Perspective Taking in Older Age Revisited: A Motivational Perspective

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Abstract

How perspective taking ability changes with age, i.e., whether older adults are better at understanding others' behaviors and intentions, and show greater empathy to others or not, is not clear, with prior empirical findings on this phenomenon yielding mixed results. In a series of experiments, we investigated the phenomenon from a motivational perspective. Perceived closeness between participants and the experimenter (Study 1) or the target in an emotion recognition task (Study 2) was manipulated to examine whether the closeness could influence participants' performance in *faux pas* recognition (Study 1) and emotion recognition (Study 2). It was found that the well-documented negative age effect (i.e., older adults performed worse than younger adults in *faux pas* and emotion recognition tasks) was only replicated in the control condition for both tasks. When closeness was experimentally increased, older adults enhanced their performance, and they now performed at a comparable level as younger adults. Findings from the two experiments suggest that the reported poorer performance of older adults in perspective taking tasks might be attributable to a lack of motivation instead of ability to perform in laboratory settings. With the presence of strong motivation, older adults have the ability to perform equally well as younger adults.

Keywords: perspective taking, age differences, selective engagement hypothesis

Perspective Taking in Older Age Revisited: A Motivational Perspective

People are faced with numerous and complex social interactions every day. Perspective taking is needed to handle these social interactions. Happé and colleagues (Happé, Winner, & Brownell, 1998) found that older adults showed increased theory of mind ability, defined as the ability to interpret and predict others' behavior in terms of their beliefs and intentions (Baron-Cohen et al., 2000), and they attributed the findings to increased wisdom in old age. However, this was the first and only study to demonstrate that older adults had superior performance in perspective taking tasks, while later studies all revealed that older adults either performed the same or worse than younger adults in these tasks. The aim of the present study was to address these mixed findings, testing whether older adults' performance in perspective taking tasks could be improved by increasing their motivation.

Aging and Perspective Taking

Perspective taking ability, defined as the ability to interpret and predict others' behavior in terms of their beliefs and intentions, and to interact in complex social environments and relationships, is fundamental to social interactions and relationships (e.g., Davis, 1994; Ickes, 1993), as well as an important source of pro-social behaviors (e.g., Batson, Ahmad, Lishner, & Tsang, 2002). Considering the mass of studies conducted in this field, it is perhaps surprising that little is known about how such ability is developed in older age. On the one hand, "perspective-taking" requires executive selection processes. Given the age-related declines in cognition, such as information processing speed (Salthouse, 1994), explicit memory and learning (e.g., Salthouse, McGuthry, & Hambrick, 1999), working memory and executive functions (West, 1996), one might speculate that perspective taking declines with age. Indeed, Dynamic Integration Theory (DIT, Labouvie-Vief, 2003) argues that the development of cognitive-affective complexity (i.e., the complexity of an individual's cognitive representations of the self, of other people's personality and of emotions) follows a reversed U-shape, such that there is an increase from adolescence to middle age, and then a decrease in later life.

Findings from other studies also suggest that older adults might show age-related declines in perspective taking. For example, Maylor, Moulson, Muncer, and Taylor (2002), using a false-belief task, found an age-related decline in the ability to successfully answer simple theory of mind inferences, as compared to control tasks. Helson et al. (2002) examined the developmental trajectory of empathy in three longitudinal studies. Analyses of the three samples showed a significant average decrease in empathy over a period of approximately 40 years. Moreover, in a meta-analysis, Ruffman, Henry, Livingstone, and Phillips (2008) found that compared with younger adults, older adults performed worse in recognizing some basic emotions such as anger, sadness, fear, disgust, surprise, and happiness across different modalities (e.g., faces, voices, bodies/contexts, and matching of faces to voices). On the basis of the above evidence, we might conclude that perspective taking performance generally declines during adulthood.

On the other hand, in the social relationships literature, older adults report having more close social interactions and satisfied relationships compared with younger adults (e.g., Diener, Suh, Lucas, & Smith, 1999; Lang & Carstensen, 1994; Litwin, 2001). It is obvious that to develop and maintain a satisfied relationship, correctly taking other's perspective or understanding others' thoughts and feelings is of great importance (Kilpatrick, Bissonnette, & Rusbult, 2002). When partners possess full and accurate knowledge of each other, they should be more likely to react to one another's seemingly hostile actions with understanding, perhaps even compassion.

In other words, we have a paradox: the cognitive decline in “perspective taking” in older age (i.e., older adults exhibit declines in most of their cognitive abilities) seems to contradict with the socio-motivational increase in “perspective taking” in older age (e.g., older adults tend to have more social partners and satisfied relationships, both of which require accurate perspective taking). This paradox has been recognized in the literature. Marsiske and Willis (1995) pointed out that there was “an intuitive paradox between older adults’ reported difficulties with many laboratory tasks of cognition and the apparent efficacy with which they manage their everyday lives” (p. 270). In the present study, we proposed that the paradox might exist because of motivation: Older adults might perform as well as younger adults on perspective taking tasks only when they are motivated to do so.

Motivation and Perspective Taking

According to the Selective Optimization with Compensation model (SOC: Baltes & Baltes, 1990), people select life domains that are important to them, optimize the resources and aids that facilitate success in these domains, and compensate for losses in these domains. They do so in order to adapt to biological, psychological, and socio-economic changes throughout life and to create an environment for lifelong successful development. Similarly, Hess (2006) proposed the Selective Engagement Hypothesis, and argued that older adults might be more selective in their engagement of cognitive resources. For example, they would be more likely to allocate more cognitive resources into tasks that have more personal meaning or personal relevance. According to both theories, older adults might devote more resources to support functioning in domains that could help them to achieve gains and personal meaning or minimize losses. In line with both theories, we proposed that older adults might selectively put less effort in solving the “perspective taking” problems in laboratory settings. However, in everyday life, when dealing with someone whom they find more important and relevant, older adults might be more motivated, and thus tend to expend more effort in understanding this person's mind and taking this person's perspective.

Supporting this argument, in the literature on high-level cognition, it has been found that older adults are as effective as younger adults at using top-down processing in visual search (e.g., Madden, Whiting, Spaniol, & Bucur, 2005), and in completing cognitive control tasks (Harsay, Buitenweg, Wijnen, Guerreiro, & Richard, 2010). This suggests that some higher-order cognitive abilities are preserved in old age. It might be just a matter of whether older adults use them or not. Moreover, evidence from psychophysiology suggests that, despite a lower general arousal level, older adults showed the same level of autonomic nervous system activity as did younger adults, when exposed to age-relevant sad film clips (Kunzmann, & Gruhn, 2005). There is also substantial evidence that age deficits in cognitive functioning are reduced if the tasks and instructions are designed to be age-appropriate and meaningful (e.g., Fung, & Carstensen, 2003). For example, researchers have reported that negative adult age differences tend to be attenuated if participants are tested in knowledge-rich domains of everyday relevance such as practical problem solving (Marsiske & Willis, 1995), social cognition (Blanchard-Fields & Hess, 1996), memory in collaborative contexts (Dixon & Gould, 1996), life planning (Smith, 1996), wisdom (Baltes & Staudinger, 1996), and card playing (Charness & Bosman, 1990) rather than standard cognitive-experimental assessments. More recently, Spaniol, Voss, Bowen, and Grady (2011) found that motivational incentives could modulate age-related visual deficits, such that older adults did not perform differently from younger adults in a perceptual discrimination task, when the task was associated with a payoff (either negative or positive). However, when the task was not associated with a payoff, older adults performed significantly worse than did younger adults.

Findings from all these studies suggest that motivation may indeed affect older adults' performance on tasks that depend on higher-order cognitive functions. When the tasks are personally important or relevant, older adults perform as well as younger adults.

The Present Studies

In the following studies, we investigated whether older adults could actually perform at the same level as, or even better than, their younger counterparts in perspective taking tasks, when their motivation in doing so was experimentally increased. According to the SOC model (Baltes & Baltes, 1990) and the Selective Engagement Hypothesis (Hess, 2006), older adults might be more selective in performing different tasks. Another lifespan developmental theory, socioemotional selectivity theory (SST; Carstensen, 2006), suggests that older adults select tasks that can better fulfill their emotionally meaningful goals. Older adults increasingly prefer emotionally meaningful goals, such as maintaining close social relationships, spending more time with emotionally close social partners, paying more attention to relationship harmony, rather than future-oriented goals, such as making new friends, exploring the unknown world and seeking knowledge, as they grow older (e.g., Carstensen, 2006; Fung & Carstensen, 2003). Taking these perspectives together, we hypothesized that when external stimuli are presented, people will first evaluate the importance, or personal relevance of the stimuli. If they consider the stimuli as important or personally relevant, they will apply more effort in dealing with the external stimuli, and try their best in performing; otherwise, less effort will be used to solve the problem. In terms of perspective taking tasks in laboratory settings, older adults might evaluate the tasks as not important at all, since the tasks are usually knowledge-oriented in nature. Older adults might thus be less likely to expend effort in solving the tasks. Younger adults, in contrast, might perceive the tasks as important regardless of personal relevance, given their emphasis on future-oriented goals, and thus be more likely to expend effort in solving the tasks. In the following studies, we tested whether a close relationship manipulation would increase older adults' task motivation in perspective taking to a greater extent than that of younger adults, resulting in improvements in perspective taking performance. We tested our hypotheses with Hong Kong Chinese because close relationships and relationship harmony are much more valued in the Chinese culture (Cheung et al., 2001) than Western cultures. Moreover, with age, older Chinese put more emphasis on close relationships than younger Chinese, because "Hong Kong Chinese emphasizes social reciprocity and adherence to norms and traditions, so they may learn to exhibit these characteristics more often with age" (Fung & Ng, 2006, p. 813), which might make the close relationship manipulation more salient.

Pilot Study: *Faux Pas* Recognition

In the pilot study, we sought empirical support for the selective engagement hypothesis as applied to perspective taking. There is empirical evidence to suggest that older adults tend to express less anger towards close partners than toward acquaintances (Charles, & Piazza, 2007; Fung, & You, 2011), because they value close relationships. Hence, based on Charles and Piazza (2007) and Fung and You's (2011) studies, a closeness manipulation was conducted and we hypothesized that older adults would perceive their friends and relatives as more important to them than did younger adults. Given older adults' emphasis on emotionally meaningful goals (SST; Carstensen, 2006), if one of their friends or relatives, instead of an experimenter, asked them to finish a task, they would feel more motivated to do so, leading to better performance. In the present study, a *faux pas* recognition task (Gregory et al., 2002; Stone, Baron-Cohen, & Knight, 1998) was used. The task has shown to be related to the ability to use mental state knowledge, or taking other's perspective. The *faux pas* task is considered a complex and difficult test of theory of mind abilities in which an individual must recognize that someone has accidentally said something they should not have said because it was either a secret or could hurt someone's feelings.

Method

Participants

Eighteen younger adults (8 males, *Mean age* = 20.56, *Range*: 15 – 28 years old) and 26 older adults (12 males, *Mean age* = 68.38, *Range* = 60 – 83 years old) were recruited for the pilot study. They were either requested by an experimenter (control condition) or a relative/friend (relative condition) to finish a *faux pas* recognition task randomly. Participants in the control condition received either course credit or monetary reward for finishing the task, while participants in the relative condition were not paid for participation.

In the control condition, younger adults were recruited by advertisements about the experiment posted on the campus of a local university, while older adults were recruited by similar advertisements posted in a local senior center. Neither group had participated in any similar experiments before. In the relative condition, participants were recruited through student helpers, who were asked to recruit one best friend in the university and one of their older family members (preferably grandparents). The student helper him/herself also served as the experimenter in the relative condition[1]. Before conducting the experiment, they were trained with the standardized procedure of the experiment.

Materials and Procedure

After informed consent, 20 *Faux pas* Recognition Tasks (see for details, Gregory et al., 2002; Stone, Baron-Cohen, & Knight, 1998) were presented to participants. Ten of the stories contained a social faux pas where a character unintentionally said something they should not have said and the remaining 10 stories were control stories where no social faux pas was committed. Participants were given the following instructions: “Here are 20 short stories, and after each story, there will be three questions. Please write down your answers on the paper.” The order of the tasks was counterbalanced. In order to reduce working memory load (Maylor et al., 2002; Sullivan & Ruffman, 2004), we allowed participants to go back to check different stories.

Examples of the *Faux pas* recognition task:

Helen's husband was throwing a surprise party for her birthday. He invited Sarah, a friend of Helen's, and said, "Don't tell anyone, especially Helen." The day before the party, Helen was over at Sarah's and Sarah spilled some coffee on a new dress that was hanging over her chair. "Oh!" said Sarah, "I was going to wear this to your party!" "What party?" said Helen. "Come on," said Sarah, "Let's go see if we can get the stain out."

Did anyone say something they shouldn't have said or something awkward?

If yes, ask:

Who said something they shouldn't have said or something awkward?

Why shouldn't he/she have said it or why was it awkward?

Vicky was at a party at her friend Oliver’s house. She was talking to Oliver when another woman came up to them. She was one of Oliver’s neighbors. The woman said, "Hello," then turned to Vicky and said, "I don't think we've met. I’m Maria, what's your name?" "I’m Vicky." "Would anyone like something to drink?" Oliver asked.

Did anyone say something they shouldn't have said or something awkward?

If yes, ask:

Who said something they shouldn't have said or something awkward?

Why shouldn't he/she have said it or why was it awkward?

For each of the 10 stories containing a *faux pas*, such as the first example mentioned above, the participant needed to answer all the three questions correctly to get 1 point as a pass. For the remaining 10 stories that did not contain a *faux pas*, such as the second example mentioned above, 1 point was scored if the participant got it correct that no one said anything he/she shouldn't have said, 0 if the participant reported that someone said something he/she shouldn't have said.

After participants finished all stories, the experimenter verbally debriefed them.

Results and Discussion

For data analysis, an Aprime[2] index (signal detection theory; Stanislaw & Todorov, 1999) was used, as it could consider who correctly answered not only the stories that contained a faux pas (termed “hit”), but also the stories that did not include a faux pas (termed “correct rejection”). This index has been used in previous studies (MacPherson et al., 2002). A Univariate-ANOVA with age group (younger vs. older adults) and condition (control vs. relative condition) as the between subject factors on Aprime was performed to test whether motivation could enhance older adults’ performance in *faux pas* recognition. A significant age group x condition interaction was found, F (1, 42) = 11.53, $p < .01$, $\eta^2 = .22$, suggesting that younger and older adults performed differently in the two conditions. To explore this interaction, we then performed an independent-sample *t*-test in the two conditions. We found that in the control condition, younger adults ($M = .86$, $SD = .08$) outperformed older adults ($M = .79$, $SD = .09$), t (27) = 2.02, $p = .05$, while in the relative condition, younger adults and older adults did not differ in performance, t (13) = 1.76, *n.s.* (Younger: $M = .75$, $SD = .12$, and Older: $M = .85$, $SD = .08$; please refer to Figure 1). These results are consistent with the possibility that older adults in the relative condition were more motivated to perform well on the task requested by a relative/friend, leading to better performance. In conclusion, the pilot study confirmed our hypothesis in terms of its external validity, such that in everyday settings, older adults could perform the perspective taking task as well as younger adults.

Study 1: *Faux Pas* Recognition and Closeness

Study 1 examined whether motivation could influence older adults' performances in *faux pas* recognition tasks after an experimental manipulation of closeness. In the pilot study, it was found that when older adults were requested to finish the *faux pas* recognition tasks by one of their relatives or friends, they could perform the perspective taking tasks equally well as younger adults. In order to further test whether the performance of older adults was indeed caused by closeness, a closeness manipulation was introduced. It was hypothesized that older adults in the manipulated closeness as well as the relative condition would enhance their performance in the *faux pas* recognition task.

Method

Participants

Sixty-one Chinese younger participants (32 male; *Mean Age* = 20.67 years, *Range*: 18 – 29 years), and fifty-nine Chinese older participants (29 male; *Mean Age* = 67.86 years, *Range*: 60 – 83 years) residing in Hong Kong, China, took part in the study. Younger participants received course credit or were paid twenty Hong Kong dollars for their participation, and older participants were given 50 Hong Kong dollars for their participation. The difference in payment (equivalent to US$4) occurred to reimburse older participants for travelling to the university campus to take part in the study. Since we expected younger participants to outperform older participants in the control condition, the difference in payment actually went against our hypothesis. Moreover, previous studies in Hong Kong (e.g., Zhang, Ersner-Hershfield, & Fung,

2010) have revealed that the difference in payment did not affect age-related performance. Participants in the relative condition were recruited by relatives of the participants (see next section) whereas other participants were recruited through advertisements posted at a local university and community/senior centers in the same geographical district as the university.

Materials and Procedure

After informed consent, a 15-item scale about daily activities was presented to participants. They were asked to indicate how often they engaged in different activities, such as going to the cinema, watching TV, and buying clothes (see Cornelissen, Dewitte, & Warlop, 2007 for details).

Relative condition: in this condition, participants were recruited through student helpers, who were asked to recruit one sibling (of similar age) at home and one of their older family members (preferably grandparents) as in pilot study. Participants recruited were requested to finish the tasks by the student helper. The rest of the instructions were the same as in the control condition (described below), and all student helpers received some training on the standardized experiment procedure before conducting the experiment. The success rate of recruiting participants in the relative condition was almost 100%.

The rest of the participants were randomly assigned to either the control condition or the primed closeness conditions.

Control condition: in this condition, participants were presented with a standardized instruction that "you will be given 20 short stories, and after each story, you will be asked three questions. Please write down your answers on the given paper".

Primed closeness condition: in this condition, participants were told that their answers on the 15-item daily activity scale resembled the experimenter's own profile. In a prior study, it was shown that this manipulation could successfully increase closeness feelings between participants and their artificial partners (Cornelissen et al., 2007). The rest of the instructions were the same as those in the control condition.

Next, demographic information was collected, including age, sex, religion, education level, and subjective health. In addition, two questions about the perceived closeness of the participant toward the experimenter were asked as manipulation check. The first question asked participants to indicate on a 7-point-Likert-scale (Scale) of their perceived closeness toward the experimenter, with a higher score indicating that the participants perceived the experimenter to be closer to them. The second question asked participants to indicate the distance between them and the experimenter on a continuous line (Line); a shorter distance suggested that the participants perceived the experimenter to be closer to them.

Immediately after the manipulation check, the same *Faux pas* recognition task used in the pilot study was administrated, followed by some cognitive tasks, including the forward and backward digit span, and the digit symbol substitution test (Wechsler, 1981), and a verbal fluency task. In the forward and backward digit span tasks, participants listen to a series of digits and immediately repeat them in forward or backward orders. The digit symbol substitution test consists of 9 digit-symbol pairs followed by a list of random digits, and the participants are asked to write down the corresponding symbol as fast as possible under each digit. The number of correct symbols within the allowed time (i.e., 120s in the present study) is measured (Wechsler, 1981). The verbal fluency task asks participants to name as many members of the category “animal” as they could in 60 seconds (Spreen & Benton, 1977). These tasks measure basic cognitive abilities including short-term memory, working memory, as well as general cognitive functions. They serve as potential covariates. Finally, participants were orally debriefed by the experimenter about the purpose of the study.

Results and Discussion

Descriptive Statistics

Younger participants had significantly higher education levels than did older participants, F (1, 116) = 204.60, $p < .01$, $\eta^2 = .64$, while the two age groups did not differ in self-reported health, F (1, 116) =.82, *n.s.* On the cognitive tasks, younger participants performed significantly better in the forward digit span task, (1, 116) = 33.77, $p < .01$, $\eta^2 = .23$, the backward digit span task, (1, 116) = 100.18, $p < .01$, $\eta^2 = .46$, the digit symbol substitution test, (1, 116) = 347.34, $p < .01$, $\eta^2 = .75$, and the verbal fluency task (1, 116) = 49.28, $p < .01$, $\eta^2 = .30$, than did older participants (see Table 1 for descriptive statistics of these measures). Participants in different conditions did not differ in terms of the variables mentioned above. Statistically controlling for education level, forward and backward digit span scores, digit symbol substitution score and verbal fluency score in the analyses did not affect the results described below.

Manipulation Check

A Multivariate ANOVA with condition (control, relative, vs. primed closeness) as the between-subject factor was conducted on the two manipulation questions about perceived closeness. A significant condition main effect was found, *Wilk's Λ* = .76, F (4, 232) = 13.91, $p < .01$, $\eta^2 = .19$, suggesting that the manipulation successfully increased the perceived closeness between participants and experimenter. The post-hoc analysis revealed that participants in the relative (Scale: M = 5.58, SD = 1.20; Line: M = 46.45, SD = 32.87) and primed closeness (Scale: M = 4.50, SD = 1.11; Line: M = 54.38, SD =27.40) conditions perceived the experimenter as closer to them than did participants in the control condition (Scale: M = 3.53, SD = 1.36; Line: M

= 85.63, *SD* = 29.28), while the two conditions did not differ in perceived closeness, suggesting a successful experimental manipulation. In addition, the manipulation seemed to be equally effective for younger and older adults, as indicated by effect size, *Wilk's Λ* = .53, *F* (4, 114) = 10.68, *p* < .01, η^2 = .27, and *Wilk's Λ* = .70, *F* (4, 112) = 5.44, *p* < .01, η^2 = .17, respectively, both indicating a large effect size (Cohen, 1988).

How Motivation Influenced *Faux Pas* Recognition across Age Groups

Five outliers' (four younger adults and one older adult)[3] Aprime scores were excluded from the following analysis. A Univariate ANOVA with Age group (younger vs. older adults) and Condition (control vs. relative vs. primed closeness condition) as between-subject factors on Aprime was conducted. A significant age group x condition interaction was found, *F* (2, 109) = 14.28, *p* < .01, η^2 = .21, suggesting that younger and older adults performed differently in different conditions. To further explore the interaction effect, a Univariate ANOVA on Aprime with Condition as the between-subject factor was conducted for each age group. A significant condition main effect was found for older adults only, *F* (2, 55) = 19.84, *p* < .01, η^2 = .42, but not for younger adults, *F* (2, 54) = 1.94, *p* = .15 (Control: *M* = .86, *SD* = .08, Relative: *M* = .81, *SD* = .09, and Closeness: *M* = .83, *SD* = .07). A post-hoc analysis for older adults indicated that older adults in the relative (*M* = .85, *SD* = .07) and primed closeness conditions (*M* = .88, *SD* = .05) performed significantly better than did older adults in the control condition (*M* = .75, *SD* = .08). Furthermore, independent sample t-tests were also conducted to test age differences in Aprime in different conditions. Younger adults outperformed older adults in the control condition, *t*(37) = 4.38, *p* < .01. However, older adults did not perform differently from younger adults in the relative condition, *t*(36) = 1.72, *p* = .10, and they outperformed younger adults in the primed closeness condition, *t*(36) = 2.46, *p* = .02. These findings suggest that perceived closeness could lead to an enhancement in the *faux pas* recognition tasks for older adults, making them perform equally well or even better, compared with younger adults (please see Figure 1).

Study 2: Emotion Recognition

In Study 1, the results showed that perceived closeness could enhance older adults' performance in a perspective taking task, the *faux pas* recognition task. In this study, we sought to extend the findings to other perspective taking domains (in our case, emotion recognition - the ability to interpret others' facial expressions) in a more direct manner, and to further eliminate alternative explanations to Study 1. One possible explanation to the finding of Study 1 might be that the primed closeness condition might have manipulated more than perceived closeness. In the control condition, the experimenter did not talk much to the participants. However, in the primed closeness condition, the experimenter and the participants had more interaction, which might make the participants, especially the older adults, more relaxed, leading to better performance. Thus, in this study, a new condition, which was a distance condition intended to lower participants' motivation (please refer to procedure for detailed description) was added to test whether it was indeed perceived closeness that enhanced older adults' performance. We hypothesized that in the closeness condition, older adults would perform significantly better in emotion recognition than did those in the control and distance conditions.

Method

Participants

Forty-nine Chinese younger participants (23 male; *Mean Age* = 20.39 years, *Range*: 18 – 29 years), and forty-nine Chinese older participants (23 male; *Mean Age* = 69.00 years, *Range*: 60 – 82 years) residing in Hong Kong, China, took part in the study. Younger adults received course credit and older adults were paid 100 Hong Kong dollars for their participation.

Materials

The facial expression stimuli were obtained from the Chinese face set created by Wang and Markham (Wang & Markham, 1999). The stimuli consist of the facial expressions of 3 out of the 6 basic emotions (anger, happiness, and sadness) expressed by Chinese adults about 25-years-old. There were 60 trial slides in total and 20 trial slides for each emotion. Each trial slide displayed the faces of five different people (balanced across sex) in a cross shape with the target face indicated by a red box surrounding it. Of the 20 slides for each emotion, there were four slides in which all five faces displayed the same emotion. The remaining 16 slides displayed four faces with the same emotion, but the target face displayed a different emotion.

Procedure

In the consent session, participants were told, "in the present experiment, you will watch some facial expressions expressed by some previous participants, who were asked to express different emotions including anger, happiness, and sadness. We would like to check whether their facial expressions were clear and easy to identify". After informed consent, the same demographic and cognitive measures as Study 1 were administered. Afterwards, the 15-item scale about daily activities was presented to participants. Participants were randomly assigned to one of the following three conditions:

Control condition: in this condition, participants were given a standardized instruction that "You will see different facial expressions in the slide. One of the faces will have a red box around it; he/she is your target. Your task is to verbally say out loud what emotion the target is expressing."

Primed closeness condition: In this condition, the same standardized instruction was given. In addition, participants were also told that “after checking your daily activity scale, I noticed that participants in the red box share a lot of common interests with you.”

Primed distance condition: In this condition, the same standardized instruction was given. In addition, participants were told that “after checking your daily activity scale, I noticed that participants in the red box share no common interest with you; you have very distinct interests from them.”

After participants received the manipulation, 6 practice trials were conducted before the actual emotion recognition trials, to make sure that participants understood the task, and were familiar with the procedure. Both emotion recognition accuracy i.e., the percentage of correct responses, and viewing time i.e., how long the participants spent on finishing a single trial (from the appearance of the expression to making a final response), was measured in the experimental trials. After finishing all emotion recognition trials, a manipulation check was conducted by asking participants in the two experimental priming conditions to complete a 15-item scale about the personality of people in red boxes on a 7-point-Likert-scale (from 1 = strongly disagree, to 7 = strongly agree). Two out of the 15 items are critical items about perceived closeness, “close feeling” and “could be friend with.” The rest of the items are “easy-going”, “emotional”, “friendly”, “smart”, “can be easily manipulated”, “conservative”, “nervous”, “responsible”, “lonely”, “out-going”, “neurotic”, “anxious” and “artistic”. These items were selected from the International Personality Item Pool (IPIP).

Results and Discussion

Descriptive Statistics

Younger participants had significantly higher education levels and self-reported health than did older participants, *F* (1, 96) = 285.67, $p < .01$, $\eta^2 = .75$, *F* (1, 96) = 24.12, $p < .01$, $\eta^2 = .20$. On the cognitive tasks, younger participants performed significantly better in the forward digit span task, *F*(1, 96) = 35.88, $p < .01$, $\eta^2 = .27$, the backward digit span task, *F*(1, 96) = 112.67, $p < .01$, $\eta^2 = .54$, the digit symbol substitution test, (1, 96) = 342.46, $p < .01$, $\eta^2 = .78$, and the verbal fluency task *F*(1, 96) = 28.80, $p < .01$, $\eta^2 = .23$, than did older participants (see Table 1 for descriptive statistics of these measures). Participants in the different conditions did not differ in terms of the aforementioned variables. Statistically controlling for education level, self-reported health, forward and backward digit span scores, digit symbol substitution score and verbal fluency score in the analyses did not affect the results described below.

Manipulation Check

A Multivariate ANOVA with condition (primed closeness vs. primed distance) as the between-subject factor was conducted on the two manipulation questions about perceived closeness. A significant condition main effect was found, *Wilk's Λ* = .82, *F* (2, 57) = 6.33, $p < .01$, $\eta^2 = .18$, and an item-level Univariate ANOVA revealed that participants in the closeness condition ("close feeling": *M* = 4.73, *SD* = 1.39, and "could be friend with": *M* = 4.87, *SD* = 1.13) indeed perceived the target as closer to them than did participants in the distance condition ("close feeling": *M* = 3.53, *SD* = 1.20, and "could be friend with": *M* = 4.23, *SD* = 1.28), suggesting a successful experimental manipulation. However, for the remaining thirteen items, such as smart, out-going and neurotic, there was no significant condition effects, as indicated by a Multivariate ANOVA, *Wilk's Λ* = .80, *F* (13, 46) = .88, *n.s.* This suggests that the manipulation altered perceived closeness, but not other attributes, of the participants toward the targets.

How Motivation Influenced Emotion Recognition across Age Groups

Both emotion recognition accuracy (the percentage of correct responses) and viewing time (how long the participants spent on finishing a single trial) was used to test the hypotheses. Eleven outliers (four younger adults and six older adults)[3] were excluded from the following analysis. Table 2 describes the emotion recognition accuracy for younger and older adults across three different conditions. A Multivariate ANOVA with Age group (younger vs. older adults) and Condition (control, primed closeness, primed distance) as between-subject factors on the emotion recognition accuracies of anger, happy and sadness was conducted. Significant Age group and Condition main effects were found, *Wilk's Λ* = .68, F (3, 81) = 12.82, $p < .01$, $\eta^2 = .32$, and *Wilk's Λ* = .73, F (6, 162) = 4.58, $p < .01$, $\eta^2 = .15$, respectively, qualified by a significant age group x condition interaction, *Wilk's Λ* = .68, F (6, 162) = 5.67, $p < .01$, $\eta^2 = .17$, indicating that younger adults and older adults had different emotion recognition accuracies in different conditions. Then, a Multivariate ANOVA on emotion recognition accuracies of anger, happy and sadness, with condition as the between-subject factor was conducted for each age group. Results further revealed that there was a significant condition main effect for older adults, *Wilk's Λ* = .47, F (6, 78) = 6.06, $p < .01$, $\eta^2 = .32$, while the condition main effect for younger adults was marginal, *Wilk's Λ* = .73, F (6, 80) = 2.26, $p = .05$, $\eta^2 = .15$. To explore the condition main effect for older adults, a univariate ANOVA with condition as the between-subject factor was conducted among older adults. Older adults in the primed closeness condition performed significantly better than those in the control ($M_{\text{differnce}} = .11$, $p < .01$) and primed distance condition ($M_{\text{differnce}} = .18$, $p < .01$), while the difference between the latter two conditions was only marginally significant ($M_{\text{differnce}} = -.17$, $p = .06$).

Next, an average emotion recognition accuracy score across emotions was calculated, and independent sample t-tests were conducted to test for age differences in different conditions. Younger adults performed better than did older adults in both primed distance and control conditions, $t(27) = 4.23$, $p < .01$, and $t(31) = 3.91$, $p < .01$, respectively; however, there was no age difference in the primed closeness condition, $t(25) = 1.88$, *n.s*. These findings suggest that perceived closeness could enhance older adults' performance in emotion recognition tasks to a comparable level as younger adults (refer to Table 2).

It is also worth noting that there was a significant age group x condition interaction for anger and happiness[4] recognition but not for sadness (see Table 2). This might be because anger and happiness are emotions that are more interpersonally-sensitive (e.g., Whitesell, & Harter, 1996). Although most emotional experiences are undoubtedly influenced by relationships, anger seems to be especially affected by the actions of others and, in turn, has a high potential to influence subsequent relationships. Anger results when the focus is on the cause of an undesired outcome (usually a person) rather than just on the outcome itself. But for sadness, individuals may be sad because of what someone did or did not do, i.e. they focus on what was lost rather than on the cause of the loss (i.e., the other person). Moreover, in a visual search paradigm, Mather and Knight (2006) asked younger and older adults to identify one different face (either sad, angry, happy or neutral) from a group of similar faces. They found that older adults actually identified angry faces faster than sad faces. They argued that this might be the case because anger was a more threatening stimuli compared with sadness and happiness. In line with both of these arguments, our findings suggested that, when perceived closeness was experimentally increased, older adults showed enhancement in recognizing the two interpersonally-sensitive (i.e., happiness and anger) and threatening (i.e., anger) emotions. The emotion recognition of sadness might not be enhanced because it was not as important or threatening to interpersonal relationships.

Viewing Time in Different Conditions and the Mediation Effect

To partially address whether there was any motivational change after the experimental manipulation, we conducted a Univariate ANOVA on the average viewing time of the emotion recognition trials, with Age group and Condition as the between-subject factors. A significant condition main effect was found, F (2, 83) = 5.26, $p < .01$, $\eta^2 = .11$. The post-hoc analysis indicated that people in the primed closeness condition spent more time viewing the pictures than did participants in the other two conditions (Young: Control, *M* = 2.43, *SD* = .30; Primed closeness, *M* = 2.79, *SD* = .57; Primed distance, *M* = 2.68, *SD* = .56; Old: Control, *M* = 4.33, *SD* = .84; Primed closeness, *M* = 5.49, *SD* = 1.90; Primed distance, *M* = 4.33, *SD* = .73).

Moreover, we further tested whether the differences in viewing time could mediate the observed emotion recognition accuracy differences in older adults' performance across conditions. Mediation analyses were conducted using bootstrapping, because of the relatively small sample size (n = 44, Fritz, & MacKinnon, 2007). A macro for testing the indirect effect using bootstrapping was submitted to SPSS (Hayes, & Preacher, 2011). In the macro, condition was dummy coded into two variables D1 and D2 (Primed distance: D1 = 0, D2 = 0; Control: D1 = 1, D2 = 0; and Primed closeness: D1 = 1, D2 = 1; Hence in D1 condition, the primed distance group was the reference group whereas in D2 condition, primed closeness group was the reference group). Bootstrapping based on 5000 samples yielded a 95% confidence interval for the D2 indirect effect that excluded zero, indicating that the primed closeness condition, relative to the primed distance and control conditions, indirectly influenced emotion recognition accuracy through viewing time (indirect of D2 = .03, *SE* = : 0.01, 95% confidence interval: .01 to .06). In contrast, the D1 indirect effect was not significant, suggesting that, relative to the control and primed closeness conditions, the primed distance condition, did not indirectly influence emotion recognition accuracy through viewing time (for D1: effect = -.0002, SE = .007, 95% confidence interval: -.016 to .014). Moreover, after controlling for viewing time, D2 direct effect could still predict emotion recognition accuracy, $\beta = .10$, $t(3, 40) = 2.44$, $p = .02$, suggesting that viewing time partially mediated the linkage between condition and emotion recognition accuracy for older adults. Taken together, these findings indicate that older adults in the primed closeness condition paid more attention to the facial expressions by watching these expressions longer than did participants in the control and primed distance condition, which in turn increased their emotion recognition accuracy.

This study manipulated perceived closeness between the target and participants, and found that closeness manipulation could enhance older adults' perspective taking performance. Findings from this study directly confirmed our hypothesis that a closeness manipulation would increase older adults' performance. As in previous studies (i.e., Pilot study and Study 1), participants were taking someone else's perspective instead of the one whom they were manipulated to be feeling close with, and moreover, the study further eliminated the alternative explanation that a relaxing environment resulting from mere interaction between the experimenter and participant could enhance older adults' performance. Despite similar interaction duration, primed closeness enhanced performance in perspective taking while primed distance impaired the performance. These findings generally indicated that older adults did not show emotion recognition deficits when they were motivated to recognize the emotions of targets, whom they perceived to be closer to them.

General Discussion

The present studies investigate age differences in perspective taking. Generally, findings from the present studies provide support for the Selective Engagement Hypothesis (Hess, 2006). Experimentally increasing perceived closeness enhanced older adults' performance in perspective taking tasks (e.g., *faux pas* recognition, and emotion recognition), and the enhancement was at least partially due to increased motivation to view the stimuli longer. These findings contribute to the existing literature of adult development by showing that not only does cognition influence older adults' performance in perspective taking, but motivation also matters.

Consistent with some previous findings in the literature on aging and perspective taking (e.g., MacPherson et al., 2002), older adults in the present studies performed worse than did younger adults in the control condition, as indexed by both *faux pas* recognition and emotion recognition accuracy. However, as hypothesized, this age-related deficit was significantly reduced, to a point where the age difference was no longer statistically significant, after a closeness manipulation — when the experimenter or target was perceived to be closer to the participants. To our knowledge, this is the first demonstration of direct motivation modulation of age differences in perspective taking. It nicely adds to the existing literature on compensatory resource allocation as suggested by the SOC model in aging. This literature has largely focused on attention, executive control, and memory (e.g., Cabeza, Daselaar, Docos, Prince, Budde, & Nyberg, 2004) whereas investigations on higher level cognitions are very rare (e.g., Peters, Hess, Vastfjall, & Auman, 2007).

One highly investigated aspect of aging is its association with declines in memory and mechanical cognitive functions. However, aging theorists have observed that aging is also characterized by *plasticity* (e.g., Baltes & Baltes, 1990). Strategies of selection, optimization, and compensation are used to counteract the negative effects of aging (Baltes & Carstensen, 2003). Findings on emotion – cognition interactions (e.g. Mikels, Larkin, Reuter-Lorenz, & Carstensen, 2005) emphasize the existence of compensation in the aging mind. Working memory and mental speed are the cognitive processes most severely impaired by advancing age. But Mikels et al. (2005) found no impairment in the working memory for emotions. These and other similar findings were attributed to SST (e.g., Carstensen, 2006), which postulates that, whereas future-oriented goals are predominant in youth, emotionally meaningful ones become more salient in later years. Adding to this literature, findings from the present studies also suggested that when the task was framed as consistent with older adults' emotionally meaningful goals, the well-documented age-related deficits in perspective taking became non-significant. In contrast, when the emotionally meaningful goals were not salient to them (such as in the control condition or even the distance condition), the same experiment with the same experimenter gave rise to age-related differences in performance.

Limitation and Future Directions

This study has several limitations. First, the present studies are cross-sectional, and the observed age differences might be caused by cohort effects rather than, or in addition to, developmental changes. Future studies should investigate the phenomenon in longitudinal studies.

Second, it was found that in Study 2 the manipulation effect seemed to be stronger in affecting older adults' closeness feeling (η^2 = .27) than that of younger adults (η^2 = .13) as indicated by effect size, thus raising the question of the robustness of manipulation. One possibility might be that in real life, older adults prefer closeness to other types of motivators, while younger adults might show other preferences (Carstensen, 2006). In the future, more motivation contexts (e.g., with informative but novel social partners) should be examined, to get a more comprehensive understanding of the development of perspective taking abilities across adulthood. In addition, our hypothesis could be tested in a more naturalistic setting instead of the laboratory. For example, in terms of emotion recognition, it might be helpful to use daily activity video coding to test the hypothesis, examining whether older participants might be more accurate in reading relatives' emotions than reading acquaintances' emotions.

One question that remains is to what extent the influence of motivation could be applied to other cognitive domains and to other populations. In the current investigation, it seemed that the closeness manipulation did not affect older adults' basic cognitive performance, such as the performance on the digit span task, digit symbol substitution task, or verbal fluency task, (as shown in Study 1). Other researchers have suggested that motivational factors might affect higher-level cognition the most, such as visual search (Spaniol et al., in press). Future studies should test the hypothesis in other cognitive domains as well as other perspective taking tasks. Moreover, Wu and Kayser (2007) found that Chinese participants were better perspective takers than were Americans. Further studies are needed to test the generalizability of our findings to other populations.

Finally, the underlying mechanism of the motivational changes in the brain of the older adult, and in other words, how motivation affects the brain structures underlying perspective taking, is still unknown. Emerging research suggests that the orbitofrontal cortex (OFC) may play a central role in recognizing emotion from facial expressions (Blair & Curran, 1999). Moreover, it has been widely demonstrated that the OFC is particularly sensitive to age-related cognitive declines (e.g., Raz et al., 1997). Is there compensation from other brain regions to account for the increased performance in emotion recognition in the primed closeness condition?

Further studies with neuroimaging techniques should be employed to test the mechanism of the influence of motivation on perspective taking.

Conclusion

We investigated, for the first time, how motivational factors could influence age differences in perspective taking. Our findings confirmed the Selective Engagement Hypothesis (Hess, 2006) in the context of perspective taking and highlighted the advantages of applying a motivation perspective to investigate the aging mind.

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Footnote

[1] There was only one experimenter (male, and aged 28) in the control and manipulation conditions throughout all three studies, hence, we believe the condition effect within each age group should not be influenced.

[2] d-prime was also calculated, and the results were identical to the results obtained using Aprime. Since Aprime was also used in a previous study of aging and emotion decision making (i.e., MacPherson et al., 2002), we decided to report Aprime here.

[3] We applied a strict standard (i.e., 2.5 SD above/below the mean of the dependent variable) in detecting outliers in both studies. In Study 1, data from 2 younger adults in the relative condition, 2 younger adults in the primed closeness condition and 1 older adult in the control condition were eliminated from the subsequent analysis. Those outliers were not different from the remaining participants in other demographic variables, such as sex, education, health and cognitive abilities (except digit span forward task, they performed significantly worse).

In Study 2, data from 2 younger and 1 older adults in the primed closeness condition, 1 younger adult in the primed distance condition, and 1 younger and 5 older adults in the control condition were eliminated from subsequent analysis. Those outliers were not different from the remaining participants on other demographic variables, such as age, sex, education, health and cognitive abilities.

[4] The assumption of equal variance for ANONA was violated, although, Lindman (1977, p. 33) suggested that *F* statistic is quite robust against violations of the assumption of heterogeneity of variances, the reader should be aware that the age group x condition interaction effect for the recognition of happiness should be interpreted with caution.

Table 1. Participant Characteristics in Study 1 and Study 2

	Study 1		Study 2	
	Younger Adults (N = 61)	Older Adults (N = 59)	Younger Adults (N = 49)	Older Adults (N = 49)
Age	20.67 (2.29)	67.86 (5.72)	20.39 (2.41)	69.00 (5.69)
Sex (Male %)	52.5%	49.2%	46.9%	46.9%
Religious (Yes %)	34.4%	54.2%	26.5%	55.1%
Education **	4.00 (.26)	2.41 (.82)	4.08 (.28)	2.35 (.66)
Self-reported Health *	3.07 (.95)	2.90 (1.09)	3.37 (.93)	2.51 (.79)
Digit Span Forward **	8.90 (.35)	7.93 (1.24)	8.80 (.50)	7.76 (1.11)
Digit Span Backward **	7.17 (1.32)	4.50 (1.57)	6.71 (1.51)	3.94 (1.03)
Digit Symbol Substitution Test **	28.88 (3.47)	15.34 (4.38)	29.35 (3.95)	13.35 (4.59)
Verbal Fluency **	24.85 (5.40)	18.72 (3.94)	22.49 (6.42)	16.78 (3.78)

Notes. ** indicates a significant age difference in both studies at $p < .01$;

* indicates a significant age difference only in Study 2 at $p < .01$

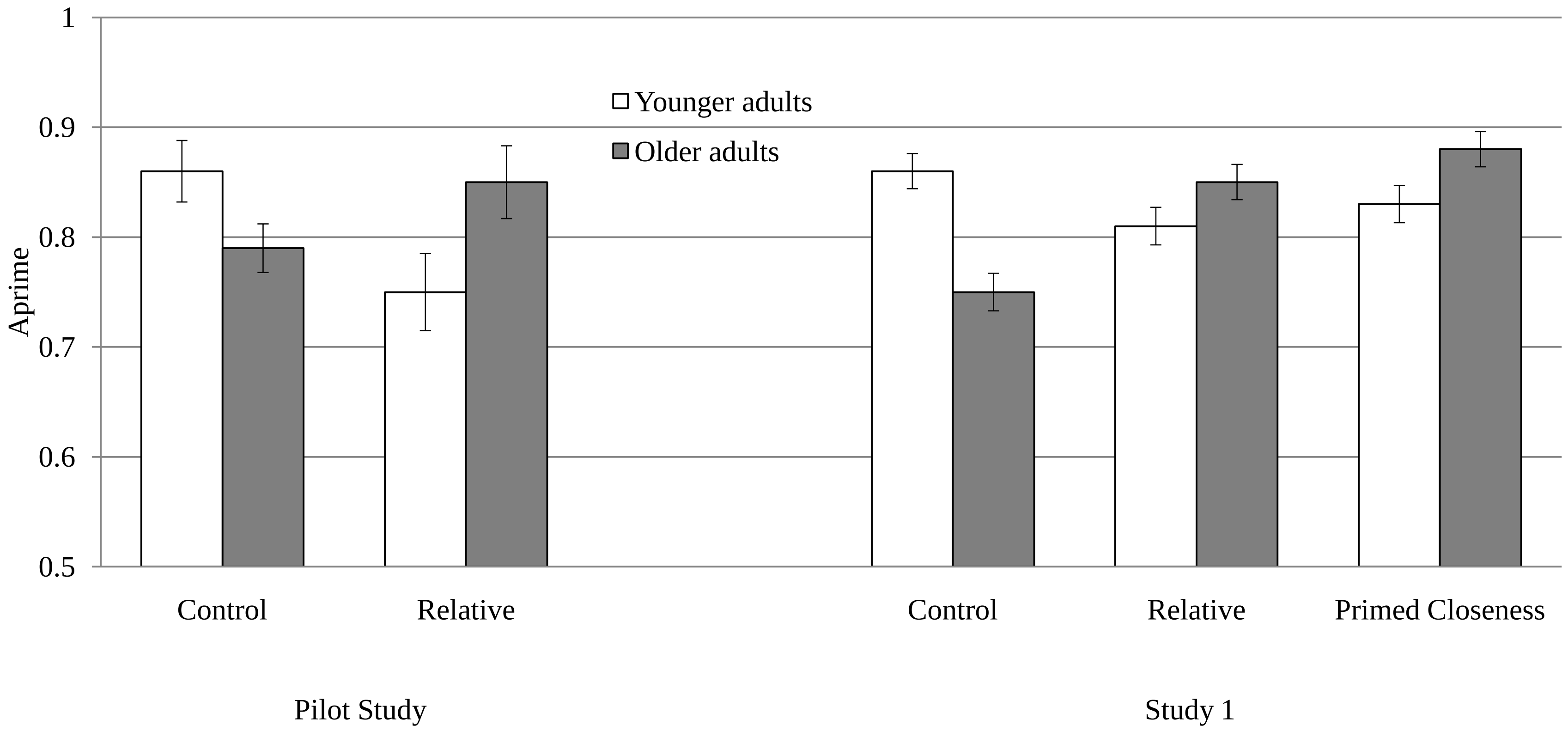
Table 2. Emotion Recognition Accuracy (%) for both Younger and Older Adults across Different Conditions

M (*SD*)		Anger	Happiness	Sadness	Overall
Primed Closeness	Younger Adults (N = 13)	87.61 (11.60)	100.00 (.00)	78.21 (12.10)	88.60 (5.50)
	Older Adults (N = 14)	81.75 (10.32)	100.00 (.00)	68.25 (19.42)	83.33 (8.59)
Control	Younger Adults (N = 18)	82.10 (13.55)	97.84 (3.38)	69.75 (19.27)	83.23 (6.88)
	Older Adults (N = 15)	65.93 (19.80)	99.63 (1.43)	51.85 (12.72)	72.47 (8.93)
Primed Distance	Younger Adults (N =14)	86.90 (12.82)	100.00 (.00)	66.27 (29.03)	84.39 (11.18)
	Older Adults (N = 15)	52.22 (26.21)	94.81 (5.34)	48.15 (24.99)	65.06 (13.24)
	$F_{\text{Condition}}$	5.96**	6.27**	4.68*	10.62**
	$F_{\text{Age Group}}$	27.97**	3.77+	12.29**	34.68**
	$F_{\text{Interaction}}$	5.35**	13.17**	.36	4.00*

Notes. ** $p < .01$, * $p < .05$, + $p = .06$.

Figure Caption

Figure 1. *Faux pas* Recognition Accuracy in Pilot Study and Study 1



Note: Error bars represent the standard errors of the mean