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Taking the Biggest First: Age Differences in Preferences for Monetary and Hedonic Sequences

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Abstract

**Objectives:** People face decisions about how to sequence payments and events, including when to schedule bigger events relative to smaller ones. We examine age differences in these sequence preferences.

**Methods:** We gave a national adult life-span sample ( $n=1,296$ ,  $M=53.06$  yrs,  $SD=16.33$ ) four scenarios describing a positive or negative hedonic (enjoyable weekends, painful dental procedures) or monetary (receiving versus paying money) event. We considered associations among age, sequence preferences, three self-reported decision-making processes—emphasizing experience, emotion, and reasoning—and two dimensions of future time perspective—focusing on future opportunities and limited time.

**Results:** Older age was associated with taking the ‘biggest’ event sooner instead of later, especially for receiving money, but also for the other three scenarios. Older age was associated with greater reported use of reason and experience and lesser reported use of emotion. These decision-making processes played a role in understanding age differences in sequence preferences, but future time perspective did not.

**Discussion:** We discuss ‘taking the biggest first’ preferences in light of prior mixed findings on age differences in sequence preferences. We highlight the distinct roles of experience- and emotion-based decision-making processes. We propose applications to financial and health-care settings.

Key words: decision making, event sequences, experience, emotion, future time perspective

## **Taking the Biggest First: Age Differences in Preferences for Monetary and Hedonic Sequences**

People commonly face choices about scheduling positive events such as how to spend their free time, and negative events such as painful medical procedures. They also face choices about sequences for receiving money and paying off loans. Such choices often involve when to schedule bigger events relative to smaller ones. For example, should a larger or smaller loan be paid off first? Most decision research, including that on sequence preferences, is conducted with college students (Peters & Bruine de Bruin, 2012, Strough, Karns, & Schlosnagle, 2011). Yet, understanding age differences in sequence preferences could inform the design of programs and services that aim to help people of all ages to improve their wealth, health, and psychological well-being. We therefore investigated associations among age and sequence preferences in positive and negative hedonic and monetary contexts. Using our conceptual framework (Strough, Parker, & Bruine de Bruin, 2015), we focused on experience-, emotion-, and reasoning-based decision-making processes, as well as future time perspective, to understand age differences in sequence preferences.

### **Preferences for Improving Sequences**

**Monetary events.** Choices about sequences of monetary events often suggested a preference for improving sequences where the best event is ‘saved for last’ (Loewenstein & Prelec, 1993). For example, for positive monetary events such as receiving income, people preferred increasing instead of decreasing increments (Duffy & Smith, 2013; Loewenstein & Sicherman 1991). This preference conflicts with the normative economic principle of maximizing the present value of funds (Loewenstein & Sicherman, 1991).

When asked about negative events such as paying money, people also preferred improving sequences in which payments reduced with time, even overpaying initially if this resulted in a refund later (Prelec & Loewenstein, 1998). A real-world example of such preferences is seen in US taxpayers' over-withholding of income to produce refunds (Gandhi & Kuehlwein, 2016). However, preferences for improving monetary sequences were not persistent. When making choices about a monetary windfall, people preferred to receive a larger amount of money up front, even when this led to less money overall (Read & Powell, 2000).

**Hedonic events.** Preferences for improving sequences have been found for positive hedonic events, such as dining out, where students saved the best meal for last (Loewenstein & Prelec, 1993). For negative events, students preferred to get the worst experience over with first, ending with the least painful one (Chapman, 2000). When sequencing a mixture of positive, negative, and neutral experiences, students preferred positive experiences to be last (Lau-Gesk, 2005). Such preferences have been attributed to anticipatory emotions experienced while waiting for events to happen (Loewenstein, 1987). By putting off a positive event, good feelings can be prolonged through savoring, whereas getting a negative event over with prevents anticipatory dread (Loewenstein, Weber, Hsee, & Welch, 2001).

### **Age and Sequence Preferences**

Of the four studies examining age differences in sequence preferences, two investigated mixed-affect sequences and yielded contradictory results. When choosing the viewing order of negative, neutral, and positive images, older adults were less likely than younger adults to construct improving sequences and put positive images relatively earlier (Loeckenhoff, Reed, & Maresca, 2012). However, older age was associated with stronger preferences for improving sequences of hypothetical foods that, respectively, tasted terrible, mediocre, and excellent

(Drolet, Lau-Gesk & Scott, 2010). It is unclear whether event magnitude contributed to age differences because the magnitude of negative and positive events was equated (Loeckenhoff et al., 2012) or confounded with valence (Drolet et al., 2010).

When presented with hypothetical scenarios about receiving income, older age was associated with more normatively-correct preferences, to receive larger amounts sooner instead of later (Loewenstein & Sicherman, 1991). However, another study found no age differences in actual experiences of winning or losing money, or of electrodermal shocks (Loeckenhoff, Rutt, Samanez-Larkin, O'Donogue, & Reyna, 2017). No studies have contrasted age differences in preferences for sequences of solely positive or solely negative events. Yet, doing so would disentangle event magnitude from valence. As we discuss next, older age could be associated with preferring to take the biggest event first, irrespective of valence.

### **Decision-Making Processes, Age, and Sequence Preferences**

**Experience.** Life experience increases with age (Baltes, Lindenberger, & Staudinger, 2006). Theorists have therefore posited that older adults rely more on experience when making decisions (Peters, Hess, Vastjfall, & Aumann, 2007; Strough et al., 2015). One of the few tests of this idea found that crystallized intelligence, presented as a proxy for experience, helped older people to compensate for declines in fluid cognitive abilities when making financial decisions (Li et al., 2014).

With increased experience, cognitively-effortful analytic processes may become automatic, giving rise to intuition based on learned associations (Pretz et al., 2014). Age differences in this type of experience have not been examined but could be important for decision making (Strough et al., 2011). For example, older adults' greater financial experience may facilitate understanding the present value of money, such that older age is associated with

preferring to receive larger (vs. smaller) amounts of money sooner (Loewenstein & Sicherman, 1991). Older adults' financial experience could also contribute to preferences for paying off larger loans sooner than smaller loans, thereby avoiding accrual of interest when the interest rates on the loans is the same. Thus, greater reliance on experience might be associated with preferring to both pay and receive larger amounts sooner than smaller amounts. For hedonic events, life experience with the affective benefits of avoiding dread could be associated with preferring to get negative experiences over with, or stronger preferences for improving hedonic sequences, in older age (Drolet et al., 2010).

**Emotion.** Traditionally, dual-process models have combined experience and emotion when describing decision-making processes (Evans, 2008). They distinguish an 'affective/experiential' system that is guided by emotions and experience, and is faster and less effortful than a 'deliberative' system (Kahneman, 2003). However, elsewhere we have argued that conceptualizing experience and emotion as distinct but overlapping processes could advance research on aging and decision making (Strough et al., 2011, 2015). For example, basing decisions on incidental emotions may be disadvantageous, but affective associations learned through experience may be advantageous (Peters et al., 2007).

Recently, measures have been developed to distinguish emotion-based processes from experience-based processes (Pretz et al., 2014), but they have not yet been used in age-diverse samples. If some automatic decisions are based on emotions, and others on experience, then each process could show different associations with age, and with sequence preferences. For example, experience-based processing might facilitate normatively-correct economic preferences, as discussed. In contrast, if emotion-based processing is a source of decision errors (Kahneman, 2003), then relying on emotions might be associated with non-normative economic preferences.

Further, if older adults are less likely to rely on emotions when making decisions (Delaney, Strough, Bruine de Bruin & Parker, 2015), this could explain their normatively correct economic preferences (Loewenstein & Sicherman, 1991). Using Pretz et al.'s (2014) measures in the current study allowed us to distinguish age-related differences that may exist between these two processing modes.

**Reason.** Theorists posit that due to age-related fluid cognitive declines (Salthouse, 2004) deliberative processing decreases with age (Peters et al., 2007). Older people experience cognitive effort as physiologically more costly, and become more selective about using their cognitive resources (Hess, 2014). Few studies have investigated age differences in reported use of decision styles, but Delaney et al. (2015) found that older age was associated with greater self-reported use of deliberate decision processes (cf., Bruine de Bruin, Parker, & Strough, 2016). Self-reports of using reason to make decisions have been linked to better performance on decision-making tasks (Bruine de Bruin, Parker, & Fischhoff, 2007), but links with sequence preferences have not been examined.

### **Future Time Perspective, Age, and Sequence Preferences**

Socioemotional selectivity theory posits that older age is associated with prioritizing positive experiences in the 'here and now' due to viewing time as limited (Carstensen, 2006). Limited future time perspective has been associated with less willingness to delay positive experiences (Loeckenhoff et al., 2012), suggesting that perceiving limited time might be associated with preferences for taking 'bigger' positive events sooner than less positive ones. Perceiving a limited future also could be associated with delaying the worst event in a negative sequence due to the possibility of never having to experience it at all. Alternatively, it could be



associated with preferring to get the worst over with to avoid anticipatory dread that could interfere with feeling good in the present.

### **The Present Research**

In summary, we built from the literature to conduct an exploratory study of age differences in sequence preferences. To avoid confounds of event magnitude and valence, we compared sequences that were solely positive to those that were solely negative. If older age was associated with taking the biggest hedonic event first, this could reconcile seemingly conflicting findings about age differences in preferences for improving sequences. For the monetary context, we investigated whether the association between older age and more normatively-correct preferences for receiving money (Loewenstein & Sicherman, 1991), generalized to paying money.

We also for the first time explored age differences in the roles of experience, emotion and reason in sequence preferences. Building from theory (Strough et al., 2011, 2015), we investigated whether decision-making processes based on experience versus emotion had different associations with age and sequence preferences. We investigated whether associations found in prior research among age, future time perspective, and sequence preferences (Loeckenhoff et al., 2012) generalized to our scenarios. This approach was reflected in three research questions:

- 1. Is age associated with sequence preferences in positive and negative hedonic and monetary contexts?**
- 2. Are self-reported use of experience, emotion, and reason to make decisions associated with age and sequence preferences?**
- 3. Is future time perspective associated with age and sequence preferences?**

## Method

### Participants

Participants were from RAND's American Life Panel, a probability-sampled internet-based panel study designed to represent U.S. adults age 18 and older (see <https://mmicdata.rand.org/alp/>). The study was approved by RAND's Human Subjects Protection Committee. Each participant was invited to participate in the first of two surveys. Those who completed the first were invited to complete the second. The surveys' procedure is described below. Of the 1,996 panelists invited to the first survey, 1,483 (74.3%) responded. Of these, 1,328 (89.5%) responded to the second survey. Of these, 1,296 (97.7%) answered all four sequence preference questions.<sup>1</sup> Age, gender, race, education, and income did not differ significantly between those who answered all four questions and those who did not (all  $ps > .05$ ).

The final sample ( $n=1296$ ) included adults aged 20-91 years ( $M=53.06$ ,  $SD=16.33$ ), 58.8% women, 81.3% Whites/Caucasians, and 84.3% Non-Hispanics/Latinos. Fifty-four percent had an associate's degree or higher, 51% reported their family income as \$49,999 or less.

### Procedure

Participants completed one positively-valenced and one negatively-valenced survey, in counterbalanced order, a few weeks apart. Each began with: "This survey will ask you to make decisions about things that will happen now or in the future. There are no right or wrong answers to these questions. We are merely interested in what you think." Each survey presented a

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<sup>1</sup> Data were missing for 14 (monetary, positive), 10 (monetary, negative), 18 (hedonic, positive) and 13 (hedonic, negative) cases. Surveys (390 and 391) are available at:

<https://alpdata.rand.org/?page=data>.

monetary context followed by a hedonic context. This design allowed a within-subjects comparison of valence for each context, without repeating positive and negative events in the same survey. Table 1 summarizes the four decision scenarios used to elicit preferences for sequences of receiving an inheritance (positive money), paying bills (negative hedonic), spending a month of enjoyable weekends (positive hedonic) and a month of weekly painful dental procedures (negative hedonic). Participants also took part in an experiment on thinking styles that did not interact with any of our independent variables and had no effect on our dependent measures,  $p > .05$ .

The positively-valenced survey ended with the inferential and affective subscales of the Types of Intuition scale (Pretz et al., 2014) and the rational subscale of Scott and Bruce's (1995) decision styles inventory. The negatively-valenced survey ended with a twelve-item version of Carstensen and Lang's (1996) future time perspective scale (Strough et al. 2016).<sup>2</sup>

## Measures

**Hedonic sequences.** Participants indicated their preferences for sequences of hedonic events on a 1-6 scale. For the month of enjoyable weekends scenario (positive valence), 1 was labeled "Start with **most enjoyable** weekends first, end with least enjoyable" and 6 was labeled

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<sup>2</sup> When at least 75% of scale items were complete, their mean was used to estimate the missing data and compute a scale score, yielding about 20 more usable cases. The significance of results was unaffected by whether missing data were excluded versus included. Gender, education, and income did not differ between responders and nonresponders ( $p > .05$ ). For the Types of Intuition, Rational, and Future Time Perspective scales, responders (versus non-responders) were more likely to be older and white ( $p < .001$ ).

“Start with **least enjoyable** weekends first, end with most enjoyable.” For the month of painful procedures scenario (negative valence), 1 was labeled “Start month with **most painful** procedures first, end with least painful” and 6 was labeled “Start month with **least painful** procedures first, end with most painful.” Lower ratings indicated a preference for taking the ‘biggest’ event sooner over later (starting off with the most pleasant weekend, or with the most painful procedure). Preferences for improving sequences were shown in lower scores for negative events and higher scores for positive events.

**Monetary sequences.** The response scale for sequences of receiving (positive valence) and paying (negative valence) money ranged from 1, labeled “Start with **larger amounts** first, end with the smaller,” to 6, labeled “Start with **smaller amounts** first, end with the larger.” For both items, lower ratings indicated a preference for the largest monetary installment sooner over later. Normatively correct preferences of maximizing current value were reflected in lower scores for receiving money and higher scores for paying money. Preferences for improving sequences were shown in lower scores for negative events and higher scores for positive events.

**Experience.** An eight-item Types of Intuition subscale (TIntS; Pretz et al., 2014) assessed using experience to make decisions. For example, “When I make a quick decision in my area of expertise, I can justify the decision logically.” Response options ranged from 1= “*definitely true*” to 5= “*definitely false*” ( $\alpha = .75$ ).

**Emotion.** Another eight-item TIntS subscale (Pretz et al., 2014) assessed using emotion to make decisions. For example, “I tend to use my heart as a guide for my actions.” Response options ranged from 1= “*definitely true*” to 5= “*definitely false*” ( $\alpha = .71$ ).

**Reason.** The four-item rational decision-making style measure (Scott & Bruce, 1995) assessed using reason to make decisions, for example, “I make decisions in a logical and

systematic way.” Response options ranged from 1=“*completely disagree*” to 5=“*completely agree*” ( $\alpha = .87$ ).

**Future time perspective.** A twelve-item version of Carstensen and Lang’s (1996) future time perspective scale assessed future time perspective (Strough et al., 2016). Seven items assessed focus on future opportunities, “My future is filled with possibilities” ( $\alpha=.91$ ), five assessed focus on limited time, “I have limited time left to live my life” ( $\alpha= .77$ ). Response options ranged from 1=“*very untrue*” to 7=“*very true.*” The subscales were correlated at  $-.45$  ( $p < .001$ ).

## Results

### Preliminary Analyses

An analysis of variance indicated no significant main effects or interactions with survey order,  $p > .05$ . Subsequent analyses collapsed across order. Income and education were correlated with some study variables (Supplementary Table 1), and were controlled in all analyses. Except when noted, analyses were unaffected by the inclusion of these controls.

### 1. Is age associated with sequence preferences in positive and negative hedonic and monetary contexts?

We estimated separate general linear models in SPSS for each context to examine effects of the within-subjects variable, valence (positive, negative), and the between-subjects continuous variable, age. We report significant associations.

**Hedonic contexts.** For hedonic contexts, the effect of valence,  $F(1,1290)=97.99$ ,  $p < .0001$ ,  $\eta^2=.07$  indicated preferences for improving sequences by delaying positive events ( $M=4.49$ ,  $SE=.05$ ) relative to hastening negative ones ( $M = 1.88$ ,  $SE=.04$ ).

For positive events of enjoyable weekends ( $r = -.11$ ,  $p < .001$ ) and negative events of painful dental procedures ( $r = -.07$ ,  $p < .008$ ), older age was associated with preferring bigger events sooner instead of later,  $F(1,1290) = 25.03$ ,  $p < .0001$ ,  $\eta^2 = .02$  (Figure 1).

**Monetary contexts.** For the monetary contexts, the effect of valence,  $F(1,1290) = 11.27$ ,  $p = .001$ ,  $\eta^2 = .01$ , indicated preferences for receiving larger amounts of money sooner ( $M = 2.26$ ,  $SE = .05$ ) relative to delaying payments ( $M = 2.66$ ,  $SE = .05$ ).

The significant association between age and sequence preferences,  $F(1,1290) = 47.52$ ,  $p < .0001$ ,  $\eta^2 = .04$ , was modified by an interaction with valence,  $F(1,1290) = 13.81$ ,  $p < .0001$ ,  $\eta^2 = .01$ . Older age was significantly associated with preferring to receive ( $r = -.21$ ,  $p < .001$ ) and pay ( $r = -.06$ ,  $p < .05$ ) bigger (vs. smaller) amounts sooner (Figure 1). The association was significantly stronger for choices about receiving versus paying money,  $p < .01$ . Older age was associated with normatively-correct preferences when receiving money, but was not associated with normatively-correct preferences when paying it.

## **2. Are self-reported use of experience, emotion, and reason to make decisions associated with age and sequence preferences?**

Older age was significantly correlated with greater reported use of experience and reason, and less use of emotion (Table 2). Thus, automatic decisions based on experience versus emotion were differently correlated with age.

Greater use of experience was correlated with preferences for 'bigger' events sooner than smaller ones for three scenarios: painful procedures, paying and receiving money. For the other scenario (enjoyable weekends), experience was correlated with delaying the more enjoyable (bigger) weekend relative to less enjoyable ones. Thus, greater use of experience was

significantly correlated with preferences for improving sequences, except when receiving money.<sup>3</sup>

Greater use of emotion was correlated with preferring bigger events later than smaller events for painful procedures and receiving money. Thus, greater use of emotion was correlated with preferences for increasing pain and receiving larger amounts of money later— with the latter reflecting a non-optimal choice according to normative economic theory.

Greater use of reason was correlated with preferences for bigger events sooner for painful procedures and paying money. Thus, use of reason was correlated with preferences for improving sequences of negative events. For money, this was a non-optimal choice according to normative economic theory.

To examine whether decision-making processes mediated age differences in sequence preferences, Hayes (2013) PROCESS macro used 5,000 bootstrapped resamples (Figure 2). As recommended (Hayes, 2013), we report unstandardized effects. Age was entered as a continuous variable.

First, age was significantly associated with all three decision-making processes (Table 3). Second, after controlling for the other decision-making processes and age (a) greater use of experience was significantly associated with preferences for improving sequences, except when receiving money, (b) greater use of emotion was significantly associated with preferring to receive larger amounts of money later, and (c) greater use of reason was significantly associated with preferring to pay larger amounts of money sooner (Table 3).

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<sup>3</sup> When education and income were not controlled, the association between experience and preferring larger payments sooner was marginal ( $p=.06$ ).

Third, for the positive hedonic context of enjoyable weekends, the direct effect of older age on preferences for more enjoyable weekends sooner than less enjoyable ones was stronger after taking into account the significant indirect effect of older adults' greater reported use of experience, indicating a suppression effect (Table 4).<sup>4</sup>

For the negative hedonic context of painful procedures, the direct effect of older age on preferring more painful procedures sooner than less painful ones was reduced after accounting for the significant indirect effect of older adults' greater reported use of experience, consistent with mediation (Table 4).

For the positive monetary context of receiving money, the direct effect of older age on preferences for receiving larger amounts of money sooner than smaller amounts was reduced after taking into account the significant indirect effect of older adults' lesser reported use of emotion, consistent with mediation (Table 4).<sup>5</sup>

For the negative monetary context of paying money, the direct effect of older age on preferences for paying larger amounts of money sooner than smaller amounts was reduced after accounting for the significant indirect effect of older adults' greater reported use of reason, consistent with mediation (Table 4).

### **3. Is future time perspective associated with sequence preferences and age?**

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<sup>4</sup> The indirect path through emotion was significant when education and income were not controlled.

<sup>5</sup> The indirect path through experience was significant when education and income were not controlled.



Older age was correlated with focusing more on a limited future and less on future opportunities (Table 2). Greater focus on future opportunities was correlated with preferences for improving sequences of delaying more enjoyable weekends relative to less enjoyable ones. A greater focus on limited time and lesser focus on future opportunities were each correlated with normatively-correct preferences to receive larger amounts of money sooner than smaller amounts. Neither dimension of future time perspective was correlated with negatively-valenced sequence preferences.

Dimensions of future time perspective were examined as mediators of age differences in sequence preferences (Supplementary Figure 1). First, age was associated with future time perspective dimensions. Second, after accounting for age, neither dimension was significantly associated with sequence preferences for any of the scenarios. Third, bootstrapped estimates of the indirect effect of age through future time perspective dimensions were nonsignificant for each of the four scenarios. Neither focus on future opportunities, nor limited time, mediated age differences in sequence preferences.

### **Discussion**

Understanding sequence preferences is important because the choices people make about when to receive versus pay money and when to schedule aversive health appointments and positive experiences likely have implications for their wealth and psychological well-being. Our findings show that older adults preferred to take the biggest event first. This association was strongest for positive sequences of receiving money, but also characterized the other three sequences we examined. Self-reported decision-making processes accounted for age-related variance in sequence preferences, but future time perspective did not. Our findings offer insights about why older age was associated with preferring bigger events sooner than later.

## **Age and Sequence Preferences**

By showing that older age was associated with taking the biggest event first, we highlight the importance of considering event magnitude along with valence. This could help reconcile seemingly conflicting findings about whether older adults are more or less likely to prefer improving hedonic sequences of saving the best for last (Drolet et al., 2011; Loeckenhoff et al., 2012). The valence of events within a mixed-affect sequence may drive age differences in preferences when magnitude is held constant (e.g., Loeckenhoff et al., 2012). Otherwise, event magnitude may drive preferences, as shown in our findings. If big events are more arousing, getting them over with may benefit older adults by reducing arousal that challenges their physiological vulnerabilities (Charles & Luong, 2013). Thus, our findings align with the suggestion that older adults avoid arousal (Isaacowitz & Ossenfort, 2017).

Older adults' preferences for receiving larger amounts of money 'up front' are consistent with research showing that older adults' decisions are more likely than those of younger adults to conform to normative economic principles (Li et al., 2014; Strough et al., 2016). Yet, older age was also associated with preferences to pay larger (vs. smaller) amounts sooner. Getting big payments over with may have utility for avoiding anticipatory dread (Loewenstein et al., 2001), but it violates economic principles. Optimal economic choices among older adults may be context specific (Roalf, Mitchell, Harbaugh, Janowski, 2012).

## **Decision-Making Processes, Age, and Sequence Preferences**

Older age was associated with greater reported use of experience and lesser reported use of emotions to make decisions, demonstrating the value of considering these as distinct processes (Strough et al., 2011). Further research is necessary to address whether using experience reflects the quality or amount of experience one has.

For painful procedures, older adults' greater use of experience helped to explain their preferences for worse events sooner than less aversive ones. This could be an example of taking action before an emotion is experienced to mitigate it (Gross, 2001). Other research showed older age was associated with less rumination about past negative events (Bruine de Bruin et al., 2014; Strough et al., 2016). Older adults may also seek to avoid anticipatory worrying about future negative events.

Older adults' lesser use of emotions to make decisions (Delaney et al., 2015) facilitated optimizing present value when choosing how to receive money. Others have also suggested that age-related improvements in emotion regulation facilitate good decision making (Bruine de Bruin et al., 2014).

Older adults' non-optimal economic preferences to pay larger amounts of money sooner than smaller amounts was associated with their greater reported use of reason. Their reasoning may have been that making a big payment first would reduce penalties. Other work suggests that people use their experience to 'go beyond' researchers' scenarios (Strough et al., 2016) and that such inferences are more prevalent when people use logical reasoning (Wong, Kwong, & Ng, 2008). Older adults may also have reasoned that making a big payment up front would reduce dread about impending payments.

### **Future Time Perspective, Age, and Sequence Preferences**

For positive events, the association between older age and present-oriented preferences of bigger events sooner than smaller events are consistent with ideas from socio-emotional selectivity theory (Carstensen, 2006). Focus on future opportunities was associated with preferences for improving sequences of saving the best for last, replicating Loeckenhoff et al. (2012). Focus on limited time was associated with preferring to receive bigger amounts of

money sooner than smaller amounts. Yet, future time perspective did not account for the association between age and present-oriented sequence preferences. This is inconsistent with socioemotional selectivity theory's emphasis on time perspective as an explanatory mechanism. We compared hedonic sequences occurring over a month, and monetary sequences occurring over an unspecified time. Past research investigated preferences within a single laboratory session, hypothetical meal, or over five years (Drolet et al., Lockenhoff et al., 2012, Loewenstein & Sicherman, 1991). Future research should examine the role of time frame. Older age and focusing on limited time are associated with perceiving time as passing more quickly for activities with long-term, but not immediate outcomes (John & Lang, 2015).

### **Future Directions and Conclusions**

Because we used one cross-sectional life-span sample and correlational methods, our data cannot address causal, developmental, or cohort effects (Lindenberger, van Oertzen, Ghisletta, & Hertzog, 2011; Maxwell & Cole, 2007; Schaie, 1983). Our hypothetical scenarios may not have captured the complexity of decisions about receiving retirement earnings, or when to engage in health screenings. However, decisions about hypothetical scenarios do predict real-world decision behaviors and outcomes (Bruine de Bruin, et al., 2007).

We did not assess cognitive functioning. Imagining the future taxes cognitive resources that decline with age (Schacter, Gaesser, & Addis, 2013). Older adults are worse than younger adults at imagining events, especially future ones (Rendell et al., 2012). Additional research is required to rule out the possibility that older adults' present-oriented preferences reflect insufficient cognitive resources to imagine the future.

Our findings suggest that when designing interventions for older adults it may be important to consider their tendency toward making present-oriented choices. In the US, older

adults often choose to receive Social Security benefits before they are eligible to receive full benefits, even though this means they receive less money overall (Purcell, 2010). This burdens the Social Security system and puts older adults at risk for financial disadvantage, by exiting the workforce when earning potential is often at a peak and because annual Social Security benefits will be lower and checks will be smaller. Early retirement also has disadvantages for health and well-being (Calvo, Sarkisian, & Tamborini, 2013; Vo et al., 2015). Perhaps one strategy to encourage older adults to remain in the workforce might be to emphasize present-oriented positive benefits of continuing to work.

Our findings also have potential applications in health-care settings where patients may prefer to get aversive procedures over with sooner rather than later. If this is impossible, then addressing the anxiety this may cause through education and stress management may be an important part of the treatment plan (Garcia, 2014; Lee et al., 2014). In conclusion, our findings contribute new knowledge to the growing literature on aging and decision making. Ultimately, we aim to promote physical, mental, and financial health across the life span.

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Table 1

## Within-Subject Decision Scenarios

Context	Valence	
	Positive	Negative
Hedonic events	<p>Imagine that you are deciding how you will spend your time over the next four weekends. Some weekends will be very enjoyable, and others will not be enjoyable at all. There are different ways the weekends could be scheduled over the next month. One way would be for the early weekends to be very enjoyable and the later weekends to be not enjoyable at all. Another way would be for the early weekends to be not enjoyable at all and the later weekends to be very enjoyable. In all cases, the total amount of enjoyment for the month is the same. How would you prefer to spend your time?</p>	<p>Imagine that for the next four weeks you will need to visit the dentist once each week. Sometimes the procedures will be very painful, and other times they will be not painful at all. There are different ways the procedures could be scheduled over the next month. One way would be for the early procedures to be very painful and the later procedures to be not painful at all. Another way would be for the early procedures to be not painful at all and the later procedures to be the very painful. In all cases, the total amount of pain for the month is the same, and at the end of the month you will be pain free. How would you prefer to visit the dentist?</p>

Table Continues

Table 1 Continued

## Within-Subject Decision Scenarios

Context	Valence	
	Positive	Negative
Monetary events	<p>Imagine you just found out that that you will receive a very large monetary inheritance from a relative that you didn't even know you had. You will be given the money in multiple installments over time. There are different ways that you can receive the money. One way would be to receive larger amounts of money early and smaller amounts of money later. Another way would be to receive smaller amounts of money early and larger amounts of money later. In all cases, the total amount of money would be the same. How would you prefer to receive the money?</p>	<p>Imagine that you owe a very large amount of money. You will have to pay out the money in multiple installments over time. There are different ways that you could make the payments. One way would be to pay larger amounts of money early and to pay smaller amounts of money later. Another way would be to pay smaller amounts of money early and to pay larger amounts of money later. In all cases, the total amount of money would be the same. How would you prefer to pay the money?</p>



Note. Two-sided p-value  $p < .05^*$ ;  $p < .01^{**}$ ;  $N = 1289$ . For age, higher values indicated older age. For hedonic and monetary contexts, lower ratings indicated a preference for the 'biggest' event sooner over later meaning that preferences for improving sequences were shown in lower scores for negative events (painful procedures, paying money) and higher scores for positive events (enjoyable weekends, receiving money). Normatively correct preferences of maximizing current value were shown in lower scores for receiving money and higher scores paying money. Greater reported reliance on experience, emotion, and reason to make decisions were indicated by higher values. Greater focus on future opportunities and limited time were indicated by higher values.



Table 3

Associations Between Age and Decision-Making Processes and Between Decision-Making Processes and Sequence Preferences in Positive and Negative Hedonic and Monetary Contexts

Variable	<u>Decision-Making Process</u>		
	Experience b(SE)	Emotion b(Se)	Reason b(SE)
Age	.002 (.001)*	-.005 (.001)*	.003 (.0001)*
Hedonic Contexts			
Enjoyable Weekends	.394 (.109)***	-.170 (.097)+	-.053 (.069)
Painful Procedures	-.289 (.092)*	.145 (.074)+	-.092 (.059)
Monetary Contexts			
Receiving Money	-.245 (.113)*	.206 (.091)*	.127 (.072)
Paying Money	-.232 (.116)*	-.008 (.093)	-.192 (.074)*

Note. Greater reported reliance on experience, emotion, and reason to make decisions were indicated by higher values. For hedonic and monetary contexts, lower ratings indicated a preference for the 'biggest' event sooner over later meaning that preferences for improving sequences were shown in lower scores for negative events (painful procedures, paying money) and higher scores for

positive events (enjoyable weekends, receiving money). Normatively correct preferences of maximizing current value were shown in lower scores for receiving money and higher scores paying money.

N = 1289, +  $p = .05$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 4

Direct and Indirect Effects of Age on Sequence Preferences in Positive and Negative Hedonic and Monetary Contexts

Context and Valence	<u>Direct effect of age before and after</u>				
	<u>accounting for indirect effects</u>		<u>Indirect effect of age through decision-making process</u>		
	Before	After	Experience	Emotion	Reason
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
<u>Hedonic Contexts</u>					
Enjoyable Weekends	-.013 (.003) ***	-.015 (.003)*	.0007 (.0004)*	.0009 (.0005)	-.0002 (.0003)
Painful Procedures	-.007 (.003) **	-.005 (.003)*	-.0005 (.0003)*	-.0007 (.0004)	-.0003 (.0002)
<u>Monetary Contexts</u>					
Receiving Money	-.024 (.003) ***	-.023 (.003) ***	-.0004 (.0003)	-.0010 (.0005)*	.0004 (.0003)
Paying Money	.007 (.003)*	-.006 (.003)+	-.0004 (.0003)	.0000 (.0005)	-.0006 (.0004)*

Note. Indirect effects represent the contribution of each process when holding the others constant and the change in the criterion variable associated with a change of only one year of age. To see the effect of a larger age difference, the estimate can be multiplied by, for example, 20 to show the effect of a 20 year age difference. To facilitate that exercise, we provide estimates of indirect effects to four decimal places. For age, higher values indicated older age. Greater reported reliance on experience, emotion, and reason to make decisions were indicated by higher values. For hedonic and monetary contexts, lower ratings indicated a preference for the

'biggest' event sooner over later meaning that preferences for improving sequences were shown in lower scores for negative events (painful procedures, paying money) and higher scores for positive events (enjoyable weekends, receiving money). Normatively correct preferences of maximizing current value were shown in lower scores for receiving money and higher scores paying money.

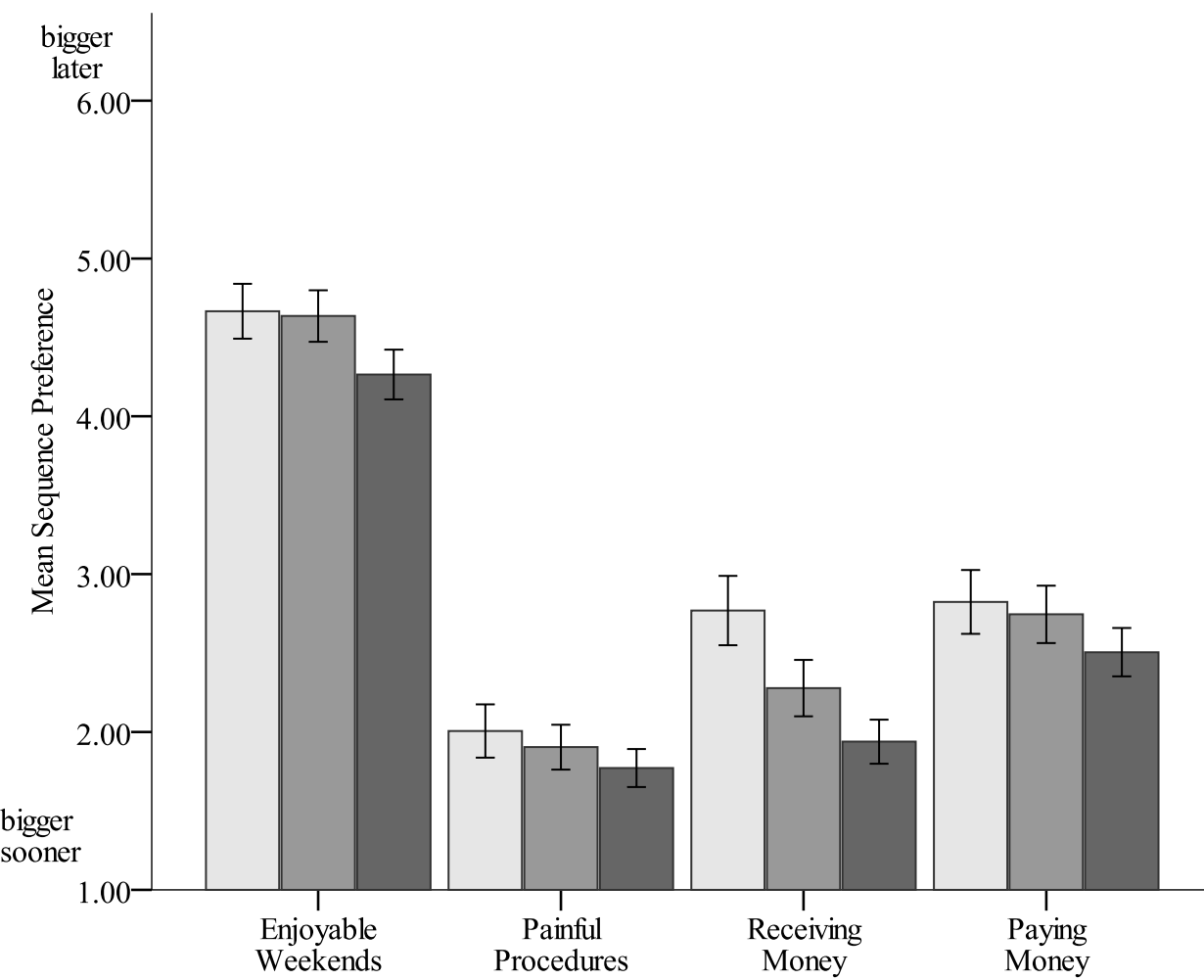
N = 1289, +  $p = .05$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

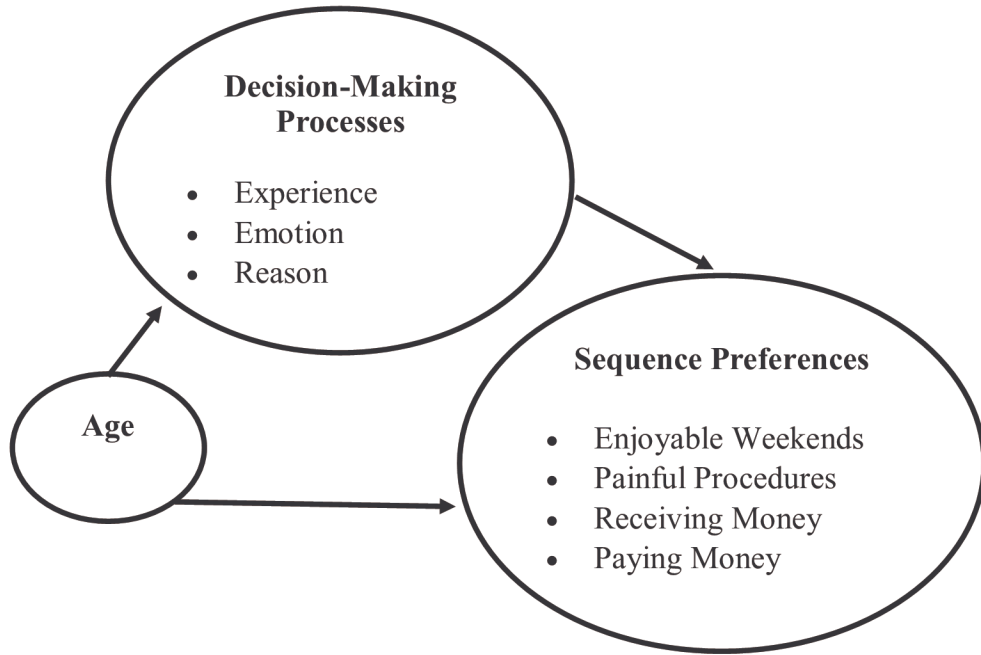
Figure Captions

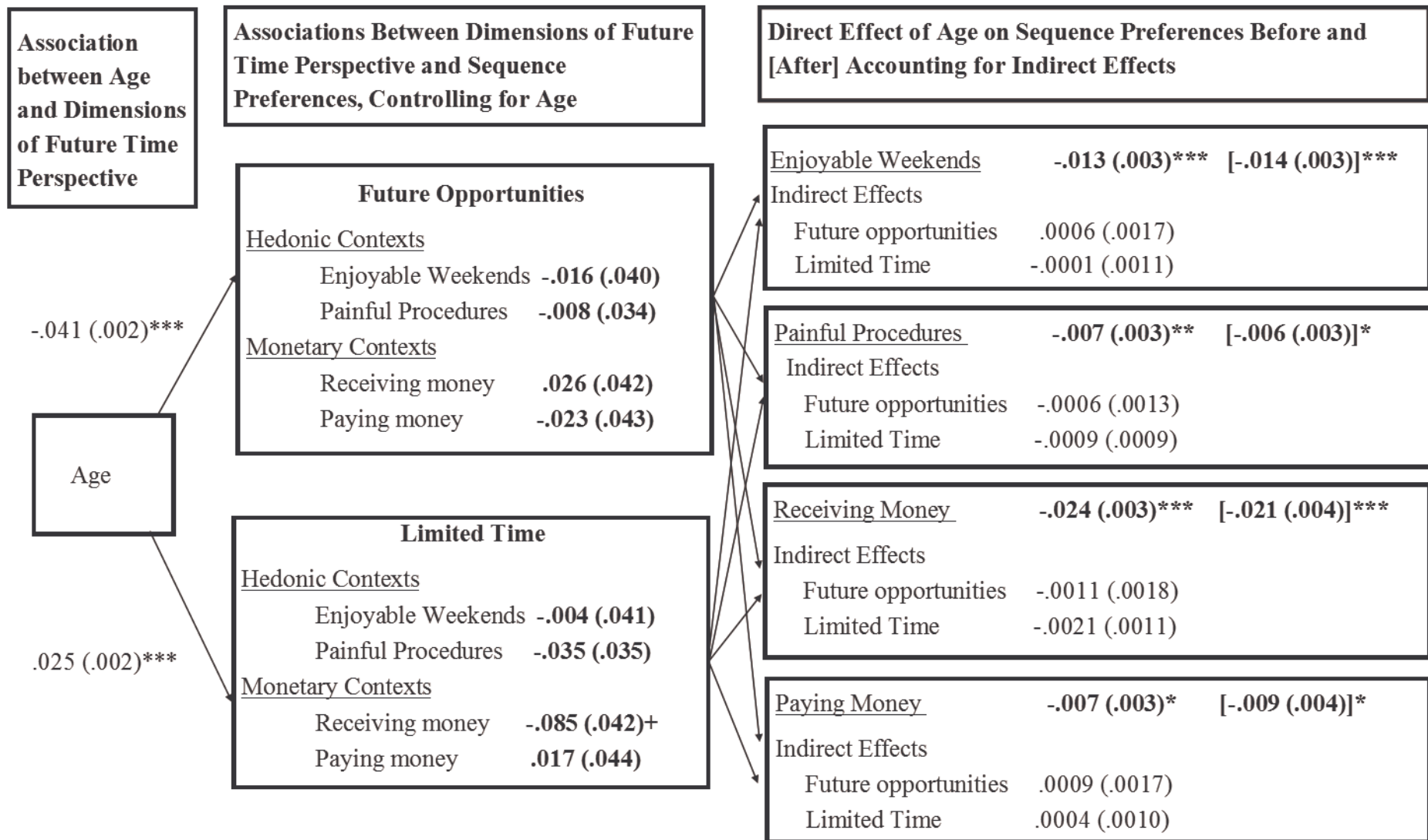
Figure 1. Age differences in sequence preferences by event valence and context.

Note. Age is depicted as a categorical variable in the figure, but was a continuous variable in all analyses. Error bars represent 95% confidence intervals of the mean. For all four items, lower ratings indicated a preference for the ‘biggest’ event sooner over later meaning that preferences for improving sequences were shown in lower scores for negative events (painful procedures, paying money) and higher scores for positive events (enjoyable weekends, receiving money). Normatively correct preferences of maximizing current value were shown in lower scores for receiving money and higher scores for paying money.

Figure 2. Conceptual model of decision-making processes as mediators of age differences in sequence preferences in positive and negative monetary and hedonic contexts.







Supplementary Figure 1. Direct effects of age and future time perspective dimensions on sequence preferences in positive and negative hedonic and monetary contexts before and after accounting for indirect effects.

*Note.* Coefficients are unstandardized effects, with standard errors shown in parentheses. For dimensions of future time perspective, associations with sequence preferences control for age while holding the other dimension constant. Indirect effects represent the contribution of each dimension when holding the other constant and the change in the criterion variable associated with a change of only one year of age. To see the effect of a larger age difference, the estimate can be multiplied by, for example, 20 to show the effect of a 20 year age difference. To facilitate that exercise, we provide estimates of indirect effects to four decimal places. For age, higher values indicated older age. Greater focus on opportunities and limited time were indicated by higher values. For hedonic and monetary contexts, lower ratings indicated a preference for the ‘biggest’ event sooner over later meaning that preferences for improving sequences were shown in lower scores for negative events (painful procedures, paying money) and higher scores for positive events (enjoyable weekends, receiving money). Normatively correct preferences of maximizing current value were shown in lower scores for receiving and higher scores for paying money.