Age differences in Discounting of Time, Probability, and Effort Across Monetary, Social, and Health Domains

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Background
- Most everyday decisions involve integration of costs and rewards.
- People often devalue delayed rewards, which is known as temporal discounting.
- It is also possible people devalue uncertain (probability discounting) or effortful (effort discounting) rewards.
- It is often assumed that discounting is consistent across domains, but discounting could depend on cost or reward domain.
- Age-related motivational shifts could also influence discounting.

Method
Participants
N = 92 healthy adults, aged 22-83 (M = 49.7, SD = 17.9, 60% Female)

Procedures
- 9 Binary choice tasks (3 Cost x 3 Reward), 42 trials of each task

Results
Time and Probability

Money

Social

Health

- No significant linear or quadratic effects of age.
- More temporal discounting in older age, Age: β = 0.300, 95% CI [0.058, 0.542]
- More probability discounting in middle age, Age: β = -0.270, [0.476, -0.072]
- More temporal discounting in older age, Age: β = 0.361, [0.168, 0.556]
- More probability discounting in older age, Age: β = 0.233, [0.117, 0.349]

Motivation
- More probability discounting for social rewards in individuals with higher social motivation, SMQ-S: β = 0.253 [0.037, 0.468]
- Less temporal discounting for health rewards in individuals with expansive time horizons, FTP: β = -0.275, [-0.492, -0.056]

Effort
- Most participants selected the difficult option for effort, creating a floor effect. Thus, age effects are difficult to interpret.

Conclusions and Future Directions
- First study to assess discount rates for these three cost and reward domains in humans of any age.
- With age, reduced tolerance of costs for social and health rewards.
- Suggests that older adults are more motivated to obtain these rewards immediately and with certainty.
- In contrast to prior studies 7-9, we did not find any age differences in temporal discounting for monetary rewards.
- Presence of other rewards (social and health) may have reduced the saliency of money.
- Possible that in prior studies age was a proxy for income, which has been shown to be a stronger predictor of discounting.
- Motivational factors were also related to discount rates.
- Suggests age differences in discounting may be related to changes in motivation.
- Floor effect in effort task made results difficult to interpret.
- Possibly due to differences in task design (no 0% effort condition)

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