To help or not: negative aging stereotypes held by younger adults could promote helping behaviors toward older adults

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Abstract

Aging stereotypes affect older adults' behaviors, however, it is unclear whether and how (negative) aging stereotypes influence younger adults' behaviors toward older adults. Two possibilities arose, such that aging stereotypes would reduce helping behaviors according to TMT and SIT; while based on the BIAS map, we would expect the opposite. The present study aimed to further compare the two possibilities by examining the effect of negative aging stereotypes on younger adults' helping behaviors, and testing which theory would fit the data better. In a cross-sectional study (Study 1), 112 Chinese younger adults ($M = 22.67$, $SD = 2.56$) were recruited. Aging stereotypes were measured by the Ambivalent Ageism Scale and the abbreviated ageism questionnaire. And their prosocial behaviors were measured by the modified third-party punishment task. The results revealed that high benevolent ageism would increase helping behaviors toward older adults. In the following experiment with aging stereotype priming (positive, neutral vs. negative) among 130 Chinese younger adults ($M = 26.82$, $SD = 3.70$), we confirmed the influence of negative aging stereotypes on prosocial behaviors measured by both third-party punishment and Social Value Orientation tasks. Study 2 further demonstrated that pity might mediate the association between negative aging stereotypes and behaviors. Our results indicated that younger adults' negative aging stereotypes could increase their prosociality toward older adults through pity in line with BIAS maps. It also had significant theoretical and practical implications for future research. For example, with more education and intergenerational contact in younger generation which could evoke pity feelings for older adults, could help to build harmonious intergenerational relations.

Keywords Aging stereotypes · Pity · Third-party punishment · Prosocial behaviors

The entire world is aging, and aging stereotypes (especially the negative ones) have been extensively studied by gerontologists. Numerous studies have found that negative aging stereotypes could influence older adults heavily on their physical, cognitive, and behavioral outcomes (see for review, Meisner, 2012). However, the influences of aging stereotypes on younger adults, for example, whether negative aging stereotypes could promote more helping behavior or more hostility toward older adults are largely unknown. Such issues also yielded practical importance nowadays, given the current circumstances that younger and older adults have more chances to interact with each other. Hence, the present

study would investigate how negative aging stereotypes could influence younger adults' helping behaviors toward older adults in the context of intergenerational interaction, from two distinct perspectives, i.e., Terror Management Theory (Greenberg et al., 1997) vs. BIAS map (Cuddy et al., 2007). Two competing hypotheses were proposed and tested on the basis of these theories in the present study to consolidate the association between negative attitudes and helping behaviors toward older adults.

Negative aging stereotypes and their consequences

Stereotypes are usually defined as a stable psychological tendency held by individuals towards a certain group. More specifically, aging stereotypes are specific beliefs held by individuals towards older adults (Eagly & Chaiken, 1993; Levy et al., 2000), and it is also suggested that there are

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more negative aging stereotypes than positive ones (e.g., Löckenhoff et al., 2009). For example, old people are usually considered weak and useless. Content analyses based on tweets implied that the life of older adults is undervalued, and younger adults made jokes about older adults during Covid-19 (Xiang et al., 2021). According to the Stereotype Content Model (Fiske et al., 2002), older adults fell into the High Warmth but Low Competence stereotype category. The consequences of negative aging stereotypes (as well as ageism) on older adults have been extensively studied by gerontologists, and it is found that negative aging stereotypes held by older adults can have a detrimental effect on the physical and psychological well-being of the individual, and even mortality (e.g., Levy, 2003; Levy et al., 2022; Moser et al., 2011; Wurm et al., 2007; Zhang et al., 2020).

However, there is still one question that remained unsolved, i.e., how negative aging stereotypes could influence younger adults, especially in the context of intergenerational interaction. Although, there have been studies reporting that negative attitudes toward aging and anxiety about death were positively correlated in younger adults, and the ageist attitudes held by younger adults are positively correlated with their risk-taking behaviors (DePaola et al., 2003; Popham et al., 2011). Fewer studies have directly investigated how younger adults' aging stereotype influences their behaviors toward older adults.

To help or not

To better understand the role of negative aging stereotypes on younger adults' behavior toward older adults, two perspectives could be utilized. On the one hand, Terror Management Theory (TMT; Greenberg et al., 1997) postulates that an individual's awareness of mortality could lead to a higher level of anxiety, which in turn can lead to an enhanced motive in self-esteem protection and worldview defense. While Social Identity Theory (SIT; Tajfel, 1981) also suggests that self-esteem protection could be achieved by ingroup favoritism and outgroup discrimination, for instance, ageism could be regarded as a form of protection of younger adults' self-esteem (Bodner, 2009). In summary, Terror Management Theory and Social Identity Theory conjointly predicted that negative aging stereotypes could lead to a lower level of prosocial behaviors in younger adults. Indeed, Bergman and Bodner (2015) revealed that younger adults' ageism was associated with reduced compassion toward incapable older adults. People with high negative aging stereotypes were more likely to keep distance from and less likely to help older adults. Other evidence also suggested that if older adults were not included in younger adults' self-group (i.e., be considered as out-group members), they would receive more hostile ageism and less helping behaviors (Chen & Zhang, 2022; Tasdemir, 2020).

Spaccatini and colleagues (Spaccatini et al., 2022) reported that during the pandemic, the younger adults' endorsement of ageist attitudes positively affected the support for selective lockdown on the older population only. Younger adults with higher level of ageist attitudes believed that it was wrong asking young people to sacrifice their social life staying at home meanwhile it would be enough to isolate the older people.

On the other hand, however, according to the Stereotype Content Model (Fiske et al., 2002) as well as its extension – the BIAS map (Behaviors from Intergroup Affect and Stereotypes map, Cuddy et al., 2007), we might predict the opposite. Older adults are perceived as warm and incompetent in terms of commonly held stereotypes. Cuddy et al. (2007) further suggested that such a stereotype could evoke the emotion of pity, which could eventually lead to increased helping behaviors towards members in such stereotyped group (i.e., older adults in our case). Supportive evidence showed that benevolent ageism was positively associated with containment behaviors, including protection for vulnerable older people, during the COVID-19 pandemic (Visintin, 2021); and feelings of pity and compassion could also facilitate prosocial behaviors toward others (Chen et al., 2022). A piece of indirect evidence, also supporting our argument, showed that males with high benevolent sexism were more likely to protect their female friends from sexual and relationship violence at a party because they believed that those women were deserving of protection and they should be the "White Knight" (Leone et al., 2020).

Measuring prosocial behaviors: the modified third-party punishment game

To better capture prosocial behaviors in the present study, a modified third-party punishment game (Fehr & Fischbacher, 2004) was used. Traditionally, prosocial behaviors could be measured by the dictator game or the second-party punishment game, both of which could be subject to social desirability, and it is suggested that compared with second-party punishment, sanctions involving the third party are more stable and effective in measuring prosociality (Bendor & Swistak, 2001; Zhou et al., 2017). Research has shown that about 60% of the third-party participants will punish the violations of social norms and follow the egalitarian distribution norm (Fehr & Fischbacher, 2004).

Besides, in the original third-party punishment game, the participant could punish the unfair proposer at the cost of his own benefit. In the modified version, the compensation component was also introduced for a more comprehensive understanding of both punishment and compensation (Hu et al., 2015; Leliveld et al., 2012) in the circumstances of social interactions.

Present study

In the present study, the core research question we would like to investigate is whether and how negative aging stereotypes could influence younger adults' (prosocial) behaviors. Based on two different theoretical frameworks, two competing hypotheses could be proposed.

Competing Hypothesis 1: negative aging stereotypes could lead to a lower level of prosociality toward older adults, from the perspective of TMT and SIT;
Competing Hypothesis 2: negative aging stereotypes could lead to increased prosocial behaviors toward older adults, according to BIAS maps.

Two experiments were designed to examine these competing hypotheses. Study 1 was a correlation study to investigate the association between self-reported (negative) aging stereotypes and their prosociality toward older adults. While for the second study, aging stereotypes were experimentally manipulated, and we are interested in testing how different manipulations could lead to differences in their prosocial behaviors toward older adults as well as the underlying mechanisms. The results of experiments and the underlying mechanisms revealed could help us consolidate the effect of negative aging stereotypes on youngers adults' prosocial behaviors toward older adults.

Study 1: associations between aging stereotypes and prosociality

In the first study, we used a modified third-party intervention task to measure participants' prosocial behaviors, while we also measured their dispositional aging stereotypes, in order to test the two competing hypotheses. It is expected that if competing hypothesis 1 stands, a negative correlation between negative aging stereotype and prosocial social behaviors toward older adults would be observed; however, if competing hypothesis 2 is correct, the opposite association between negative aging stereotype and prosociality would be expected.

Method

Participant

One hundred and twenty-nine younger adults (69.6% male, $M_{age} = 22.67$, $SD = 2.56$) were recruited via Wenjuanxing (www.wjx.cn), a Chinese professional online questionnaire survey and evaluation platform. All the participants received a random reward of 4 to 6 yuan for participation. Demographic information including age, sex, education, individual income, and health level was collected.

Materials and measurements

Third-party intervention task The task was modified from the third-party punishment paradigm (Fehr & Fischbacher, 2003). A dictator game (DG) situation was first presented to the participant who was told to be a third-party jury. In the dictator scenario, proposer A should decide how to allocate 100 tokens he shared with receiver B, and B can only choose to accept his proposal. Meanwhile, the third-party participant had 50 tokens, which could be allowed to punish A or compensate A, or the participant could choose just to do nothing and keep all 50 tokens in each trial.

Negative aging stereotypes Negative Aging Stereotypes were measured by two self-report questionnaires. Namely, the Ambivalent Ageism Scale (AAS) developed by Cary et al. (2017) and the Abbreviated Stereotype Questionnaire, adapted from Fiske and colleagues (2002, Study 3).

AAS is a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree), including 9 items measuring benevolent ageism (e.g., "Older people need to be protected from the harsh realities of society") and 4 items measuring hostile subscale (e.g., "Old people are too easily offended"). A higher score represents a higher level of negative aging stereotypes. The scale yielded good internal consistencies as indicated by Cronbach's $\alpha = 0.89$ for benevolent ageism and 0.84 for hostile ageism, respectively.

The Abbreviated Stereotype Questionnaire is a 5-point Likert Scale (1 = not at all, 5 = extremely), asking participants to rate their attitudes toward a certain group in four dimensions (Competence, Warmth, Status, and Competition) with two questions for each dimension. Here we aimed to test the attitudes toward the older adult, so we chose two trait dimensions (Competence and Warmth), and the adapted question was like "How confident are the elderly?". A higher score in warmth represents more positive attitudes toward older adults. The scale also yielded acceptable internal consistencies as indicated by significant correlations in the warmth dimension ($r = .45$, $p < .001$) and competence dimension ($r = .29$, $p = .002$).

Procedure

After getting participants' formal consent, they were first introduced to finish the modified third-party intervention task. In the present study, to better capture prosocial behaviors toward older adults, three different age combinations of proposer A and receiver B were developed,

such as young proposer A and young receiver B (baseline condition), young proposer A and old receiver B (young proposer condition), and old proposer A and young receiver B (old proposer condition). In each condition, there are 11 proposer-receiver proposal levels (i.e., 100-0, 90 − 10, 80 − 20, 70 − 30, 60 − 40, 50–50, 40–60, 30–70, 20–80, 90 − 10, 0-100), representing extremely prosocial (offering all money to receiver) to extremely selfish (keeping all money to self). Participants would play the modified third-party intervention task with different age combinations and proposer-receiver proposals (which would yield a total of 3 × 11 trials), and each age combination condition and proposer-receiver levels were presented in random order. In order to encourage the participants to consider both their own interests and social norms, they were informed that one turn would be selected randomly at the end of the experiment and the remaining tokens in this turn could be their extra bonus of the experiment. For better understanding of the task, two practice trials were presented and participants were asked to act following the instruction. Later, the subjective indifference point (SIP) was calculated as an indicator of participants' prosocial behaviors.

After the task, several self-report scales were measured, including the Ambivalent Ageism Scale (Cary et al., 2017) and the Abbreviated Stereotype Questionnaire (Fiske et al., 2002). Finally, demographics including sex, age, education level (1- primary school and below; 2- junior high; 3- senior high; 4- bachelor and above), self-reported health (from 1 = very poor to 5 = excellent) and subjective SES (from 1 = lower than 10th percentile, to 10 = above the 90th percentile) recorded. After participants accomplished all the tasks and measurements, they were thanked and compensated for their participation.

Results and discussion

Data preparation and descriptive statistics

In the present experiment, the least square approach was used to model the linear association between the distribution amount from the proposer and punishment (and compensation) made by the participant with MATLAB R2017b (Fehr & Fischbacher, 2004) in each age combination condition. To be more specific, the independent variable is the number of tokens receiver B got (which is also the number of tokens distributed by proposer A), and the dependent variable is tokens spent by the participant to compensate (and punish) the proposer A (a negative value represents punishment while a positive value represents compensation). In theory, tokens spent by the third party to punish the proposer are supposed to reach the highest level when the proposer distributes 0 tokens to the receiver, and monotonically

decrease close to 0 as the proposal seems fairer and fairer (Fehr & Fischbacher, 2004). Similarly, tokens spent to compensate the proposer would be the highest if the proposer distributed 100 tokens to the receiver. In other words, the number of tokens distributed by the proposer and the tokens spent to compensate (or punish) the proposer should be a linear (and positive) association. Three linear regression models (for each age combination condition) were conducted for each participant. And based on these regression models, two indices were also extracted, namely, the Subjective Indifference Point, which is the intersection point (of each regression line) with the horizontal axis, representing the (in)tolerance to unfair proposals; and the Strength of intervention, which is the average amount of tokens that the third-party participants are willing to use to punish (or reward) the proposer based on his proposals. See Fig. 1 for details.

Meanwhile, 3 (age conditions) x 2 (types of intervention) linear regressions were conducted. Participants were then screened on the following criteria: (1) the participants who could not fit the linear regression more than twice among those six regressions, and (2) having negative regression coefficients for slope, indicating that the participant was rewarding the receiver when punishment should be made and vice versa. Participants who met any of the criteria were removed, and a total of 17 participants were excluded with 112 participants remaining[1]. Table 1 depicted the demographic information of 112 participants.

Hypothesis testing

Subjective indifference point Repeated-measure ANOVA with age combination condition (Younger proposer – Younger receiver, Younger proposer – Older receiver, vs. Older proposer – Younger receiver) as the within-subject factor was conducted. A significant age combination main effect was found, $F(2,216) = 25.30$, $p < .001$, $\eta_p^2 = 0.19$. Post hoc tests further revealed that the SIP of the Older proposer - Younger receiver group ($M = 46.56$, $SD = 7.96$) were significantly smaller than those of the Younger proposer – Younger receiver group ($M = 50.47$, $SD = 9.76$), which is also significantly smaller than the Younger proposer – Older receiver group ($M = 52.99$, $SD = 7.47$), indicating that participants are more tolerant to unfair proposals by older adults, while harsher to unfair proposals made by younger adults, especially when the receiver is an older adult.

Then, linear regression for SIP and ageism-related variables was conducted. The dependent variables were SIPs of the younger-receiver group and older-receiver

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[1] t tests showed that there was no significant difference between remained and excluded participants on demographic variables.
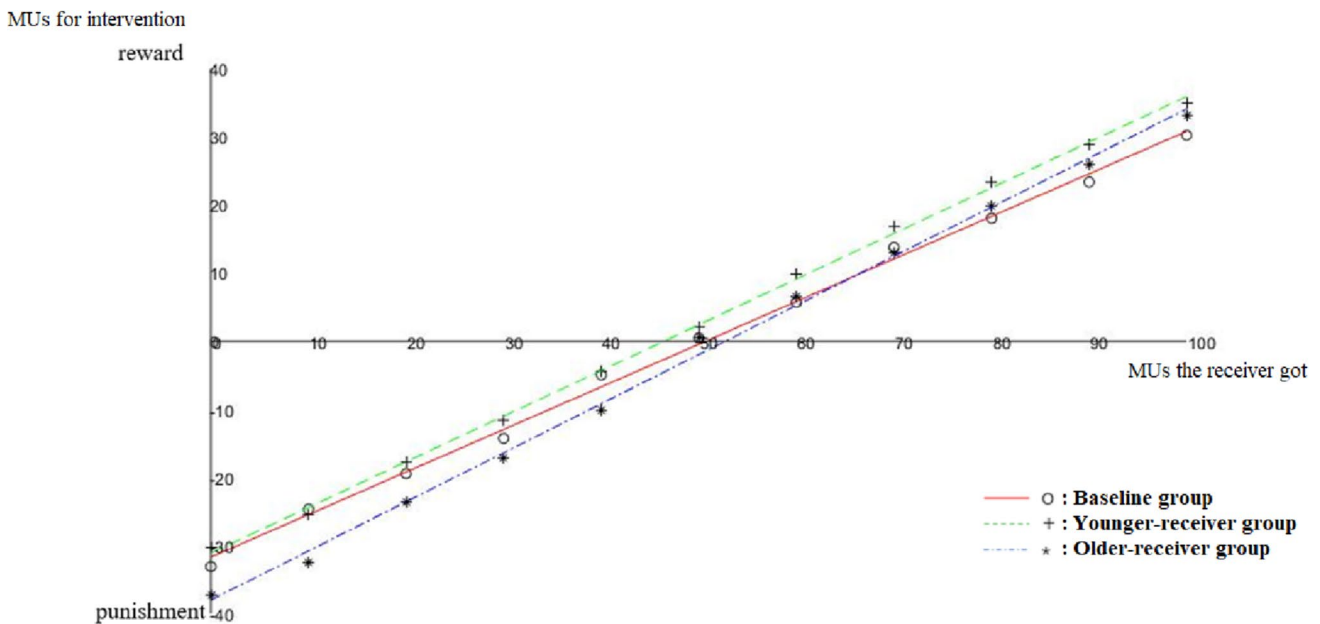
Fig. 1 Linear regressions of three age groups

Table 1 Demographic information of Study 1 and Study 2

	Study 1 (*N*=112)		Study 2 (*N*=130)	
	M	*SD*	*M*	*SD*
Age	22.67	2.56	26.82	3.70
Gender (% male)	69.6%		53.8%	
Education	3.93	0.26	5.03	0.43
Income	5.29	1.71	5.64	1.33
Health	4.10	0.74	4.38	0.53

group. Age, gender, education level, health level, family income level, and baseline SIP were controlled as covariates. Benevolent ageism and hostile ageism, as well as competence and warmth, were entered as independent variables. It was found that the SIP of the younger-receiver group can be predicted by benevolent ageism, β = -2.11, $SE = 0.89$, $p < .05$ and competence, β = 2.69, $SE = 1.01$, $p < .01$, respectively (Table 2), indicating that people would like to give a few privileges to weak older adults. However, privileges would no longer in existence when older adults were perceived as competent.

Strength of intervention A 2 (intervention: punishment and reward) × 3 (age conditions) repeated-measure ANOVA was conducted. A significant main effect of age conditions was found, $F (2, 222) = 21.81$, $p < .001$, $\eta_p^2 = 0.16$, qualified by a significant intervention x age condition interaction, $F (2, 222) = 34.11$, $p < .001$, $\eta_p^2 = 0.24$. Simple main effect analysis revealed that the punishment to the younger proposer ($M = 24.13$, $SE = 0.92$) was significantly

higher than baseline ($M = 19.40$, $SE = 0.85$) and the older proposer conditions ($M = 18.42$, $SE = 0.82$), but the latter two did not differ significantly. And the reward to the older proposer ($M = 22.72$, $SE = 1.02$) was higher than the baseline ($M = 18.17$, $SE = 0.98$), and the younger proposer conditions ($M = 19.66$, $SE = 0.96$), but no significant difference was found between the latter two.

Similar linear regressions were conducted to further test how attitudes toward older adults could affect younger participants' prosocial behaviors. The dependent variables were punishment (or reward) to the younger proposer and older proposer. Age, gender, education level, health level, family income level, and baseline punishment (or reward) were controlled as covariates. Benevolent ageism and hostile ageism as well as competence and warmth were entered as independent variables. It is found that the reward to older altruistic proposers can be positively predicted by benevolent ageism, β = 2.73, $SE = 0.82$ (please also see Table 2), suggesting that participants would like to reward the older adults especially when the old were perceived weak.

In summary, Study 1 revealed that people were lenient to older adults, even under the circumstances of them offering unfair proposals. Further, the results from multiple regression also provided support to the argument made by BIAS maps, that the tolerance (of unfair proposals from older adults) was driven by the stereotypes of low competence and help-needing. In other words, negative aging stereotypes would indeed promote more helping behaviors toward older adults.

Table 2 Subjective indifference point (SIP) and reward predicted by ageism and aging stereotype

	SIP (younger-receiver group)				Reward (younger-receiver group)			
	β	SE	β	SE	β	SE	β	SE
(Constant)	55.37	13.14	47.25	13.11	-21.28	12.29	-16.26	12.56
Age	-0.26	0.28	-0.35	0.29	0.66*	0.26	0.77**	0.27
Gender	-2.86	1.56	-3.42*	1.57	0.52	1.44	0.38	1.50
Education	-0.77	2.94	-0.66	2.96	1.19	2.69	1.77	2.79
Health	-0.37	1.01	-0.71	1.05	-0.67	0.91	-0.45	0.99
Income	-0.03	0.42	0.06	0.42	0.35	0.39	0.24	0.40
Baseline SIP/reward	0.37***	0.08	0.33***	0.06	0.79***	0.06	0.78***	0.07
Benevolent ageism	-2.11*	0.89			2.73**	0.82		
Hostile ageism	-0.71	0.77			-0.46	0.71		
Competence			2.69**	1.01			-1.57	0.98
Warmth			-1.71	1.07			1.32	1.03
ΔR^2	0.08		0.06		0.04		0.01	
F	4.56		4.28		23.78		21.14	
p	<0.001		<0.001		<0.001		<0.001	

$^{***}p < .001; {}^{**}p < .01; {}^{*}p < .05$

Study 2: manipulated incompetence leads to increased prosociality

Preliminary results from our first study revealed that indeed negative attitudes toward older adults could promote younger adults' prosocial behaviors toward older adults. However, as the first study is correlational in nature, no causal relations could be inferred. In our second study, we sought to establish the causality between attitudes toward older adults and prosocial behaviors, by manipulating the different types of aging stereotypes. Besides, we also would like to explore the underlying mechanism involved. According to the BIAS map, a stereotype of high warmth but low competence is associated with the emotion of pity, which would eventually lead to more helping behaviors toward such stereotyped groups. Hence, in the present study, we also measured perceived pity toward older adults, to see whether pity could mediate the effect of negative attitudes toward older adults, and directly associate with increased prosocial behaviors toward older adults as predicted by the BIAS map.

In the present study, in addition to the third-party intervention task used in Study 1, we also utilized another widely used task to capture prosocial behaviors, i.e., the Social Value Orientation (SVO) task (Murphy et al., 2011), to further consolidate our results.

Method

Participant

One hundred and sixty-four adults (53.8% male, $M_{age} = 26.82$, $SD = 3.70$) were recruited via Credamo (www.credamo.com), a Chinese one-stop intelligent research platform. All participants received a monetary reward of 15 to 17 Chinese Yuan for participation. Demographic information including age, sex, education, individual income, and health level was collected. Thirty-four participants were excluded because they could not pass the attention check or manipulation check set in the experiment. Demographic information of the rest 130 participants was shown in Table 1.

Materials and measurements

Prosocial behaviors Besides the third-party intervention task used in Study 1, Social Value Orientation task developed by Murphy et al. (2011) was also adopted. The original task consists of 6 trials with 9 different monetary distribution proposals in each trial, and participants are required to choose one proposal to distribute money between themselves and a partner for each trial (similar to a dictator game). Then an SVO score could be calculated and used to represent the participant's prosociality (Murphy et al., 2011). We again

modified the task to fulfill the purpose of the present study by manipulating the age of the partner, such that participants are introduced that they are about to distribute some money with a younger adult (ranging from 20 to 30) or they are about to distribute the money with an older adult (ranging from 65 to 75).

Attitudes and feelings toward older adults An 8-item self-report questionnaire adapted from (Zhang et al., 2016) was used to measure participants' attitudes toward older adults (i.e., Warmth and Competence) as well as their emotions toward older adults (Pity and Envy), with a 7-point-Likert scaling (from 1 = strongly disagree, to 7 = strongly agree). The scale also yielded acceptable internal consistencies as indicated by significant correlations in Competence ($r = .69$, $p < .001$), Warmth ($r = .84$, $p < .001$), Pity ($r = .84$, $p < .001$), and Envy ($r = .62$, $p < .001$).

Experimental design and procedures

After getting participants' informed consent, they were randomly assigned to three different aging stereotype priming conditions (i.e., positive aging stereotypes, negative aging stereotypes vs. control condition). Participants in each condition were asked to read a particular material accordingly. After reading the materials, two manipulation check questions were asked, to make sure they can understand the material correctly. For details, refer to the supplementary material.

Participants who failed at least one manipulation check question were dropped from the analysis. Then, participants were asked to provide their attitudes and feelings toward older adults. Next, participants finished the SVO task and third-party intervention task in a fixed order (the order of trials in each task was random). Finally, demographic information including age, sex, education level, self-reported health, and subjective income was also collected.

Results and discussion

Data preparation and descriptive statistics

Similar to Study 1, we processed participants' responses in the third-party intervention task using MATLAB and got their subjective indifference points and strength of intervention for each age combination condition. Following the advice from Murphy et al. (2011), participants' average SVO scores for different-aged partners were also calculated.

$$SVO = arctan\left(\frac{average\ allocation\ to\ partner}{average\ allocation\ to\ self}\right)$$

A larger SVO score represents a higher level of prosocial behavior toward that partner.

Effectiveness of manipulation

One-way ANOVAs were conducted with priming conditions (positive, negative vs. control condition) as the between-subject factor on warmth, competence, pity, and envy, respectively. Significant main effects of priming were found for warmth, $F (2, 122) = 16.62$, $p < .001$, $\eta_p^2 = 0.21$; competence, $F (2, 122) = 22.04$, $p < .001$, $\eta_p^2 = 0.27$; and pity, $F (2, 122) = 5.06$, $p < .01$, $\eta_p^2 = 0.21$; but not envy, $F (2, 122) = 1.94$, $p = .15$ $\eta_p^2 = 0.03$. Further post-hoc analyses revealed that participants in the positive priming condition indeed expressed the most positive attitudes toward older adults, while participants in the negative priming condition expressed the most negative attitudes. Moreover, participants in the negative priming condition exhibited a higher level of pity feelings toward older adults than did participants in the positive priming condition (Table S1 in supplementary material).

Hypothesis testing – attitudes toward older adults predict prosocial behaviors

According to SCM (Fiske et al., 2002), older adults are seen as warm but incompetent, hence a stereotype score was calculated by subtracting competence from warmth to capture the stereotypes of high warmth but low competence. Besides, we also calculated SVO (towards the old) minus SVO (towards the young) as SVO difference representing to what extent participants were more friendly to older adults than to the young.

Linear regression with SVO difference as the dependent variable was conducted. Age, gender, education level, health level, family income level and were controlled as covariates. Stereotype score was the independent variable. It was found that SVO difference can be predicted by stereotype score, $\beta = 3.02$, $SE = 1.33$ $p = .03$ (please refer to Table 3). Similar linear regressions with SIPs (both younger-receiver group and older-receiver group) as the dependent variables were also conducted. It was found that only the SIP of the older-receiver group can be positively predicted by stereotype score, $\beta = 1.17$, $SE = 0.51$, $p = .02$ (see Table 4). These results suggested that participants would be more altruistic and lenient if they perceived older adults as more warm-but-incompetent.

Table 3 Main and mediation models of SVO difference

	Main model			Mediation model		
	Estimates	95% CI		Estimates	95% CI	
		LL	UL		LL	UL
SVO difference ←						
Age	0.90*	0.10	1.70	0.91*	0.13	1.69
Gender	-1.88	-7.74	3.99	-1.50	-7.21	4.22
Education	1.07	-5.75	7.88	1.75	-4.91	8.41
Health	-1.64	-7.04	3.76	-2.38	-7.67	2.91
Income	1.29	-0.89	3.47	1.17	-0.95	3.30
Stereotype score	3.02*	0.38	5.65	1.95	-0.73	4.63
Pity				2.92*	0.83	5.00
Pity←						
Stereotype score				0.37*	0.15	0.59

CI = Confidence Interval. Bootstrap = 5000. CI without zero indicates significance

Table 4 Main and mediation models of subjective indifference point (SIP)

	SIP (younger-receiver group)						SIP (older-receiver group)					
	Main model			Mediation model			Main model			Mediation model		
	Estimates	95% CI		Estimates	95% CI		Estimates	95% CI		Estimates	95% CI	
		LL	UL		LL	UL		LL	UL		LL	UL
SIP←												
Age	0.04	-0.34	0.42	0.04	-0.34	0.41	0.11	−0.201	0.424	0.11	-0.19	0.42
Gender	1.54	-1.21	4.29	1.28	-1.42	3.98	0.11	-2.16	2.37	0.34	-1.88	2.56
Education	0.62	-2.58	3.82	0.40	-2.74	3.53	0.15	-2.50	2.79	0.34	-2.25	2.93
Health	1.65	-0.91	4.20	2.12	-0.41	4.65	1.51	-0.59	3.61	1.10	-0.98	3.17
Income	-0.26	-1.30	0.79	-0.14	-1.16	0.89	-0.38	-1.23	0.47	-0.48	-1.31	0.35
Baseline SIP	0.12	-0.13	0.38	0.19	-0.07	0.45	0.58*	0.37	0.78	0.52*	0.31	0.72
Stereotype score	-0.52	-1.75	0.71	-0.10	-1.35	1.15	1.17*	0.16	2.19	0.81	-0.22	1.84
Pity	-1.26*	-2.27	-0.25				1.08*	0.25	1.92			
Pity←												
Stereotype score				0.33*	0.11	0.55				0.33*	0.12	0.55

CI = Confidence Interval. Bootstrap = 5000. CI without zero indicates significance

Hypothesis testing – the mediation role of pity

Using PROCESS (v 3.4 by Andrew F. Hayes) in SPSS, the mediation effects of pity on SVO difference and SIPs were analyzed (controlling covariates, bootstrap = 5000). Starting with the main model, it was found that SVO difference increased with higher Stereotype scores (B = 3.02, 95% CI = [0.38, 5.65]), suggesting that participants holding a more negative aging stereotype (high warmth but low competence) were more friendly to older than to younger adults. In the mediation model, hypotheses regarding the mediation effect of perceived pity on the association between attitudes and prosocial behaviors toward the old were tested. Adding pity into the model attenuated the effect of stereotype on SVO, such that the stereotype score became insignificant (B = 1.95, 95% CI = [-0.73, 4.63]), but perceived pity could significantly predict both higher SVO differences (B = 2.92, 95% CI = [0.83, 5.00]), see Table 3. The results of the mediation model indicated that pity fully mediated the effect of aging stereotypes on prosocial behaviors toward older adults, making younger adults allocate more resources to older partners (vs. younger partners).

Similar mediation analyses with SIP of younger-receiver and older-receiver groups were conducted. It was found that there was no association between stereotype score and SIP of the younger-receiver group in neither the main model (B = -0.52, 95% CI = [-1.75, 0.71]), nor the mediation model (B = -0.10, 95% CI = [-1.35, 1.15]). However, in

the mediation model, it was found that a higher stereotype score positively predicted pity (B = 0.33, 95% CI = [0.11, 0.55]), and higher perceived pity predicted lower SIP (B = -1.26, 95% CI = [-2.27, -0.25]), suggesting that higher level of pity toward older adults, would make participants more tolerance to unfair proposals made by older adults. For the SIP of the older-receiver group, it was found that SIP increased with a higher stereotype score (B = 1.17, 95% CI = [0.16, 2.19]), suggesting that people who held a higher warm-but-incompetent stereotype of older adults would be less tolerant to unfair proposals made by younger adults. Furthermore, the attenuated and insignificant effect of stereotype on SIP was found (B = 0.81, 95% CI = [-0.22, 1.84]), after pity was entered as a mediator. Significant effects of pity on SIP (B = 1.08, 95% CI = [0.25, 1.92]) indicated that pity fully mediated the association between stereotype and SIP, suggesting that, people holding a more warm-but-incompetent attitude had a higher level of pity toward older adults, which would result in less tolerant to unfair offers made by younger adults.

In summary, the results revealed the mediation effect of pity on the association between aging stereotypes and helping behaviors to older adults, such that the warm-but-incompetent stereotype toward older adults would evoke feelings of pity in younger adults, which could, in turn, increase younger adults' prosociality toward older adults.

General discussion

The present study aimed to compare two competing hypotheses regarding the relationship between (negative) aging stereotypes and prosocial behaviors based on two different perspectives (Cuddy et al., 2007; Greenberg et al., 1997; Tajfel, 1981). Our results indicate that the prosocial behaviors toward older adults would increase as the negative aging stereotypes increase, which provides support to the Competing Hypothesis 2 based on the BIAS map.

In Study 1, it was found that high benevolent ageism could predict more tolerance to selfish older adults and more rewards to altruistic older adults, which is in line with the competing hypothesis 2, suggesting that people with high benevolent ageism would be more likely to help or protect the weak (i.e., older adults in the present study; see Leone et al., 2020; Visintin, 2021). In Study 2, we manipulated the participants' aging stereotypes and introduced another paradigm to mutually validate our findings. The experiments showed that as the young participants perceived the older adults as warm-but-incompetent, they would have more prosocial behaviors toward the older than toward the younger adults as indicated by SVO, besides, their standard of fairness would be stricter to younger adults and looser to old adults as indicated by SIP. These results again supported

the competing hypothesis 2 that negative aging stereotypes lead to increased prosocial behaviors toward older adults.

Moreover, the findings from study 2 further confirmed that pity could mediate the association between negative aging stereotypes and prosociality as suggested by the BIAS map (Cuddy et al., 2007). Such results are also consistent with empirical evidence that sympathy and compassion, which come with feelings of warmth, concern, and positive affect, could increase prosocial behaviors (Chen et al., 2022; Chierchia & Singer, 2017; Leiberg et al., 2011). However, they are partly contrary to existing research suggesting that ageism is associated with reduced compassion and efficacy to help incapable older adults (Bergman & Bodner, 2015). One possible explanation is that a high level of hostile ageism toward older adults indeed triggers younger adults' negative feelings and trends to keep their distance. However, the ambivalent ageism (e.g., benevolent but ageist attitudes toward older adults) caused by perceived warm-but-incompetent might lead to more helping behaviors though unwanted, according to Cary and colleagues (2017). In general, with two studies, we provided consistent support for the BIAS map, revealing general negative ageism could indeed promote prosocial behaviors in younger adults in the economic domain via the mediation of pity feelings toward older adults. Such findings also yielded important practical implications. For example, we could educate people about aging in a nonpatronizing way to evoke their pity and make them realize that the old need help. It could be helpful for building harmonious intergenerational relations and social environments. We could also encourage the younger generation to have more intergenerational interaction (Verhage et al., 2021), to build up a proper image that older adults need and deserve help.

Limitations and future directions

Several limitations should also be acknowledged before we make any conclusion. First of all, In the present study, Chinese participants were recruited, making the generalizability of the present study less clear, as there has been evidences suggesting that Eastern Asians hold more positive attitudes toward older adults than Westerners because the cultural values such as filial piety and collectivism make Eastern Asians value and respect the old more (Ackerman & Chopik, 2021; Boduroglu et al., 2006; Sung, 2001). However, on the other hand, meta-analysis and empirical studies reveal that Eastern Asians indeed exhibited more negative attitudes (Huang, 2013; North & Fiske, 2015), or similar attitudes (Zhang et al., 2016) toward older adults compared with Westerners. The evidence suggested that ageism might be domain-specific (Vauclair et al., 2017; Voss et al., 2018), and no clear pattern of cultural differences would emerge. According to Zhang

et al. (2016), personal values rather than cultural values had a significant influence on ageism attitudes. Moreover, considering the increasing aging population, changes in the social economic environment, and cultural values (e.g., the younger generation becoming more individualistic, Tan et al., 2021) in China, we believe that our findings could be generalized to other societies. Nevertheless, replication studies are indeed necessary in the future. Second, we manipulated participants' aging stereotypes in Study 2, but we did not find behavioral differences between priming conditions. It might be because attitudes are implicit and have individual differences within groups. Third, although competing hypothesis 1 was not supported in the present study, we still cannot conclude that negative aging stereotypes could solely promote prosocial behaviors rather than hostility. As there is still evidence showing that negative stereotypes reduce prosocial behaviors through outgroup discrimination (Spaccatini et al., 2022; Stepanikova et al., 2011). Potential moderators might affect the association. For example, Wlodarczyk et al. (2014) found that realistic threats would increase ingroup favoritism and decrease prosocial behaviors. However, in the present study, older adults are not perceived as threatening, so there would be no increased ingroup favoritism and decreased prosocial behaviors. Nevertheless, future studies might be needed to test the boundary conditions for such association.

In conclusion, our results indicate that younger adults' negative aging stereotypes could lead to more helping behaviors toward older adults, and pity plays an important mediation role. Such finding provides support to the BIAS map and also has practical implications for building harmonious intergenerational relations.

Declarations

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