	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1 antilocution in Time 1	3.00	0.82	—						
2 aversion/discrimination in Time 1	2.10	0.59	.44 **	—					
3 avoidance in Time 1	2.87	0.80	.37 **	.73 **	—				
4 youth identity	3.16	0.94	.09	-.06	-.05	—			
5 contact experience	2.95	1.26	-.12	-.16	-.18 *	.18 *	—		
6 self-interested motive	3.88	1.03	.02	-.09	-.03	.18	.19 *	—	
7 altruistic motive	4.27	0.82	-.13	-.27 **	-.15	.01	.02	.40 **	—
8 age	40.56	9.65	-.26 **	-.16	.01	-.24 **	.15	.00	.29 **
control group	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1 antilocution in Time 1	2.94	0.79	—						
2 aversion/discrimination in Time 1	2.09	0.53	.46 **	—					
3 avoidance in Time 1	2.77	0.75	.38 **	.64 **	—				
4 youth identity	3.42	0.99	.10	.27 **	.10	—			
5 contact experience	3.02	1.34	.06	-.07	-.13	.05	—		
6 self-interested motive	3.75	1.06	-.01	-.12	-.04	-.06	.04	—	
7 altruistic motive	3.98	0.88	-.05	-.20 *	-.06	-.14	.13	.51 **	—
8 age	39.61	9.09	-.09	-.20 *	-.14	-.31 **	.17	.03	.15

\*  $p < .05$ , \*\*  $p < .01$ .



Table 5

*Changes in discriminatory attitudes in each group (Study 2)*

		Time 1		Time 2		Time 3	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
antilocution	integrated intervention	3.12	0.74	2.77	0.74	2.79	0.83
	SET intervention	3.04	0.73	2.88	0.77	2.83	0.80
	educational intervention	3.00	0.82	2.59	0.72	2.64	0.85
	control	2.94	0.79	2.92	0.78	2.83	0.78
aversion/ discrimination	integrated intervention	2.11	0.62	2.02	0.57	2.08	0.59
	SET intervention	2.19	0.66	2.12	0.65	2.15	0.68
	educational intervention	2.10	0.59	1.98	0.60	2.06	0.62
	control	2.09	0.53	2.14	0.57	2.13	0.57
avoidance	integrated intervention	2.93	0.82	2.69	0.80	2.72	0.81
	SET intervention	2.94	0.86	2.80	0.83	2.80	0.88
	educational intervention	2.87	0.80	2.69	0.81	2.67	0.82
	control	2.77	0.75	2.73	0.74	2.68	0.77

**Figure legends**

Figure 1. Changes in three aspects of discriminatory attitudes in each group (Study 1)

Figure 2. Changes in three aspects of discriminatory attitudes in each group (Study 2)

## Appendix

### Text Used in Each Intervention

**SET intervention.** Everyone will eventually become an elderly person. However, we could internalise anti-elderly discriminatory attitudes throughout our lives and turn these attitudes against ourselves. In short, the stronger your current internalised discriminatory attitudes, the worse your own mental and physical health will fare when you become an elderly person. Here are some examples of this tendency. People with more discriminatory attitudes are more likely to (1) feel stressed and lonely, (2) have poorer memory and (3) have worse blood pressure and other physiological indicators when they become older. (Study 1). People with more discriminatory attitudes are more likely to have lower self-efficacy and worse lifestyles and less likely to recover from illnesses when they become older. (Study 2). Therefore, you should avoid anti-elderly discriminatory attitudes, as these will have some undesirable impacts on your own future.

**Educational intervention.** The general impression about older people is that they do not work as efficiently as younger people, that they are stuck in their own ways and that they cannot change easily. Furthermore, it is believed that that they often spend their time bored (Studies 1 and 2) and that they are unhealthy (Study 2). However, these are all misconceptions. Older workers have less turnover and absenteeism rates and also tend to have more flexible attitudes towards issues such as retirement, children's independence and illness. Furthermore, many elderly people tend to avoid boredom by volunteering or engaging in hobbies. Furthermore, many elderly people are healthy and able to lead a normal life without suffering from serious diseases (Study 2). Anti-elderly discriminatory attitudes based on various misconceptions should be avoided because these can have some undesirable impacts on the elderly people around you.

**Control group (common to both Studies 1 and 2).** Internet technology has

changed the traditional information environment, where there was once a clear division between huge senders and small receivers of information (e.g. TV and viewer, newspaper and reader and so on). In the past, people were only receptive to information in the media, but the interaction between the sender and receiver and the immediacy of communication have changed this environment dramatically. Media that allow people to demonstrate their active nature are called 'participating' media. These circumstances have produced new problems of trustworthiness and risk judgement regarding websites and information.

**Integrated intervention (only in Study 2).** Everyone will eventually become an elderly person. However, we could internalise anti-elderly discriminatory attitudes throughout our lives and turn these attitudes against ourselves. In short, the stronger your current discriminatory attitudes, the worse your own mental and physical health will fare when you become an elderly person. Here are some examples of this tendency. People with more discriminatory attitudes are more likely to have lower self-efficacy and worse lifestyles and less likely to recover from illnesses when they become older. Therefore, you should avoid anti-elderly discriminatory attitudes, as these will have some undesirable impacts on your own future. Although there is a widespread misconception that they are unhealthy, many elderly people are healthy and able to lead a normal life without suffering from serious diseases.

Figures

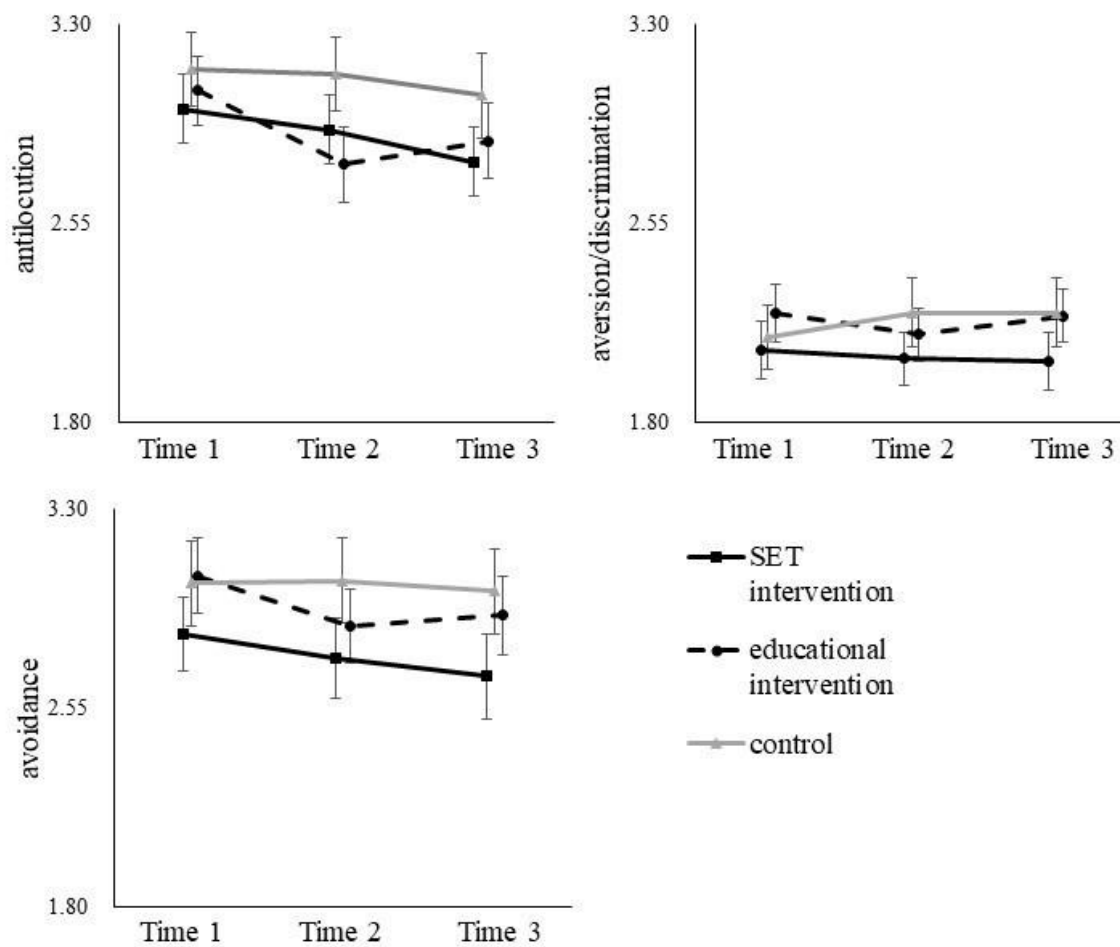


Figure 1. Changes in three aspects of discriminatory attitudes in each group (Study 1). Error bars represent the 95% confidence intervals.

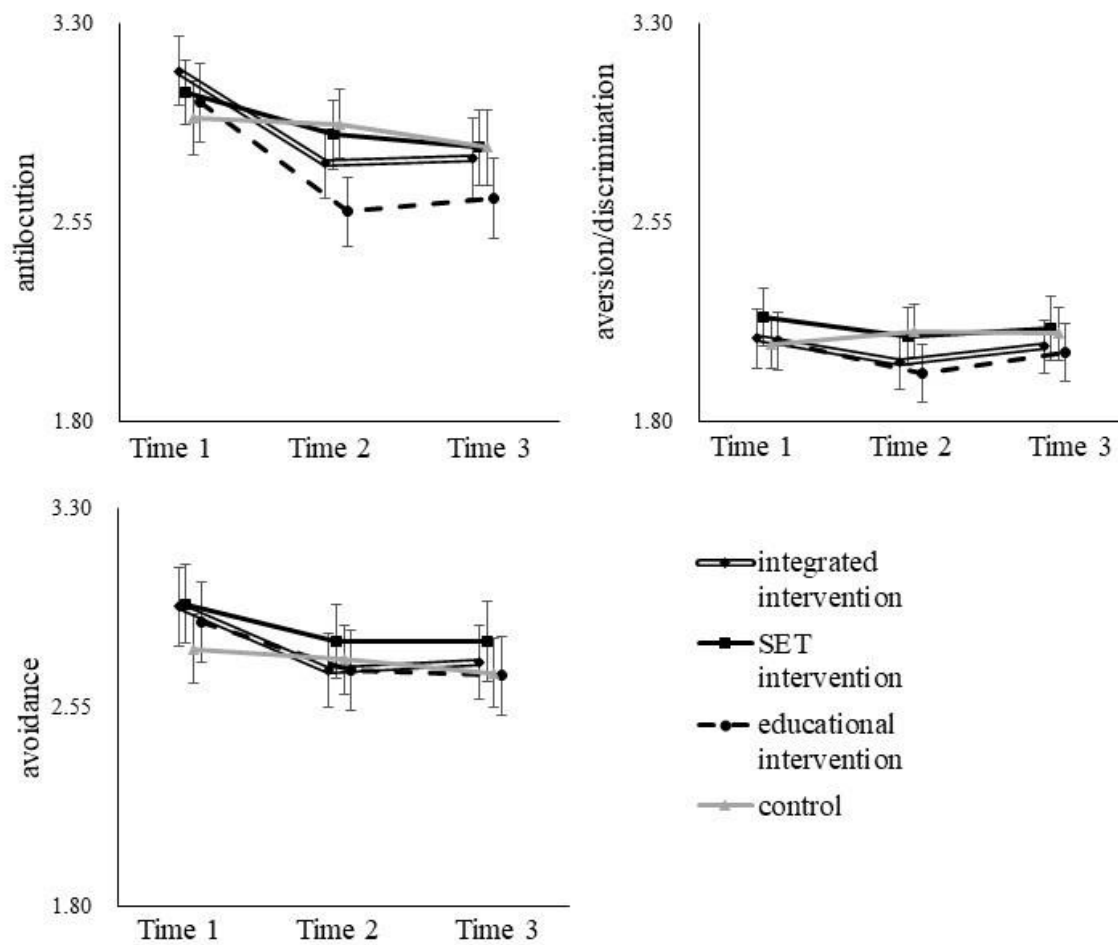


Figure 2. Changes in three aspects of discriminatory attitudes in each group (Study 2). Error bars represent the 95% confidence intervals.