

Adult Age Differences in Monetary Decisions with Real and Hypothetical Reward

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Abstract

Most laboratory studies on aging and decision making have used scenarios in which rewards were merely hypothetical (decisions did not have any real consequences) or in which only small amounts of money were at stake. In the current study, we compared younger adults' (20–29 years) and older adults' (61–82 years) decisions in probabilistic choice problems with real or hypothetical rewards. Decision-contingent rewards were in a typical range of previous studies (gains of up to ~\$4.25) or substantially scaled up (gains of up to ~\$85 per participant).

Real and Hypothetical Rewards

- Decision-contingent rewards for participants are the norm in experimental economics, but only occasionally used in psychology^[1]
- Many studies on behavioral decision making have used hypothetical scenarios. Assumption: People can know how they would behave in actual situations of choice and have no reason to disguise their preferences^[2]
- Rewards often reduce noise in decision behavior. People are sometimes cautious when real and high rewards are at stake^[3]
- However, several studies have found no effects of real vs. hypothetical outcomes. In a review of 74 experiments comparing no/low/high performance-based rewards, the modal finding was no effect^[4]
- Reward may particularly affect behavior in tasks that require effort and attention. In contrast, in the kinds of tasks economists are often interested in (e.g., bargaining in games; preferential choices between lotteries) rewards often do not change behavior substantively ^[see 4]

References

[1] Hertwig, R., & Ortmann, A. (2001). Experimental practices in economics: A methodological challenge for psychologists? *Behavioral and Brain Sciences*, 24(3), 383–403.
 [2] Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291.
 [3] Holt, C. A., & Laury, S. K. (2002). Risk aversion and incentive effects. *American Economic Review*, 92(5), 1644–1655.
 [4] Camerer, C. F., & Hogarth, R. M. (1999). The effects of financial incentives in experiments: A review and capital-labor-production framework. *Journal of Risk and Uncertainty*, 19(1), 7–42.
 [5] Tymula, A., Belmaker, L. A. R., Ruderman, L., Glimcher, P. W., & Levy, I. (2013). Like cognitive function, decision making across the life span shows profound age-related changes. *Proceedings of the National Academy of Sciences*, 110(42), 17143–17148.
 [6] Mata, R., Josef, A. K., Samanez-Larkin, G. R., & Hertwig, R. (2011). Age differences in risky choice: A meta-analysis. *Annals of the New York Academy of Sciences*, 1235, 18–29.
 [7] Horn, S., & Freund, A. M. (2021). Adult age differences in monetary decisions with real and hypothetical reward. *Journal of Behavioral Decision Making*. <https://doi.org/10.1002/bdm.2253>

Adult Age Differences in Preferential Decisions

- Typical previous findings
 - Decision quality: older adults' (OAs) decisions are often less consistent than younger adults' (YAs)^[5]
 - Preferences (regarding risk, gains, losses): dependent on characteristics of task and stimuli; mixed pattern of age differences^[6]
 - However, previous aging studies have largely used low or hypothetical outcomes
- We^[7] used a well-known set of decision problems^[3] to investigate age differences in preferential decisions with low vs. high and hypothetical vs. real outcomes

Design and Materials

- Age Group (younger, older)
- × Reward Type (real, hypothetical; within-subjects)
- × Reward Magnitude (low, high; within-subjects)
 - lower reward: ~ \$0.11-\$ 4.25
 - higher reward (x20): ~ \$2.21-\$85.00

Table 1 Characteristics of the Choice Problems (High-Reward Condition; Outcomes in CHF; 1CHF ~ \$1.10)

| # | Option A | Option B | EV _A | EV _B | SD _A | SD _B |
|----|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 | 40, 0.1; 32, 0.9 | 77, 0.1; 2, 0.9 | 32.8 | 9.5 | 2.4 | 22.5 |
| 2 | 40, 0.2; 32, 0.8 | 77, 0.2; 2, 0.8 | 33.6 | 17.0 | 3.2 | 30.0 |
| 3 | 40, 0.3; 32, 0.7 | 77, 0.3; 2, 0.7 | 34.4 | 24.5 | 3.7 | 34.4 |
| 4 | 40, 0.4; 32, 0.6 | 77, 0.4; 2, 0.6 | 35.2 | 32.0 | 3.9 | 36.7 |
| 5 | 40, 0.5; 32, 0.5 | 77, 0.5; 2, 0.5 | 36.0 | 39.5 | 4.0 | 37.5 |
| 6 | 40, 0.6; 32, 0.4 | 77, 0.6; 2, 0.4 | 36.8 | 47.0 | 3.9 | 36.7 |
| 7 | 40, 0.7; 32, 0.3 | 77, 0.7; 2, 0.3 | 37.6 | 54.5 | 3.7 | 34.4 |
| 8 | 40, 0.8; 32, 0.2 | 77, 0.8; 2, 0.2 | 38.4 | 62.0 | 3.2 | 30.0 |
| 9 | 40, 0.9; 32, 0.1 | 77, 0.9; 2, 0.1 | 39.2 | 69.5 | 2.4 | 22.5 |
| 10 | 40, 1.0; 32, 0.0 | 77, 1.0; 2, 0.0 | 40.0 | 77.0 | 0.0 | 0.0 |

Summary

- Decision quality was markedly better with real than hypothetical rewards in older adults and correlated with numeracy in both age groups. However, we found no evidence that reward type affected people's preferences.

Results

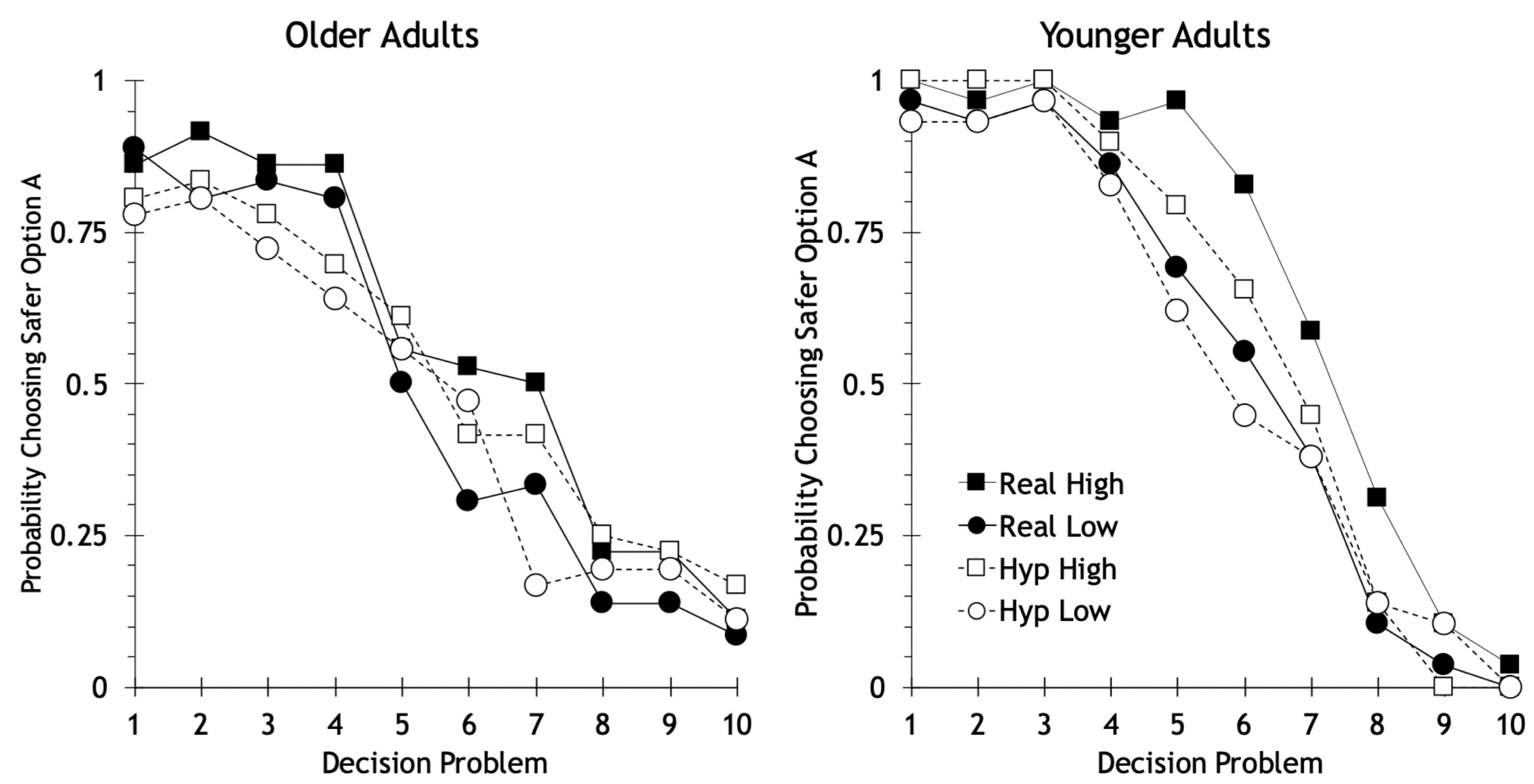


Table 2 Age Group Comparisons

| | M | | BF ₁₀ |
|----------------------------|---------|-------|------------------|
| | Younger | Older | |
| Age (years) | 24 | 70 | |
| Sample size (n) | 29 | 36 | |
| Numeracy (0-11) | 9.82 | 7.67 | 41.64 |
| Vocabulary (0-93) | 29.97 | 32.83 | >100 |
| Cognitive speed (0-93) | 41.83 | 24.53 | >100 |
| Decision quality: EV-max. | | | |
| hypothetical, low | .80 | .73 | 0.66 |
| hypothetical, high | .79 | .70 | 1.30 |
| real, low | .80 | .78 | 0.27 |
| real, high | .71 | .74 | 0.31 |
| Decision quality: Noise | | | |
| hypothetical, low | .13 | .27 | 6.70 |
| hypothetical, high | .12 | .29 | 71.44 |
| real, low | .12 | .18 | 1.64 |
| real, high | .13 | .22 | 1.87 |
| Risk aversion | | | |
| hypothetical, low | .53 | .46 | 0.66 |
| hypothetical, high | .59 | .52 | 1.04 |
| real, low | .55 | .48 | 0.55 |
| real, high | .67 | .56 | 3.47 |
| Achieved total gains (CHF) | 47.84 | 48.79 | 0.26 |