

Monetary Losses Do Not Loom Large in Later Life: Age Differences in the Framing Effect

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Studies of the framing effect indicate that individuals are risk averse for decisions framed as gains but risk seeking for decisions framed as losses. However, findings regarding age-related changes in susceptibility to framing are mixed. Recent work demonstrating age-related decreases in reactivity to anticipated monetary losses, but not gains, suggests that older and younger adults might show equivalent risk aversion for gains but discrepant risk seeking for losses. In the current study, older and younger adults completed a monetary gambling task in which they chose between sure options and risky gambles (the expected outcomes of which were equated). Although both groups demonstrated risk aversion in the gain frame, only younger adults showed risk seeking in the loss frame.

Key Words: Aging—Biases—Decision making—Framing.

IN modern society, older individuals are facing increasingly complex decisions regarding retirement investments, prescription drug coverage, health insurance, and the like. As such, it is becoming imperative to understand how they make decisions and the biases they exhibit (Peters, Hess, Vastfjall, & Auman, 2007). One of the most robust biases in human decision making is the framing effect, which refers to the observation that choices vary depending on how alternatives are described (Kahneman & Tversky, 2000; Tversky & Kahneman, 1981). For example, in a now-classic framing study, the “Asian disease problem” (Tversky & Kahneman), individuals who are presented with options described in terms of lives saved (the “gain” frame) show risk aversion. Specifically, they overwhelmingly prefer a sure option of saving 200 of 600 people threatened by the outbreak of a disease versus a risky option of taking a one-third chance of saving all 600 people. However, when options are described in terms of lives lost (the “loss frame”), individuals overwhelmingly select the risky option of a one-third probability that nobody will die versus surely losing 400 people. Thus, despite the fact that the decisions are objectively equivalent, people demonstrate risk aversion in the positive “gain” frame and risk seeking in the negative “loss” frame. The framing effect has been repeatedly demonstrated in studies with younger adults (for a review, see Kahneman & Tversky) and has been shown to emerge as early in the life span as late childhood (Reyna & Ellis, 1994). However, it remains unclear whether this bias remains stable through older adulthood.

The few studies that have examined aging and the framing effect have produced mixed results. Mayhorn, Fisk, and Whittle (2002) found essentially no age difference in framing between older and younger adults despite presenting each individual with 16 decisions akin to the Asian disease problem from two domains (health and finance) and three frames (gain, loss, and combination). A later study by Rönnlund,

Karlsson, Lagnäs, Larsson, and Lindström (2005) also incorporated a decision-vignette paradigm for a variety of domains (health, art, and finance) and found no effects of age on choice behavior. However, an additional study by Kim, Goldstein, Hasher, and Zacks (2005) employing similar vignettes found greater framing effects for older relative to younger adults for health-related decisions. The results lack clear consensus and, thus, compel further investigation (Peters et al., 2007). These previous studies employed decision vignettes akin to the Asian disease problem that were complex, abstract, and hypothetical, while lacking personal relevance. Given age-related increases in motivation to achieve personal social and emotional goals (for reviews see Carstensen, Mikels, & Mather, 2006; Peters et al.), such hypothetical tasks may not detect nuanced age differences in framing. Moreover, in the face of declines in deliberative processing, older adults do not show declines on social and emotional judgment and decision tasks (MacPherson, Phillips, & Della-Sala, 2002). Additionally, on a gambling task, older adults preferred decision-making strategies that relied on affective valence, relative to younger adults who preferred deliberative strategies (Wood, Busemeyer, Kolling, Cox, & Davis, 2005). In light of these findings, it is possible that a personally relevant, nonhypothetical framing task could detect age differences.

Consistent with this notion, Samanez-Larkin et al. (2007) found significant differences in the affective and neural responsiveness of older and younger adults to the anticipation of real monetary gains and losses. Whereas younger adults showed relatively equivalent responsiveness to the anticipation of both, older adults demonstrated intact neural and affective responses to gains, but reduced responses to losses. This differential reactivity to the anticipation of gains and losses has implications for the framing of decisions. Insofar as older adults experience equivalent reactivity to anticipated gains but reduced reactivity to anticipated losses relative to

Table 1. Participant Characteristics by Age Group

Characteristic	Younger		Older		Statistic	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i> (42)	<i>p</i>
Age (in years)	19.77	1.19	71.55	4.48		
Education (in years)	14.59	1.22	15.82	3.54	1.54	>.1
Digit-symbol coding (WAIS-III)	96.95	13.30	62.09	20.25	6.75	<.001
Digit span (WAIS-III)	20.55	4.07	17.86	4.37	2.11	<.05
Vocabulary (WAIS-III)	53.45	7.35	53.72	9.34	0.11	>.9
Self-reported health	44.67	29.10	41.91	29.76	0.31	>.7

Note: Digit-symbol coding from the Wechsler Adult Intelligence Scale, 3rd ed. (WAIS-III; Wechsler, 1997): maximum score = 133; digit span from the WAIS-III: maximum score = 30; vocabulary from the WAIS-III: maximum score = 66; self-reported health (Wahler, 1973): rating of 42 different symptoms on a scale of 0–5, maximum score = 210.

their younger counterparts, it follows that loss frames may not have as large an impact on older adults when the task is personally relevant.

In the present study, we sought to extend prior research on aging and framing by using a monetary gambling task. In contrast to previous work, the decision task incorporated in the present study entailed a series of personal, nonhypothetical, and simple monetary decisions. Importantly, this task has been shown to produce a significant framing effect in 20 younger adults and to engage affective processes, as evidenced by greater neural activity in the amygdala when making decisions that reflected the framing effect (i.e., risk seeking in a loss frame and risk avoidance in a gain frame) versus the opposite pattern (De Martino, Kumaran, Seymour, & Dolan, 2006). In line with age-related motivational changes toward personal emotional goals, such a task may be more sensitive than other framing tasks. On each trial of the task, participants were given an endowment of money and then had to choose between two options: (a) losing/retaining a certain amount for sure or (b) gambling on a set probability of losing/retaining the full amount. Thus, each choice was presented in terms of either a potential gain or loss. Based on the findings of Samanez-Larkin et al. (2007), we predicted that both older and younger adults would show risk aversion for gain frames but that older adults would show reduced risk seeking for loss frames relative to younger adults.

METHOD

Participants

Twenty-two undergraduate students (64% women) and 22 community-dwelling older adults (68% women) participated in exchange for course credit and/or monetary compensation. The groups were typical for studies comparing older and younger adults as determined by the demographic information in Table 1.

Design and Procedure

Participants completed a decision task based on that of De Martino et al. (2006). In this task, participants were informed that they would be making a series of decisions on a

computer. To enhance the personal relevance of the task, they were informed at the beginning of the study that they would receive an amount of money proportional to the amount they “won.”

At the beginning of each decision trial, participants were given an initial endowment (e.g., “You receive \$100”), which ranged from \$25 to \$100 in increments of \$25. Participants were then offered a choice between a sure gain (or loss) versus a gamble. The options for each trial were presented simultaneously on the computer screen with the sure option on the left and the gamble option on the right. For gain trials, the sure options were framed in terms of keeping a proportion of the initial endowment (e.g., “Keep \$20” of \$100), whereas for loss trials, the options were framed in terms of losing a proportion of the endowment (e.g., “Lose \$80” of \$100). Gambles were depicted by pie charts representing the probability of keeping or losing the full endowment, which ranged from 20% to 80% in increments of 20%. Crucially, the expected outcome of the gamble was identical to that of the sure gain or loss (e.g., a guaranteed \$20 of \$100 was paired with a 20% chance of keeping \$100) for framing trials. Replicating the design of De Martino et al. (2006), “catch” trials were included to help ensure participants were engaged in the task (half of which were framed as potential gains and half as potential losses). These trials were highly unbalanced in terms of expected outcomes—gamble options were always either a 95% chance of winning or losing the endowment coupled with a sure option of keeping or losing 50% of the endowment. Participants completed 96 randomly ordered decision trials, of which 64 were “framing” trials (32 loss frame, 32 gain frame) and 32 were “catch” trials.

Following the procedures of De Martino et al. (2006), initial endowments, probabilities, and expected outcomes were balanced such that the 32 gain trials were identical to the 32 loss trials in all but their frame. That is, for each gain trial (e.g., deciding between surely keeping \$20 of \$100 vs. a 20% chance of keeping the endowed \$100), there was an equivalent loss trial (e.g., surely losing \$80 of \$100 vs. an 80% chance of losing the endowed \$100). Participants made their choice by pressing a corresponding key on the keyboard.

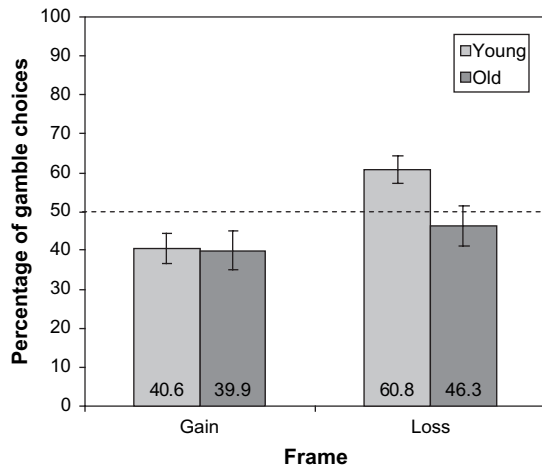


Figure 1. Percentage of gain and loss trials on which the gamble option was chosen for younger and older adults. Error bars represent the standard error. The dashed line indicates an “unbiased” percentage.

RESULTS

To test for age differences in framing, we computed a repeated measures analysis of variance (ANOVA) with the between-subject factor of age (young, old) and the within-subject factor of frame (gain, loss). The dependent variable was calculated as the percent of trials on which a participant chose the gamble. These percentages were compared with an “unbiased” choice pattern (choosing the gamble on 50% of trials) in order to determine risk aversion (gambling on less than 50% of trials) versus risk seeking (gambling on more than 50% of trials). Analysis of the catch trials did not reveal differences across age groups or frames. Moreover, when the catch trial scores were included as covariates in the main task analysis subsequently, the frame by group interaction remained significant. As such, these trials are not discussed further.

Older and younger adults did not differ overall in percent of gamble options chosen, $F(1, 42) = 1.77, p > .19, \eta_p^2 = .04$. However, across both groups, the gamble option was chosen more frequently in the loss frame (53.6%) than in the gain frame (40.3%), $F(1, 42) = 29.69, p < .001, \eta_p^2 = .41$. This main effect suggests that both groups demonstrated a framing effect. Indeed, examination of gamble choices between the gain and loss frames separately for the groups indicated that both the younger and older adults were significantly more likely to choose the gamble in the loss versus gain frame, $t(21) = 4.83, p < .001$ and $t(21) = 2.54, p < .05$, respectively. Crucially, there was an age by frame interaction, $F(1, 42) = 7.99, p < .01, \eta_p^2 = .16$, as depicted in Figure 1. The older and younger adults did not differ in how likely they were to choose the gamble in the gain frame, $t(42) = 0.12, p > .90$. One-sample t tests using 50% as the test value indicated that both groups were significantly less likely than chance to choose the gamble in the gain frame, $t_s(21) = 2.51$ and 2.07 , respectively, $p \leq .05$. In contrast, the

groups differed in how likely they were to choose the gamble in the loss frame, $t(42) = 2.30, p < .05$. Although younger adults were more likely than chance to choose the gamble in the loss frame, $t(21) = 2.97, p < .01$, older adults were not more likely than chance to choose the gamble in the loss frame, $t(21) = .72, p > .45$. Importantly, this pattern of results remained unchanged when we included the cognitive variables of processing speed and short-term memory as covariates in the ANOVA.

DISCUSSION

The current study sought to examine age-related changes in the framing effect using a novel monetary gambling task. Participants chose between sure options and risky gambles with either positive (gain) frames or negative (loss) frames. Whereas older and younger adults demonstrated commensurate levels of risk aversion in the gain frame, only younger adults were risk seeking in the loss frame. Thus, the present findings suggest that older adults, relative to younger adults, are less influenced by loss-framed risky decisions. This finding is consistent with the decreased affective reactivity of older adults to anticipated monetary losses but not gains (Samanez-Larkin et al., 2007). Additionally, insofar as the framing effect constitutes a bias in decision making, the current findings suggest that older adults do not demonstrate such a strong bias.

In contrast to previous studies examining aging and the framing effect using hypothetical vignettes, the present study employed a relatively simple monetary gambling task that was personally relevant (participants received an amount of money proportional to their “winnings”). We contend that given age-related motivational changes toward personal emotional goals (for a review, see, e.g., Carstensen et al., 2006), gains—and not losses—remain salient to older adults. This theoretical explanation, though, remains speculative, and the precise underlying mechanisms for age-related changes in the framing effect remain opaque, presenting an opportunity for future research. Perhaps older individuals—who have more experience with loss and are more motivated by hedonic factors—view losses as “smaller” than gains, which could result in giving less weight to losses versus gains (Harinck, Van-Dijk, Van-Beest, & Mersmann, 2007). Alternatively, from a regulatory focus perspective, given the motivational changes with age, perhaps older adults focus to a greater extent on promotion than prevention, which could result in a greater focus on the pleasure of gains over the pain of losses (Idson, Liberman, & Higgins, 2000).

Although the present study provides evidence of age-related changes in framing, it is not without limitations. First, the use of pie charts resulted in the inclusion of gain and loss information in all trials. However, this inclusion did not vary across the frames, but the sure option did vary, resulting in sufficient framing. In addition, all gambles

were presented on the right, which may have interacted with participant characteristics such as handedness. Due to random sampling, such influence is unlikely. Future research would nevertheless benefit from considering these factors.

Investigating age-related changes in decision making represents an important area of inquiry—especially considering the complex decisions that older individuals face. As older adults are increasingly encumbered with major health and financial decisions, it is critical to understand how they react to the framing of options. The current results indicate that older adults did not differ from younger adults in general susceptibility to the framing of risky monetary decisions per se but that it is the valence of the frame that influences them; older adults were less biased by negative loss frames than younger adults. Thus, using a novel monetary gambling task in the current study, we found that positively framed options appear to have equal impact on older and younger individuals but that negatively framed options do not appear to loom as large for older adults.

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