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Implicit Social Comparison: An Effective Approach to Promote Positive Attitudes Toward Aging Among Older Adults

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ABSTRACT: Previous studies have consistently demonstrated that positive attitudes toward aging are associated with better psychological well-being and cognitive performance among older adults. Building upon these findings, the present study focused on memory improvement as a direct indicator of cognitive benefit derived from more positive self-perceptions of aging. Specifically, we examined whether an implicit social comparison manipulation could enhance older adults' memory performance by altering their attitudes toward aging. A total of 161 community-dwelling older adults (M = 66.88 years) were randomly assigned to one of five conditions: Better-self (downward comparison), Worse-self (upward comparison), Equal-good, Equal-bad, and Control. In four experimental conditions, an adopted directed-thinking task was used to activate attitudes toward one's own and peers' aging in different combinations, implicitly triggering upward or downward social comparisons. Attitude toward own aging (ATOA), attitude toward peers' aging (ATPA), self-superiority (ATOA–ATPA), and memory performance were assessed before and after the manipulation. Results showed that significant changes in self-superiority were found only under the two contrast conditions. Specifically, self-superiority increased in the Better-self group and decreased in the Worse-self group. Moreover, the Better-self group demonstrated greater memory gains than the Control and Worse-self groups. These findings suggest that implicit downward comparison can serve as an effective, non-defensive strategy to strengthen older adults' self-perceptions of aging and to produce short-term improvements in memory. The study extends prior research on social comparison in old age by linking its psychological and cognitive effects within a single experimental framework.

Keywords: Social comparison; Implicit approach; Self-superiority; Attitudes toward aging; Memory

1. Introduction

Attitudes toward aging refer to individuals' believes and evaluations of the aging process and their experiences in later life [1]. With the growing advocacy for active and healthy aging, the importance of cultivating positive attitudes toward aging has gained increasing recognition [2]. Research has demonstrated that positive attitudes toward aging play a critical role in promoting older adults' mental health, often outperforming other predictors [3,4]. A substantial body of empirical evidence indicates that positive attitudes toward aging not only reduce older adults' risk of depression and anxiety [5,6], but also enhance their well-being and life satisfaction [7].

Beyond these subjective well-being outcomes, attitudes toward aging can also impact the cognitive performance of older adults. Older adults with more positive attitudes toward aging tend to perform better in memory tasks [8]. Given that cognitive decline, particularly in terms of memory loss, is a prevalent and concerning issue in aging [9,10], enhancing positive attitudes toward aging may offer a novel approach to improving cognitive health in later life.

1.1. Social Comparison: A Potential Strategy to Promote Positive Attitudes Toward Aging

Social comparison plays a fundamental role in self-concept regulation and becomes especially critical in later adulthood [11] due to the increasing challenges that arise with aging. As individuals age, they experience a natural decline in primary control—defined as the ability to directly influence life circumstances—and thus, they must adapt to these changes through psychological strategies. These compensatory strategies, as outlined in the Motivational Theory of Life-Span Development [12], are often referred to as secondary control mechanisms. Social comparison, a common secondary control strategy, allows older adults to adjust their self-concept and emotional well-being in response to perceived losses in primary control. Specifically, social comparison involves evaluating oneself relative to others, and this process can either alleviate negative emotions or reinforce a sense of self-worth, depending on the direction of the comparison (downward *vs.* upward) [13]. According to the Motivational Theory of Life-Span Development [12], these strategies are called compensatory secondary control strivings, which help buffer the emotional and motivational effects of losing or not achieving primary control. Among various compensatory strategies, downward social comparison plays a particularly important role. Downward social comparison plays a particularly important role in enhancing emotional resilience and self-esteem in older adults. This form of comparison occurs when individuals assess their situation in relation to others who are perceived to be in worse circumstances. Research has shown that by engaging in downward social comparison, older adults can bolster their self-concept, reduce negative emotions such as anxiety and depression, and ultimately adapt more effectively to the challenges of aging. This effect is grounded in the Compensatory Control Model, which posits that older adults use social comparison to sustain a positive self-image when faced with the inevitability of physical decline [14]. Furthermore, downward comparison can be a powerful tool for mitigating the emotional distress associated with aging, as it provides a mechanism for older adults to view their own situation in a more favorable light [15,16].

Social comparison is not a unitary construct, but rather it varies critically by its direction—specifically, upward versus downward comparison. Upward comparison occurs when individuals evaluate themselves against those perceived as better off, often eliciting motivation for self-improvement but also feelings of inadequacy or threat. Downward comparison, in contrast, involves evaluating oneself against those perceived as worse off and typically produces self-enhancing or self-protective effects [12].

For older adults, these comparison directions carry particular psychological implications. Upward social comparison (e.g., comparing oneself with younger or healthier peers) has been linked to increased negative affect, higher stress, and lower subjective well-being [15]. Downward comparison, by contrast, often serves as a compensatory strategy that preserves self-esteem and reinforces adaptive self-concepts in the face of age-related losses (Ferring & Hoffmann, 2007). Yet, the benefits of downward comparison are not unconditional: when older adults strongly identify with the worse-off target (e.g., "that could be me soon"), its positive effects may diminish [16].

Substantial evidence across multiple domains supports the critical role of downward social comparison in self-concept. For instance, older adults' subjective perceptions of health are significantly associated with social comparison, even after controlling for objective health indicators such as chronic illnesses [17]. As most older individuals may unconsciously compare themselves to the stereotypical image of the "frail elderly", which is an extreme image, they can often conclude, "I am doing better than the average older person", and thereby maintain a favorable self-evaluation. Another example is that when older adults were told they had outperformed their peers on physical tasks, they not only felt younger but also showed improved grip strength [18]. Again, positive social comparison feedback (e.g., "You are stronger than younger individuals") led to younger self-perceptions, whereas negative feedback reinforced a sense of aging [19].

In sum, these findings suggest that social comparison is essential in shaping older adults' self-concept and self-evaluations. As attitudes toward aging are deeply rooted in how individuals perceive and assess the aging process they are experiencing, social comparison may be a key factor that influences the development and maintenance of attitudes toward aging in later life. Clarifying these bidirectional mechanisms is essential for understanding how social comparison contributes to aging attitudes and well-being in later life.

1.2. Effective Social Comparison Could Be Generated Via an Implicit Approach

Previous research on social comparison has mainly primed social comparison explicitly, such as directly showing comparative information or instructing people to assess themselves against others [17,19]. Although these explicit approaches may reshape individuals' self-concept, their effectiveness is often limited. This is mainly because explicit comparisons tend to trigger psychological defense mechanisms, which may block the acceptance and internalization of

positive information [20]. In contrast, implicit approaches have distinctive advantages. By avoiding deeply rooted negative beliefs and defensive reactions, implicit approaches may be a more effective way to promote individuals' self-perception and behavior patterns.

Although few studies examined the effects of implicit social comparison on psychological outcomes directly, research on aging stereotype activation may offer relevant insights, as stereotypes often serve as benchmarks for social comparison across groups. For example, the implicit activation of positive aging stereotypes significantly improved older adults' memory performance, whereas explicit priming triggered defensive responses and even impaired performance [8]. Similarly, implicit activation of positive aging stereotypes enhanced memory performance, while explicit false feedback did not [21]. Further evidence found that repeatedly and unconsciously activating positive aging stereotypes not only significantly strengthened positive age-related beliefs and self-perceptions of aging, but also improved physical functioning. Notably, these intervention effects lasted for several weeks and even surpassed the physical benefits observed in a six-month exercise program [22].

In summary, these findings indicate that activating implicit psychological mechanisms can effectively improve older adults' psychological and cognitive functioning. Therefore, we posit that implicitly activating social comparison—by guiding individuals to make comparisons with others—may produce similar effects.

2. Current Study

Although a substantial body of evidence has demonstrated that social comparison plays an important role in self-regulation during older adulthood and can influence cognitive functions, including memory performance, few studies have examined implicit social comparison and its effects on memory performance among older adults. The current study aims to validate an implicit approach to activate social comparison and examine its effect on memory performance.

We used a directed-thinking task to prime attitudes towards aging. Given that social comparison is inherently a process of evaluating oneself in relation to others, older adults in this study were specifically instructed to reflect on the advantages and disadvantages of ageing in relation to themselves and others. We hypothesized that when older adults consider both their own and others' aging, implicit social comparison would be triggered.

Five experimental conditions were created: two contrast groups where attitudes toward one's aging and toward peers' aging were activated in opposite directions (the "Better-self group" and the "Worse-self group"); two equal groups where attitudes toward both self and peers were activated in the same direction (the "equal-good group" and the "equal-bad group"); and one control group.

Since previous studies found that older adults generally hold more positive attitudes toward their own aging than toward their peers' aging [23,24], this study separated Attitude Toward Own Aging (ATOA) and Attitude Toward Peers' Aging (ATPA) [25]. A self-superiority score was calculated by subtracting ATPA from ATOA, which was used as an indicator of the change in aging attitudes resulting from implicit social comparison. Accordingly, the following hypotheses were proposed:

Hypothesis 1 (H1). *In the better-self group, implicit social comparison would enhance older adults' self-superiority, whereas in the worse-self group, self-superiority would be diminished. In the equal-good, equal-bad, and control groups, no significant change in self-superiority was expected after the manipulation.*

Given that social comparison may influence attitudes toward aging and subsequently affect memory performance, we further hypothesized that:

Hypothesis 2 (H2). *Older adults in the better-self group would have improved memory performance, while those in the worse-self group would exhibit impaired memory performance. No significant changes in memory performance would be observed among participants in the equal-good, equal-bad, or control groups following the manipulation.*

3. Materials and Methods

3.1. Participants

Participants were recruited via snowball sampling from a senior learning center and surrounding communities in Beijing. A total of 161 older adults (120 females; age range, 60–80 years; M = 66.88 years, SD = 5.24) participated in the study. To screen for cognitive impairment, we administered the 4-point Clock Drawing Test [26]. All participants scored higher than 3, indicating they had sufficient cognitive ability to complete the experimental tasks. The participants were randomly assigned to one of the five experimental groups, and their demographic information is displayed in Table 1.

Table 1. Participant Characteristics.

Group	Gender M	Gender F	Age Mean (Standard Deviation)	Education Mean (Standard Deviation)	Self-Rated Health [a] Mean (Standard Deviation)	Self-Rated Memory [a] Mean (Standard Deviation)	Clock Drawing Test [b] 3	Clock Drawing Test [b] 4
Better-self	9	23	65.34 (5.08)	13.34 (3.22)	5.09 (0.96)	4.84 (1.02)	1	31
Worse-self	6	26	67.78 (5.66)	13.09 (2.90)	4.81 (0.97)	4.25 (1.14)	2	30
Control	10	23	67.97 (4.43)	14.42 (1.56)	4.91 (0.95)	4.79 (0.82)	1	32
Equal-good	8	24	66.34 (5.47)	13.19 (2.91)	4.84 (1.19)	4.75 (1.27)	1	31
Equal-bad	8	24	66.94 (5.35)	12.56 (2.99)	4.69 (1.35)	4.16 (1.05)	0	32
Total	41	120	66.88 (5.24)	13.32 (2.81)	4.87 (1.06)	4.50 (1.15)	5	156

Notes. [a] 7-point scale. [b] The number of participants who had scored 3 or 4 in the clock drawing test.

Chi-square tests revealed no significant differences in gender ($\chi^2 = 1.29$, $df = 4$, $p = 0.86$), self-rated health ($\chi^2 = 27.34$, $df = 20$, $p = 0.13$), or performance on the clock drawing test ($\chi^2 = 2.08$, $df = 4$, $p = 0.72$) among the five groups. The ANOVA results indicated no difference in age across groups ($F(4, 156) = 1.38$, $p = 0.24$) or in years of education ($F(4, 138) = 1.96$, $p = 0.10$).

Although the chi-square test of self-rated memory revealed a significant difference among the five groups ($\chi^2 = 47.91$, $df = 24$, $p = 0.003$), the correlation between self-rated memory and memory performance at baseline was not significant ($r = -0.06$, $p = 0.46$). In general, the participants across the five groups can be considered homogeneous.

3.2. Procedure

The experiment consisted of three phases: a pretest, a manipulation phase, and a posttest. The pretest was conducted via telephone to collect basic demographic information and assess baseline scores on the Attitudes Toward One's Own Aging (ATOA) and Attitudes Toward Peers' Aging (ATPA) scales.

Three to five days later, participants visited the laboratory to complete the remaining experimental tasks. After providing informed consent, they first completed a baseline memory assessment. Participants were then randomly assigned to one of five experimental conditions. In four of the conditions, participants completed a directed-thinking task adapted from a previous study [27]. Originally, this task involved researcher-guided instructions prompting participants to reflect on and write about different aspects of the self, aiming to influence self-esteem and thought accessibility by activating specific self-concepts.

In the current study, the task was modified to create four attitude activation conditions related to aging. Participants were instructed to list the advantages or disadvantages of aging either for themselves or for other older adults within a specified time limit. The goal was to cognitively prime specific aging attitudes and implicitly trigger social comparison between the self and others. For instance, in the "Better-Self" condition, participants received the following instructions:

"Please list as many advantages of getting old as possible within three minutes, focusing only on yourself."

"Now list as many disadvantages of getting old as possible within three minutes, focusing only on your older peers."

To control for potential order effects, the presentation order of tasks in experimental conditions followed a counterbalanced ABBA design. In the control group, no directed-thinking task was implemented; instead, participants engaged in casual conversation with the experimenter.

In the posttest phase, participants' ATOA and ATPA scores were reassessed, and memory performance was re-evaluated using a parallel version of the memory test. All participants received monetary compensation of 30 RMB upon completion of the study.

3.3. Measures

3.3.1. Memory Performance

The paired-association learning test retrieved from the Chinese battery of the Clinical Memory Test was used to measure participants' memory performance [28]. The test includes two matched forms and consists of learning and testing phases. During the learning phase, 12 paired words, including six easy pairs (e.g., Sun-Moon) and six difficult pairs (e.g., Bright-Obey), were presented to the participants. Each pair appeared on a computer screen for three seconds, with a two-second interval between pairs. Participants studied the 12 pairs three times in different orders, followed by

a testing phase after each learning phase. In the testing phase, only the first word of each pair was displayed, and participants had five seconds to recall and respond with the corresponding word. Participants received 0.5 points for each correct answer in an easy pair and 1 point for each correct answer in a difficult pair, with a maximum score of 27 points. The test was carried out via the E-Prime 2.0 software package (Psychology Software Tools, http://www.pstnet.com, accessed on 25 October 2016). To avoid individual bias due to familiarity with the keyboard, all participants were required to provide oral responses, which were recorded by the experimenters.

3.3.2. Attitudes Towards Own Aging

The Attitude towards Own Aging (ATOA) scale, a subscale of the Philadelphia Geriatric Center Morale Scale [29], was utilized to assess participants' attitudes toward their own aging in this study. The Chinese version of the scale, employed for this research, underwent a rigorous back-translation process. The scale comprised five items that measured participants' self-perceptions of aging, such as "As I get older, I become useless". Previous research has demonstrated that these items show high factor loadings on a single factor [30]. Participants rated each item on a seven-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Ratings on the reversed items were reversed, and a higher total score indicated a more positive attitude towards one's own aging. In the present study, the ATOA scale exhibited good internal consistency, with a Cronbach's α of 0.68 in the pretest and 0.78 in the posttest.

3.3.3. Attitudes Towards Peers' Aging

The Attitude towards Peers' Aging (ATPA) scale was derived from the ATOA by modifying the target of perception from oneself to peers. For example, items were rephrased to reflect attitudes towards others' aging, such as "As other older people get older, they become useless". As with the ATOA scale, a higher total score on the ATPA indicated a more positive attitude towards peers' aging. In the present study, the ATPA demonstrated acceptable internal consistency, with a Cronbach's α of 0.62 in the pretest and 0.77 in the posttest.

3.4. Statistical Analysis

The data analysis of this study included three major components. First, a one-way ANOVA was conducted to examine whether participants' baseline ATOA (Attitudes Toward One's Own Aging) and ATPA (Attitudes Toward Peer Aging) scores differed significantly across the five experimental conditions (Better-self, Worse-self, Equal-good, Equal-bad, Control), in order to assess the randomization of group assignment.

Second, to evaluate the effectiveness of the manipulation, paired-sample *t*-tests were used to compare changes in ATOA and ATPA from pretest to posttest, assessing whether the intervention successfully induced the expected attitude shifts. Additionally, paired-sample *t*-tests were conducted to examine changes in self-superiority scores (computed as ATOA minus ATPA) before and after the manipulation, which served as an indicator of implicit social comparison effects.

Finally, to assess the impact of the implicit social comparison manipulation on cognitive performance, participants' memory performance on the paired-associate learning task was analyzed using a 5 (Condition: Better-self, Worse-self, Equal-good, Equal-bad, Control) × 2 (Time: Pretest, Posttest) mixed-design ANOVA. Time was treated as a within-subjects variable, and condition was treated as a between-subjects variable to examine the trajectories of memory performance change across groups. All the data were analyzed using SPSS 22.

4. Results

4.1. Manipulation Check

Demographic information is displayed in Table 1. One-way ANOVA results showed no significant differences across the five groups at baseline on either ATOA ($F(4, 145) = 0.53$, $p = 0.72$) or ATPA ($F(4, 145) = 0.14$, $p = 0.97$), confirming successful randomization in terms of initial aging attitudes.

Paired-sample *t*-tests (see Table 2) revealed the following: in the control group, no significant pre-post changes were observed in ATOA or ATPA. In the Better-Self group, ATOA scores increased significantly, and ATPA scores decreased significantly from pretest to posttest. In the Worse-self group, ATOA scores significantly decreased, while ATPA scores remained unchanged. In the Equal-good group, both ATOA and ATPA increased significantly. In the Equal-bad group, both ATOA and ATPA significantly decreased. These results indicate that the directional thought manipulation effectively induced the intended shifts in aging attitudes.
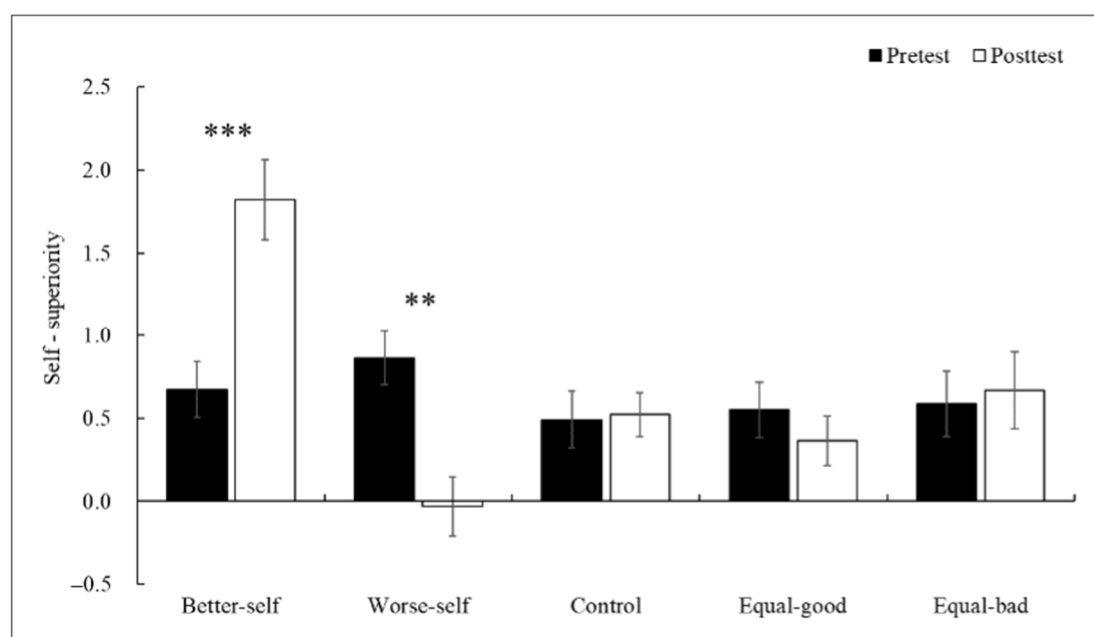
Table 2. Participants' Pretest and Posttest ATOA, ATPA and Self-Superiority.

Group	Pretest Mean (Standard Deviation)	Posttest Mean (Standard Deviation)	t	df
Better-self				
ATOA	5.64 (0.59)	6.24 (0.76)	−4.26 ***	26
ATPA	4.97 (0.86)	4.41 (1.11)	2.62 *	26
Self-superiority	0.67 (0.88)	1.82 (1.26)	−4.57 ***	26
Worse-self				
ATOA	5.76 (0.90)	5.14 (0.87)	3.62 ***	31
ATPA	4.89 (0.84)	5.18 (1.07)	−1.24	31
Self-superiority	0.86 (0.91)	−0.03 (1.01)	3.85 ***	31
Control				
ATOA	5.51 (0.70)	5.61 (0.57)	−0.76	32
ATPA	5.02 (0.71)	5.09 (0.51)	−0.46	32
Self-superiority	0.49 (0.98)	0.52 (0.76)	−0.13	32
Equal-good				
ATOA	5.55 (0.60)	6.14 (0.93)	−3.59 ***	27
ATPA	5.00 (0.74)	5.78 (0.63)	−4.32 ***	27
Self-superiority	0.55 (0.88)	0.36 (0.80)	0.84	27
Equal-bad				
ATOA	5.60 (0.83)	4.86 (1.02)	3.56 ***	28
ATPA	5.03 (0.93)	4.20 (0.94)	3.71 ***	29
Self-superiority	0.59 (1.06)	0.67 (1.24)	−0.26	28

Note. * $p < 0.05$, *** $p < 0.001$.

4.2. Indicator of the Comparison Process: Self-Superiority

As shown in Table 2 and Figure 1, changes in self-superiority aligned with Hypothesis 1: participants in the Better-self group showed a significant increase in self-superiority, while those in the Worse-self group showed a significant decrease. No significant changes in self-superiority were observed in the Equal-good, Equal-bad, or Control groups. These findings support the efficacy of the implicit social comparison manipulation in eliciting directional changes in self-evaluative judgments.

Figure 1. Participants' pretest and posttest self-superiority across groups. The error bars represent the standard errors. Only in the comparison groups (*i.e.*, better-self and worse-self) were there significant differences in self-superiority after manipulation.** $p < 0.01$. *** $p < 0.001$.

4.3. Effects of Social Comparison on Memory Performance

With respect to performance on the paired-associate learning task (see Table 3), the mixed ANOVA revealed a significant main effect of time, $F(1, 155) = 100.10$, $p < 0.001$, $\eta^2 = 0.39$, and a significant Time × Group interaction, $F(4, 155) = 5.75$, $p < 0.001$, $\eta^2 = 0.13$, but no significant main effect of group, $F(4, 155) = 0.35$, $p = 0.85$. A post hoc power analysis was conducted using G*Power 3.1 for the group × time interaction effect in the repeated-measures ANOVA. Given an observed effect size of f = 0.39 ($\eta^2 = 0.13$), $\alpha = 0.05$, and a total sample size of 161 (5 groups × 2 measurements), the achieved power was 1.00. This indicates that the sample size was sufficient to detect the observed effect with a high level of statistical power.

Follow-up simple effects analyses showed that participants in the Better-self, Equal-good, Equal-bad, and Control groups all demonstrated significant improvements in memory performance after the manipulation ($p < 0.01$). The Worse-self group exhibited a marginally significant improvement ($p = 0.06$). The improvement observed in the Control group likely reflects a practice effect.

To control for this confound, we computed the gain scores (*i.e.*, improvement in memory performance) for each group and conducted a one-way ANOVA to compare these gains across conditions (see Figure 2). Results indicated a significant effect of condition, $F(4, 156) = 5.75$, $p < 0.001$, $\eta^2 = 0.13$.

Table 3. Pretest and Posttest Paired-Association Learning Performance.

Variable	Pretest		Posttest		ANOVA			
	Mean	Standard Deviation	Mean	Standard Deviation		F Ratio	df	η^2
Better-self	9.90	3.94	14.58	4.96	G	0.35	4, 155	0.01
Worse-self	12.22	3.72	13.30	3.23	T	100.10 ***	1, 155	0.39
Control	12.18	2.46	14.32	3.81	G × T	5.75 ***	4, 155	0.13
Equal-good	11.39	4.23	14.55	4.53				
Equal-bad	12.13	3.97	13.95	4.73				

Note. ANOVA = analysis of variance; G = group; T = time. *** $p < 0.001$.
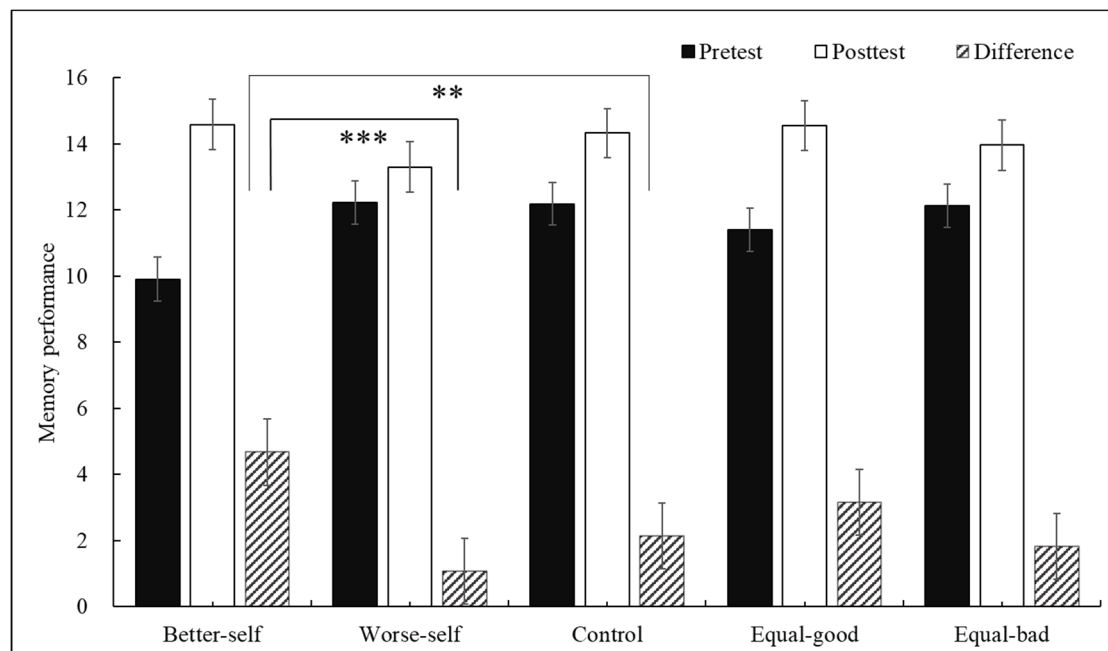
Figure 2. Participants' pretest and posttest memory performance across groups. The error bars represent the standard errors. There was an increase in memory performance in all groups. In terms of the differences after the manipulations, the only difference was that memory performance was significantly better in the better-self group than in the control group.** $p < 0.01$. *** $p < 0.001$.

Because the data violated the assumptions of homogeneity of variance and normality, Brown-Forsythe statistics were used [31]. Dunnett post hoc tests comparing each experimental group to the Control group showed no significant differences in memory gain for the Equal-good group ($p = 0.528$), Equal-bad group ($p = 0.987$), or Worse-self group ($p = 0.495$). In contrast, the Better-self group exhibited significantly greater improvement in memory performance compared to the Control group ($p = 0.008$).

Furthermore, memory gains in the Better-self group were significantly higher than those in the Worse-self group (Bonferroni-corrected $p < 0.001$), partly supporting Hypothesis 2 and demonstrating that positive implicit social comparison can effectively enhance memory performance in older adults.

5. Discussion

The current study explored the effect of implicit social comparison on self-superiority in aging attitudes and memory performance among older adults through a directed-thinking task. These findings confirm that implicit social comparison can influence attitudes toward aging and that downward comparison can lead to improved memory performance. Such effects provide new perspectives on the relationship between psychological mechanisms and cognitive outcomes in older adults. The results generally support our hypotheses, providing important empirical evidence for understanding the role of implicit social comparison in the aging process.

5.1. Reframing Aging Through the Self-Other Lens: The Efficacy of Implicit Social Comparison Approach

Our study confirmed Hypothesis 1. Results showed that under the "Better-self" condition, participants' self-superiority significantly increased, whereas under the "Worse-self" condition, self-superiority significantly decreased. In contrast, participants in the "Equal-good", "Equal-bad", and control groups showed no significant changes in self-superiority. These findings indicate that when older adults are simultaneously exposed to aging information about themselves and their peers, they spontaneously engage in implicit social comparisons, adjusting their attitudes toward aging based on perceived relative standing. The significant manipulation effect thus provides empirical support for the efficacy of the implicit social comparison approach in modifying aging attitudes.

It is well-understood that the implicit approach can elicit spontaneous social comparison via providing information about others' aging performance as a social reference. Unlike deliberate comparisons where individuals consciously select reference targets, implicit social comparison is typically triggered automatically during the processing of social information. This phenomenon has been attributed to the cognitive architecture of evaluation: the act of encoding information about the self or others activates comparison standards in memory, which then guide self-evaluation in a largely unconscious fashion [32]. Three characteristics of implicit comparison are particularly noteworthy. First, implicit comparison is automatic, in the sense that it requires minimal cognitive resources and is difficult to suppress once triggered. Individuals compare by default, and only with effort can they inhibit or override these processes [33]. Second, it is pervasive, extending beyond contexts of clear evaluative relevance. People often compare themselves to others who are irrelevant or in domains where the information has little practical value [34]. Finally, implicit comparison is embedded in daily life: it occurs in mundane interactions, casual media exposure, or everyday conversations with peers [35]. These characteristics render social comparison not an exceptional process but a ubiquitous feature of human cognition. Older adults, therefore, are continuously immersed in social environments where aging-related cues—whether from peers, family members, or media portrayals—may trigger spontaneous comparisons.

This finding not only supplements and extends prior research, which has focused mainly on explicit cognitive interventions [17,19], but also highlights the central role of social comparison in psychological adaptation during older adulthood. As individuals transition into old age, retirement, physical decline, and changes in social roles often require reconstructing self-identity. Social comparison becomes a vital strategy for older adults to maintain self-esteem and affirm self-worth [11,12]. Unlike younger adults who frequently engage in upward comparisons, older adults tend to adopt downward comparison strategies to preserve positive emotions and stabilize their self-concept.

Theoretically, our findings suggest that aging attitudes in older adults are not only shaped by cultural stereotypes or knowledge about aging but more fundamentally by individuals' perceived relative position within a social reference framework. Importantly, such social comparisons often occur implicitly and automatically, embedded in daily cognitive processing and emotional regulation among older adults. Thus, implicit social comparison serves as a crucial psychological foundation for aging attitudes and may offer a key entry point for future interventions.

5.2. Self-Superiority as an Important Mechanism for Enhancing Memory Performance

By employing multiple social comparison conditions, this study distinctly differentiated the independent effects of self-superiority on memory performance from Attitudes Toward Own Aging (ATOA), revealing self-superiority as a core psychological mechanism driving memory improvement. Specifically, both ATOA and self-superiority increased significantly in the "Better-self" group and decreased significantly in the "Worse-self" group. In contrast, while the "Equal-good" group showed a significant rise in ATOA, their self-superiority remained unchanged; the "Equal-bad"

group experienced a decline in ATOA with no change in self-superiority. Importantly, only the "Better-self" group outperformed the "Worse-self" group on memory tasks, while the "Equal-good" group did not significantly surpass either the "Worse-self" or "Equal-bad" groups in memory performance.

These results clearly indicate that memory improvements occur only when self-superiority is enhanced; a mere increase in aging attitude alone (as seen in the "Equal-good" group) does not yield cognitive benefits. This finding provides critical insight into the inconsistent efficacy of aging attitude interventions, pointing out that the key pathway through which positive aging attitudes improve cognition lies in their ability to elicit increased self-superiority rather than the attitude change per se. Additionally, this study adds new evidence for the role of social comparison in cognitive regulation.

Self-superiority may enhance memory performance through multiple interrelated psychological pathways, including affective, motivational, and cognitive mechanisms. Although direct empirical evidence linking self-superiority to these processes is limited, prior research on downward social comparison suggests strong associations with these variables. From an affective perspective, downward social comparison has been shown to elicit greater positive affect and reduce negative emotions among older adults [36]. Such positive states broaden attentional scope and cognitive flexibility, thereby facilitating memory encoding and retrieval [37]. By alleviating anxiety and fostering positive mood, self-superiority may thus free up cognitive resources for more efficient memory processing. From a motivational perspective, downward social comparison can strengthen self-efficacy, defined as the belief in one's ability to execute tasks successfully [38]. Empirical evidence indicates that memory self-efficacy is positively associated with memory performance in older adults [39]. When individuals perceive themselves as outperforming their peers, this enhanced belief in their competence may encourage greater task engagement and persistence, ultimately supporting superior memory outcomes. From a cognitive resource perspective, anxiety and negative affect are well-documented predictors of poorer memory performance, as they consume working memory capacity and disrupt processing efficiency [40]. By contrast, self-superiority derived from downward comparison may mitigate these detrimental states, thereby releasing attentional and cognitive resources essential for optimal performance. Taken together, these mechanisms suggest that the "Better-self" condition in the present study, by inducing downward social comparison, likely enhanced self-superiority and indirectly facilitated improvements in memory performance by boosting self-efficacy, reducing negative affect, and broadening cognitive processing.

Notably, although the "Worse-self" group performed significantly worse than the "Better-self" group, their memory scores did not significantly differ from the control group, indicating that Hypothesis 2 was not fully supported. This may reflect the psychological resilience characteristic of older populations. Previous studies have shown that older adults do not passively accept negative aging information but rather tend to engage in meaning reconstruction, goal adjustment, or increased effort to cope with adverse situations [41,42]. For example, older adults with high cognitive motivation may focus more on tasks when facing self-deprecating contexts to offset potential threats, thereby compensating for psychological disadvantages [43]. This may explain the absence of the expected memory decline in the "Worse-self" group. Nonetheless, the significantly better performance of the "Better-self" group further emphasizes the unique advantage and practical value of the strategy of activating self-superiority in social comparison.

5.3. Clinical and Well-Being Implications

The current results hold promising implications for clinical and community interventions aimed at promoting cognitive health in older adulthood. The finding that subtle downward comparison can enhance both self-perceptions of aging and memory performance suggests that similar implicit techniques could be incorporated into preventive or rehabilitative programs. For example, guided reflective writing, narrative therapy, or age-positive discussion sessions may help older adults reinterpret aging as a period of competence and continued growth. By reinforcing positive self-views rather than emphasizing deficits, such approaches may increase engagement and persistence in cognitive training tasks [44].

Beyond cognitive outcomes, strengthening positive attitudes toward aging can contribute to broader psychological well-being. Enhanced self-superiority and self-efficacy may protect against negative emotions and foster greater life satisfaction, autonomy, and resilience [45]. Integrating implicit comparison tasks into daily routines—such as community workshops or online interventions—may therefore serve as a low-cost and non-stigmatizing means to improve both memory and emotional adjustment in later life. This approach aligns with contemporary frameworks in geriatric psychology and positive aging which emphasize building adaptive beliefs and self-schemas rather than merely compensating for decline [46]. Future applied research should explore whether repeated exposure to such interventions produces enduring benefits for both cognitive and affective health.

5.4. Implications and Limitations

To our knowledge, this study is the first to propose and empirically validate the implicit social comparison approach's potential in improving aging attitudes and cognitive function among older adults. Nevertheless, further research is needed to replicate and extend these findings. For example, he study sample was composed entirely of community-dwelling older adults in China, and the manipulation materials and self-perception measures were designed to reflect cultural norms surrounding aging in Chinese society. In collectivist cultures such as China, older adults' self-views are often influenced by interdependent social values, filial expectations, and family-oriented self-construals. These factors may shape how individuals engage in social comparison and interpret age-related feedback. Consequently, the observed effects of implicit downward comparison and self-superiority on memory performance may not fully generalize to Western or more individualistic cultures, where autonomy and personal achievement play a more dominant role in self-perception [47]. Future cross-cultural studies are therefore needed to examine whether similar mechanisms operate across different sociocultural contexts.

This study also has limitations, as it relied on short-term experimental manipulations, and the durability of the observed memory improvements over time remains unclear. Longitudinal or repeated-intervention designs are recommended to determine the persistence and practical significance of these effects. Finally, while implicit comparison tasks can be easily adapted for applied settings, ecological validity could be enhanced by incorporating real-life social interactions and diverse participant samples.

6. Conclusions

This study is the first to propose and empirically test the effectiveness of the implicit social comparison approach in promoting positive aging attitudes and enhancing cognitive performance among older adults. The results demonstrate that when older adults implicitly perceive themselves as relatively advantaged in the aging process through social comparison, their self-superiority significantly increases, which in turn leads to improved memory performance.

Statement of the Use of Generative AI and AI-Assisted Technologies in the Writing Process

The authors used ChatGPT and Grammarly tools during the writing of this manuscript to fine-tune the grammatical structures of the introduction and conclusion. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Author Contributions

Conceptualization, D.W.; Methodology, D.W.; Investigation, L.Y.; Data Curation, L.Y.; Writing—Original Draft Preparation, Y.L.; Writing—Review & Editing, H.Z.; Resources, S.G.; Supervision, D.W.; Project Administration, D.W.

Ethics Statement

This study was conducted in accordance with the guidelines of the Helsinki Declaration and approved by the Review Committee of Beijing Normal University. The ethical approval number is BNU991608180001 and the approval date is 25 August 2016.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

All data analyzed during the current study are available from the corresponding author upon reasonable request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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