

Adult Age Differences in the Response to and Regulation of Recent Versus Long-Term Regrets

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Past research on age-related differences in regrets and their regulation has failed to separate the effects of age versus recency (i.e., time since the regret originated). To address this gap, we collected data from $N = 90$ U.S. adults ($M_{\text{age}} = 49.81$, $SD_{\text{age}} = 18.71$, 63% women) who reported their most severe recent and long-time regrets. Present- and future-oriented regret regulation strategies were assessed with respect to decision avoidance, decision alteration, and affect-based strategies. In addition, we accounted for demographic, socioemotional, health, personality, and cognitive covariates, including perceived control and future time perspective. For recent regrets, older age was associated with reporting fewer, more omission-based, and fewer interpersonal regrets. Reliance on affect-based strategies (present-oriented) and decision alteration (future-oriented) was less common with age. For long-term regrets, older age was associated with reporting regrets that were more distant, less controllable, more omission-based, and less likely to be downregulated. Regarding covariates, older adults' lesser perceived control over long-term regrets was associated with age differences in omission-based regrets, and their more limited future time perspective was associated with age differences in interpersonal regrets. Several of the observed age effects, particularly those linked to long-term regrets, were associated with age differences in cognition and affect, whereas many effects concerning recent regrets were not associated with covariates. Overall, findings illustrate the necessity to distinguish between recent and long-term regrets when examining age-related differences. Given the limited diversity of the sample, the findings may not readily generalize to less well-educated or non-White populations.

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People experience regret when they know (or suspect) that having made a different choice would have led to a more favorable outcome (Zeelenberg, 1999). Compared to younger people, older people have and perceive fewer opportunities to exert control over their regrets (e.g., Newall et al., 2009; Timmer et al., 2005; Wrosch & Heckhausen, 2002). This may, in part, be due to older adults appraising their future time perspectives as more limited (i.e., they perceive less remaining time). Notably, most research on age-related differences in responses to regrets has failed to consider that older adults have already had more opportunities to downregulate past

regrets. To address this oversight, the present study aimed to parse apart the roles of age and regret recency with respect to regret-related experiences and their regulation. To this end, we compared U.S. adults' *recent* regrets that originated in the year prior to data collection (i.e., same timeline for all age groups) with *long-term* regrets that originated at any time in an individual's past (i.e., different timelines for different age groups). Participants also reported on the *present- and future-oriented regret regulation strategies* they were using or planned to use with respect to their recent and long-term regrets. Finally, we accounted for covariate measures that may

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contribute to the way older adults perceive or respond to regrets (i.e., demographic, socioemotional, health, personality, and cognitive variables). In particular, we examined data on people's perceived control over regrets and their perceived future time perspectives (i.e., time left to live).

Regret

Regret is a negative, low-to-moderate arousal (Patel & Urry, 2024), and cross-culturally experienced (Breugelmans et al., 2014) emotion specific to the context of decision making. It is considered distinct from similar emotions such as the experience of disappointment about facing an unfavorable outcome. More closely related to guilt, as both regret and guilt imply culpability for the occurrence of the unfavorable outcome, regret entails counterfactual thinking about more favorable outcomes that could have been experienced had a different decision been made. Compared to other negative emotions, regret is also considered more informative or valuable: Feelings of regret can help to steer future decision making by trying to avoid making (similar) mistakes moving forward (Saffrey et al., 2008; Zeelenberg & Pieters, 2007).

Multifaceted, the experience of regret can be indexed with respect to multiple characteristics. These range from the type of decision that elicits regret to the intensity or controllability of regret (see Nolte & Löckenhoff, 2024, for an overview). Below, we review the extant literature on age differences in different aspects and characteristics of regret. Of note, in keeping with the way "regret" is colloquially treated as a countable entity by many laypeople (i.e., "no regrets," "my biggest regret is"), below we both refer to and assess the feeling of regret with respect to specific decisions or occasions that have resulted in one or more countable "regrets."

Number, Intensity, and Domain of Regrets

Ninety percent of people, including older adults, harbor intense long-term or "life" regrets (Bauer & Wrosch, 2011; Wrosch et al., 2005, 2007). The intensity of life regrets appears to remain stable with age (Morrison & Roese, 2011; Thomas et al., 2019; Västfjäll et al., 2011), but some studies report that older adults report fewer life regrets (Dijkstra & Barelds, 2008; Lecci et al., 1994; Timmer et al., 2005).

Life regrets are most numerous or intense with respect to educational or romantic choices (Dijkstra & Barelds, 2008; Morrison & Roese, 2011; Roese & Summerville, 2005). Some studies indicate that regret domains are consistent with age (e.g., Morrison & Roese, 2011; Wrosch & Heckhausen, 2002). For example, in line with educational life regrets (e.g., not pursuing a certain college major) being generally among the most dominant ones, older adults seem most likely to identify education-related regrets, too (Hattiangadi et al., 1995; Lecci et al., 1994; Wrosch & Heckhausen, 2002). Other studies find that older adults hold fewer educational and leisure-related regrets than younger adults do, while being troubled more by parenting or family regrets (e.g., failure to mend an estranged relationship; Dijkstra & Barelds, 2008; Jokisaari, 2004; Lecci et al., 1994).

Commissions and Omissions

The intensity of regrets also differs between commission regrets and omission regrets. Commission regrets follow an active choice, such as pursuing the wrong college major (e.g., wasted educational

opportunity; Gilovich & Medvec, 1995). By contrast, omission regrets follow inaction or a passive acceptance of preselected choice options, such as not pursuing a college education at all (e.g., missed educational opportunity; Gilovich & Medvec, 1995). In the short run, commissions evoke more frequent or intense regrets ("action effect"; e.g., Kahneman & Tversky, 1982) and trigger more intense "hot" negative emotions, such as irritation (Gilovich et al., 1998). "Hot" emotions also include anger and embarrassment (Gilovich & Medvec, 1995). But whereas commission regrets diminish with time, omission regrets tend to linger longer. They are also thought to be associated with higher levels of rumination and to be more likely to be remembered (e.g., Gilovich & Medvec, 1994, 1995; Leach & Plaks, 2009), although findings are inconsistent in this regard: Leach and Plaks (2009), for example, showed that more pronounced regrets surrounding omissions are associated with more abstract thinking (both with respect to coded self-generated responses and manipulated thinking styles) and greater temporal distance. By contrast, Ranellucci (2025) did not observe differences in how decision-makers ruminate about omission and commission regrets when using a Self-Report Rumination Scale. On the flipside, omission regrets cue more intense "despair"-related negative emotions (i.e., helplessness, sorrow, or desperation) or "wistful" emotions (i.e., nostalgia, sentimentality, contemplation; Gilovich et al., 1998). Newall et al. (2009) suggested that older adults are more likely to report omission than commission regrets. This is plausible given that older adults' life regrets (e.g., concerning career, education, or family-related choices) may have originated a longer time ago and considering that omission regrets are longer lasting and more likely to be remembered than commission regrets are. Conversely, others (Morrison & Roese, 2011; Wrosch et al., 2005) have observed no relevant age-related differences concerning commission versus omission regrets.

Controllability of Regrets

Commission regrets that stem from identifiable decisions or actions (such as committing to marriage) are experienced as more controllable (such as by undoing the marriage) than omission regrets that are not associated with a specific decision or action (Gilovich & Medvec, 1995). Likewise, regrets that originated a short time ago might appear as more controllable than regrets that originated a long time ago (Morrison & Roese, 2011) because the decision is still mendable or its consequences limited (e.g., ability to enroll in college a year later, changing one's major within the year, apologizing after a recent disagreement). Age groups do not differ in how controllable they perceive recent regrets, but age is associated with the perceived controllability of long-term regrets (Wrosch & Heckhausen, 2002): Older adults perceive their regrets as problems that can no longer be fixed and fewer opportunities for control (Morrison & Roese, 2011), especially over long-term regrets that might be difficult or impossible to undo with age (Timmer et al., 2005; Wrosch & Heckhausen, 2002).

Anticipated Versus Experienced Regrets

Beyond the evaluation of past regrets, researchers have studied regret from a decision-making angle. During the evaluation of choice options, individuals have to envision how a choice—or its consequences—will make them feel. This can result in feelings

of anticipated regret—that is, expectations or concerns about experiencing regret in the future. After an option has been chosen, realizing or assuming that a different option would have led to a better outcome will often result in feelings of actually experienced regret.

In a daily diary study, older adults *anticipated* fewer and less intense regrets than younger adults did after making an everyday decision (Bjälkebring et al., 2013). In a similar vein, some researchers find that older adults *experience* fewer, shorter, and less intense regrets in everyday decision making than younger adults do (Bjälkebring et al., 2013; Västfjäll et al., 2011). Other research, such as research on regrets concerning medical treatments, finds experienced regrets to be unrelated to age (L. Brown et al., 2019; Thomas et al., 2019; also see English & Carstensen, 2015) or for older adults to report more numerous or intense experienced regrets than younger adults do (Becerra Pérez et al., 2016; Karuturi et al., 2019).

However, prior research on regret in decision contexts focused on day-to-day or fairly recent decisions (e.g., medical treatments in recent years). Thus, it is unclear whether the same patterns would hold for more consequential decisions or more enduring regrets. In the present research, we conceptualize experienced regrets as self-reported recent and long-term regrets. We study anticipated regrets with respect to the regret regulation strategies individuals would want to recruit when managing similar recent or long-term regrets in the future.

Regret Regulation

People have many options for downregulating feelings of regret (Zeelenberg & Pieters, 2007). This includes undoing a decision, pursuing a new course of action, bracing themselves for the experience of regret later on, and avoiding choice in the first place. According to a broad differentiation proposed by Gilovich and Medvec (1995), strategies that attempt to course-correct one's behavior or undo regrets by "fixing mistakes" reflect *behavioral repair work strategies*. By contrast, strategies that attempt to change the way regrettable decisions are being appraised (e.g., by focusing on silver linings) reflect *psychological repair work strategies*.

Here, we propose a related but more fine-grained categorization of regret regulation approaches. This categorization integrates research on age differences in regret with research on age differences in decision making. In accordance with Gross (1998), our categorization reflects that emotions can be regulated at multiple stages across the so-called process model of emotion regulation: when selecting situations, modifying situations, deploying one's attention, changing one's cognitions about an emotion, or when modulating one's response to the emotion. In detail, we differentiate among (a) decision avoidance strategies that delay, defer, or evade decisions or decision responsibility altogether (thus avoiding regret before it occurs), (b) strategies that alter engagement with the decision process (e.g., by increasing or decreasing one's efforts to choose well), and (c) strategies aimed at improving one's psychological or affective response to regrets. The first two categories share overlap with behavioral repair work. Conversely, the third overlaps with psychological repair work strategies. Arguably, this proposed categorization broadly aligns with different stages of Gross's process model: Specifically, we propose that *decision avoidance* is a variant of situation selection, that *decision alteration* and *behavioral repair work* are variants of situation modification, that *psychological repair*

work is a variation of cognitions about one's regret, and that *affect-based strategies* encompass both cognitions about regret and response modulation. In the following paragraphs, we consider prior evidence for age-related differences with respect to these categories of decision and regret regulation strategies.

Decision Avoidance

Compared to younger adults, older adults are more likely to put off (e.g., Hudak et al., 2002; Lovell et al., 2017; Winter et al., 2006), outsource (e.g., Pinquart & Duberstein, 2004; Strough et al., 2002; Wetzels et al., 2004), or avoid choices altogether (e.g., Chen et al., 2011; Curley et al., 1984; Nolte & Löckenhoff, 2025; Pethel & Chen, 2013). In fact, older adults can successfully downregulate regrets by seeking help from others or delaying the decision (Bjälkebring et al., 2013; Nolte & Löckenhoff, 2025). This reliance on decision avoidance strategies appears to explain why older adults report experiencing fewer everyday regrets, with avoidance mediating the age effect (Bjälkebring et al., 2013).

Decision Alteration

Compared to younger adults, older adults prefer to make decisions among more limited choice sets and explore fewer choice options or information about each option prior to choosing (Mata & Nunes, 2010; Reed et al., 2008; Rydzewska et al., 2018; van Helverson & Mata, 2012). Older adults also lower the complexity of their decisions by relying on simpler, less cognitively effortful decision strategies; for example, older adults make use of fewer available pieces of information and prefer strategies that require making fewer comparisons or trade-offs between options (e.g., they prefer the take-the-best or take two heuristics; Mata et al., 2007). Similarly, they are known to settle for options that are "passable" rather than "optimal" (Besedeš et al., 2012; Bruine de Bruin et al., 2012). Since older adults score lower with respect to many decision-relevant capabilities (Bruine de Bruin et al., 2012; Del Missier et al., 2011; Mata et al., 2007), they may be less likely to try and improve their decision approach (e.g., to try harder to make a good choice or consider a wider range of choices) to preserve cognitive resources. This might be the case even if it means investing less to avoid regrettable choices.

Affect-Based Strategies

Relative to younger adults, older adults exhibit a "positivity effect" by attending more strongly to positively valenced choice characteristics than negative ones (English & Carstensen, 2015; Kim et al., 2008; Löckenhoff & Carstensen, 2007, 2009). People who exhibit such a tendency tend to report greater decision satisfaction or better postdecisional affect (English & Carstensen, 2015; Levin et al., 2021; Löckenhoff & Carstensen, 2009). They also tend to misremember past decisions more positively than they were originally experienced (Kennedy et al., 2004; Mather & Johnson, 2000). In line with these findings, older adults have been found to rely more strongly on affect-based strategies and psychological repair work when downregulating experienced or anticipated regrets. For example, older adults tend to reappraise their situation in a new light (Bjälkebring et al., 2013; Newall et al., 2009; Wrosch et al., 2000, 2005). Reappraisal, too, has been found to account for the

relationship between older age and fewer reported regrets in day-to-day decision making (Bjälkebring et al., 2013).

What Drives Age Differences in Regret Experience and Regulation?

Two theoretical frameworks that describe motivational shifts across the adult lifespan shed light on potential mechanisms behind the observed age effects in regret experience and regulation. One is the motivational theory of life-span development (building on the life-span theory of control; Heckhausen et al., 2010; Schulz & Heckhausen, 1996; Wrosch & Heckhausen, 2002). It suggests that regrets can be reversed by applying primary control (similar to behavioral repair work) or emotionally downregulated through secondary control (similar to psychological repair work). People tend to rely on primary control if the circumstances of the decision can still be altered. If this is not an option or not perceived as one, people may recruit secondary control. Older adults have objectively less access to primary control and also perceive their opportunities for applying primary control as more limited (e.g., Lecci et al., 1994; Newall et al., 2009; Timmer et al., 2005; Wrosch et al., 2005; Wrosch & Heckhausen, 2002). Thus, older adults' tendency to avoid choices or to limit their investment in the decision process could reflect limitations in perceived ability to exert primary control. Further below, we derive theory-driven hypotheses about the use of behavioral and psychological repair work, the accessibility of control, decision avoidance, and decision engagement.

Socioemotional selectivity theory (Carstensen et al., 1999), in turn, proposes that a finite sense of time motivates people to invest more in present-oriented goals promoting emotional well-being and show decreased pursuit of information or knowledge-based goals that optimize future outcomes or decisions (Fung & Isaacowitz, 2016). As a result, those with a more limited time perspective (i.e., older adults) might curb their engagement with the decision process because they are less motivated to optimize information search and future decision outcomes. Thus, older adults should become more likely to avoid choice and less likely to try and alter their decision-making efforts. At the same time, individuals with shortened time perspectives should be more motivated to establish and preserve positive affect (Carstensen et al., 2003; Löckenhoff & Carstensen, 2004; Sullivan et al., 2010). This can be achieved, for example, by focusing on the upside of their choices (see the previously introduced "positivity effect" evident among older adults) or by investing in close interpersonal relationships. As such, older adults can be expected to rely more strongly on affect-based regret regulation strategies. Further below, we derive theory-driven hypotheses about the role of future time perspective, decision avoidance, and decision engagement, as well as affect-based measures and reliance on affect-based coping strategies.

The Present Study

The present study aimed to tease apart age-related and recency-based differences in the experience and regulation of regrets. Recent regrets originating in the year prior to data collection were expected to be more sensitive to participants' chronological age (e.g., different age groups may experience regrets differently or prefer different regret regulation strategies). Conversely, long-term regrets may have originated (much) longer ago for older adults than for

younger adults. Thus, long-term regrets may be influenced by recency as well as age. Because age changes the perceived availability of future opportunities to address regrets, our analyses also distinguish between strategies to address prior regrets and strategies to avoid similar regrets in the future.

Hypotheses

Because most prior work has relied on studying long-term regrets that have originated at different timelines for younger and older individuals, we expected to replicate findings referenced in the extant literature on aging and regret:

With respect to *long-term regrets*, we hypothesized that, with age, people would report fewer (Dijkstra & Barelds, 2008) and less recent regrets. These regrets would be grounded in omissions (Newall et al., 2009), harder to recall (because they originated longer ago), and, *sensu* the motivational theory of life-span development, harder to control (Morrison & Roese, 2011). Because they are more likely to be omission-based, we predicted that long-term regrets would cue less intense "hot" emotions but more intense "despair"-related or "wistful" emotions (Gilovich et al., 1998; Wrosch & Heckhausen, 2002). Furthermore, we expected older people's long-term regrets to focus more on career or interpersonal regrets (Dijkstra & Barelds, 2008; Jokisaari, 2004; Lecci et al., 1994; Wrosch & Heckhausen, 2002).

With respect to *recent regrets* that occurred at a similar timeline for people of all ages, we expected to observe fewer age-related differences. Specifically, we hypothesized that there would be no age effects concerning the number, recall, recency, severity, control over, or domains of regret. Nevertheless, following from past research and the aforementioned theoretical considerations, we expected older age to be associated with reporting fewer commission-based regrets (e.g., Bjälkebring et al., 2013; Chen et al., 2011; Newall et al., 2009; Pethel & Chen, 2013). We also assumed that older adults would report less pronounced negative emotional responses to recent regrets (e.g., English & Carstensen, 2015; Gilovich et al., 1998; Wrosch & Heckhausen, 2002).

With regard to *regret regulation strategies*, we hypothesized the following: Based on past research and the motivational theory of life-span development, older age should be associated with lower levels of behavioral repair work and more pronounced reliance on psychological repair work (e.g., Bjälkebring et al., 2013; Newall et al., 2009; Wrosch et al., 2000, 2005). When applying the more fine-grained decision-based categorization of strategies we introduced above (see subsections under "Regret Regulation"), we expected to observe the following effects: Due to age-related changes in the preference and ability to make choices, and given theoretically implicated changes in access to primary control and in the motivation to optimize future outcomes, older age should be associated with a higher likelihood of relying on decision avoidance. At the same time, older age should be associated with a lower reliance on strategies that aim to improve decision making or that require added effort/investment in choices (i.e., decision alteration). This, too, could be associated with the tenets of the motivational theory of life-span development and socioemotional selectivity theory. Due to age-related changes in the preference for experiencing positive affect, as suggested by the latter framework, older age should be associated with a higher likelihood of relying on affect-based strategies and psychological repair work. Finally, because of age-related changes in the availability of future opportunities to address

regrets, age-related differences in strategy use should be more pronounced with regard to future versus present-focused strategies.

Covariate Measures

To further test the assumptions of the motivational theory of lifespan development (Heckhausen et al., 2010; Schulz & Heckhausen, 1996; Wrosch & Heckhausen, 2002), we accounted for participants' perceived control over regrets. To test the assumptions of socioemotional selectivity theory (Carstensen et al., 1999), we also accounted for future time perspective. To test whether age-related differences in the recall of regrets, decision alteration, or decision avoidance might have stemmed from differences in cognitive abilities, we further accounted for participants' working memory, numeracy, speed, and vocabulary (Cavanaugh & Blanchard-Fields, 2015). To test whether age-related differences in affective responses to regrets or in the reliance on affect-based regulation strategies are linked to age-related differences in affective experiences (as implicated by socioemotional selectivity theory), we accounted for participants' baseline affect. Finally, we accounted for other variables relevant to decision making and regret regulation known to vary with age (Cavanaugh & Blanchard-Fields, 2015): emotional well-being, physical well-being, and personality traits.

Method

Transparency and Openness

Data were collected in 2011 without associated preregistration, as approved by the Cornell University Institutional Review Board (1010001767). Consent was documented using signed paper forms; the consent form wording does not allow for making data freely available online. Instead, the data can be obtained via request to the first author. We provide post hoc effect size estimates, report all measures in the study, and follow the Journal Article Reporting Standards for Quantitative Research in Psychology by the American Psychological Association (Appelbaum et al., 2018). No manipulations occurred, and no participants were excluded.

Participants

Data were collected from an $N = 90$ adult lifespan sample (21–89 years, $M_{\text{age}} = 49.81$, $SD_{\text{age}} = 18.71$, 63% women, 96% non-Hispanic White) tested at a large university in South-Central New York (United States). Post hoc sensitivity analyses were conducted in G*Power Version 3.1.9.7 for $N = 90$ and $\alpha = .05$ to determine effect size (power = .80). Medium-sized age-related correlations could be observed with a correlation coefficient equal to .29. When regressing variables on age (age and a covariate), it was possible to observe R^2 increments for a small-to-medium effect of $f^2 = .09$ (.11).

Measures

Coding for open-ended questions was carried out by the first author and a research assistant (see Supplemental Material A, Supplemental Table S1 for codebook). After assessing interrater agreement using κ , disagreements were resolved by the first author. All κ ranges reported below are summarized across recent and long-term regrets (i.e., “across regrets”).

Regret Characteristics

Regret Recall. Participants nominated up to five recent and five long-term regrets (Timmer et al., 2005). Difficulty recalling regrets was measured on a 7-point Likert scale (1 = *very easy*, 7 = *very difficult*). Participants then identified the most severe recent and long-term regrets, and subsequent questions focused on those two regrets.

Recency and Perceived Control. Participants indicated how long ago the regret had originated (recoded in years) and how much control they perceived having over the regret (7-point scale: 1 = *none at all*, 7 = *a lot*).

Emotional Responses to Regret. Emotional reactions to the regret were assessed with respect to “hot” ($\alpha = .81$ across regrets), “wistful” ($\alpha = .77$ –.81 across regrets), and “despairing” ($\alpha = .79$ –.82 across regrets) emotions. These were measured using three items each: “Hot” referred to feeling irritated, angry, or embarrassed; “wistful” referred to feeling nostalgic, sentimental, or contemplative; and “despairing” referred to feeling regretful, desperate, or sorrowful (assessed on a scale of 1 = *not at all*, 7 = *very much*; Gilovich & Medvec, 1995). We averaged the three items within each category and also created a single index by averaging across all nine items ($\alpha = .82$ –.83 across regrets).

Regret Severity and Type. The chosen recent and long-term regrets were coded for severity based on Morrison and Roesse (2011): 0 = *no regret*, 1 = *mild regret*, 2 = *moderate or severe regret* ($\kappa = .36$ –.86 across regrets). Due to coding categories being very unevenly distributed (with most regrets being categorized as moderate or severe, resulting in low κ even when few disagreements occurred), this variable was dropped from analyses. Regrets were further coded to reflect whether they indicated a 0 = *omission*, 1 = *commission*, or neither (coded as not applicable; $\kappa = .83$ –.95 across regrets; Gilovich & Medvec, 1995). Participants also reported self-rated regret severity in response to the item “regretful” (1 = *not at all*, 7 = *very much*; Supplemental Material A).

Regret Domain. Regret domains were identified based on guidelines from Wrosch and Heckhausen (2002): career and self-development ($\kappa = .73$ –.80 across regrets), interpersonal ($\kappa = .73$ –.92 across regrets), leisure and lifestyle ($\kappa = .35$ –.62 across regrets), health and fitness ($\kappa = .52$ –.89 across regrets), finance ($\kappa = .72$ –.90 across regrets), and off-topic/none ($\kappa = .82$ –.93 across regrets). For more details, see Supplemental Material B.

Regret Regulation

To assess regulation strategies for participants' greatest recent and long-term regrets, they were asked to write down a few sentences to describe their “strategy for dealing with your current regret” and their “strategy for avoiding similar regrets in the future.” To map onto the alternative conceptual frameworks advanced in prior literature, the strategies were coded with respect to both broader regret repair goals (repair-based strategies [RBS]; Gilovich & Medvec, 1995) and specific decision-related concepts or behaviors (decision-based strategies [DBS]; Zeelenberg & Pieters, 2007).

RBS. Following Gilovich and Medvec (1995), we coded responses into the broad categories of behavioral repair work ($\kappa = .41$ –.77 across regrets) and psychological repair work ($\kappa = .32$ –.63 across regrets; Gilovich & Medvec, 1995). These two categories were applied to both present- and future-oriented strategies.

DBS. Strategies were also coded based on the decision-focused conceptualizations of regret proposed by Zeelenberg et al. (Pieters & Zeelenberg, 2007; Zeelenberg, 1999; Zeelenberg & Pieters, 2007).

With respect to present-focused strategies, we thematically grouped the 10 specific regret regulation strategies proposed by Zeelenberg and Pieters in their aforementioned works (see Supplemental Material A, Supplemental Table S1) into decision avoidance (κ s = .71–.95 for individual strategies, across regrets), decision alteration (κ s = .37–.80 for individual strategies, across regrets), affect-based strategies (κ s = .39–1.00 for individual strategies, across regrets), or no strategy (κ s = .62–.91 across regrets).

With respect to future-oriented strategies, we thematically grouped the 11 specific regret prevention strategies proposed by Zeelenberg and Pieters in their aforementioned works (see Supplemental Material A, Supplemental Table S1) into decision avoidance (κ s = .73–1.00 for individual strategies, across regrets), decision alteration (κ s = .55–.95 for individual strategies, across regrets), affect-based strategies (κ s = .49–1.00 for individual strategies, across regrets), or no strategy (κ s = .62–.76 across regrets).¹

Covariate Measures

Intercorrelations between all covariates are summarized in Supplemental Material E (Supplemental Table S4).

Demographics. Participants reported their age, gender (coded as 0 = *man*, 1 = *woman*), race/ethnicity (coded as 0 = *not non-Hispanic White*, 1 = *non-Hispanic White*), education (on an 8-point scale), and socioeconomic status (on a 5-point scale).

Baseline Affect. Two items adapted from Nielsen et al. (2008) assessed baseline arousal (on a 7-point Likert scale ranging from 1 = *not aroused at all* to 7 = *very aroused*) and valence (1 = *very negative*, 7 = *very positive*).

Physical and Mental Health. We used the 12-Item Short Form Health Survey (Ware et al., 1998) to assess participants' physical and mental well-being. Response scales differ across items, and responses were coded according to the brief integer scorer (Andrews, 2002). Scores for physical health varied from 22 to 66, and scores for mental health varied from 15 to 61 (higher scores = better well-being).

Future Time Perspective. Time perspective was assessed with the 10-item Future Time Perspective Scale (Carstensen & Lang, 1996) on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*; Cronbach's α = .94; higher scores = more expansive perspective).

Personality. Participants rated themselves on each of the Big Five personality traits (Rammstedt & John, 2007) via two 5-point Likert-scaled items (1 = *disagree strongly*, 5 = *agree strongly*) that were then averaged.

Cognition. Working memory was assessed with a letter-based two-back task with 50 trials (percentage of correct response trials [0–1]; Ragland et al., 2002). Numeracy was assessed with a three-item numeracy test (0–3 correct responses; Lipkus et al., 2001). Processing speed was assessed with a 90-s digit-symbol task (Wechsler, 1981). Vocabulary was assessed with the 25-item version of the Nelson–Denny test, in which participants identify a correct synonym among five choice options per item (0–25 correct responses; J. Brown, 1960).

Procedure

Participants were recruited for a laboratory-based study (\$15) that included computer tasks (run on E-Prime 2.0; Psychology Software Tools, 2009) and paper questionnaires. After providing informed consent, participants reported their demographic background, completed the 12-Item Short Form Health Survey, and described recent and long-term regrets (in counterbalanced order) and associated regret regulation strategies. Finally, participants completed measures of their future time perspective and cognitive capacities (with processing speed assessed using a paper form), as well as questions about their sense of self, time perception, and decision-making preferences that are not part of the present article (Löckenhoff et al., 2012; Rutt & Löckenhoff, 2016).

Analyses

RStudio Version 1.3.1093 was used to conduct quantitative analyses. We did not analyze regret-related variables (e.g., strategies) referenced by fewer than five participants. Analyses exploring curvilinear age-related effects are reported in Supplemental Material F.

For both recent and long-term regrets as well as both current and future regret regulation strategies, we conducted the following analyses: First, we examined means and standard deviations or reported on the frequencies of participants' responses. Differences between recent and long-term regrets or current and future strategies were examined using Wilcoxon tests for paired samples in the case of continuous measures or using McNemar's χ^2 test for paired samples with continuity correction for binary measures. Covariate measures were correlated with age (and variables of interest) using Spearman's rank coefficient; point-biserial correlations were used to assess the link between age and categorical variables such as gender. In turn, characteristics of regret were regressed on age using a generalized linear model approach (binomial regressions were conducted for binary characteristics). Covariates that were associated with both age and variables of interest were entered, alongside age, as predictors in subsequent regression models attempting to identify which of the theoretically implicated covariates were most relevant with respect to the observed age effects.

Results

As summarized in Table 1, older adults reported higher income, better mental health, poorer physical health, and shorter time perspectives. They scored lower on assessments of working memory, numeracy, and processing speed, but higher on vocabulary.

Regret

Characteristics of recent and long-term regrets, as well as their regression on age, are displayed in Table 2. The last two columns compare recent and long-term regrets. As expected, long-term regrets occurred a longer time ago. They were also more plentiful than

¹ Analyses involving individual strategies are summarized in Supplemental Material C (Supplemental Table S2). In Supplemental Material D, we report analyses of questionnaire data concerning the same DBS (Supplemental Table S3). No systematic age-related effects emerged, and questionnaire data were therefore omitted from this article.

Table 1*Descriptive Statistic for Demographic and Covariate Measures as Well as Their Correlations With Age*

Variable	<i>M (SD)/n (%)</i>	<i>r_{s_age}</i>	95% CI	<i>p</i>
Demographics				
Age	49.81 (18.71)			
% women ^a	57 (63.33%)	-.04	[-.24, .17]	.726
% non-Hispanic White ^a	75 (83.33%)	.09	[-.12, .30]	.374
Education	5.08 (1.91)	.10	[-.14, .28]	.362
Income	2.37 (1.03)	.33	[-.15, .51]	.001
Socioemotional and health variables				
Baseline arousal	3.33 (1.57)	.09	[-.11, .30]	.424
Baseline valence	5.02 (1.23)	.16	[-.02, .38]	.144
Mental health	47.25 (12.13)	.37	[-.09, .48]	<.001
Physical health	50.26 (9.25)	-.33	[-.50, -.13]	.002
Future time perspective	4.66 (1.54)	-.50	[-.63, -.31]	<.001
Personality				
Neuroticism	2.92 (1.01)	-.18	[-.37, .03]	.093
Extraversion	3.30 (0.97)	.13	[-.07, .33]	.217
Openness	3.93 (0.86)	-.01	[-.25, .17]	.910
Agreeableness	3.54 (1.02)	.17	[-.03, .37]	.106
Conscientiousness	3.97 (0.78)	.06	[-.21, .24]	.603
Cognitive measures				
Working memory	0.78 (0.23)	-.27	[-.54, -.18]	.009
Numeracy	1.67 (1.10)	-.31	[-.49, -.12]	.003
Processing speed	57.21 (14.56)	-.62	[-.72, -.44]	<.001
Vocabulary	16.92 (4.92)	.44	[-.19, .54]	<.001

Note. 95% CI is calculated on the basis of Pearson correlation coefficients. Significant values appear in bold. CI = confidence interval.

^a Point-biserial correlations.

recent regrets, easier to recall, and associated with more intense “wistful” feelings.

With respect to regret domains, the most common *recent regrets* focused on interpersonal issues (31%) and career or self-development issues (17%). About one in five participants reported no regrets or provided off-topic comments (22%). The most common *long-term regrets* focused on interpersonal issues (43%) and career or self-development issues (23%). About one in 10 participants indicated no long-term regrets or provided off-topic comments (10%). Participants were significantly more likely to report no recent regrets than to report no long-term regrets. Even if a given open-ended response was not categorized as a regret, answers to the subsequent closed-ended questions were retained for analyses since each of them prompted participants again to think of their greatest regret over the past year/life.

The third column of Table 2 reports age-related differences in recent regrets. Older age was associated with reporting fewer recent commission regrets and experiencing less intense “hot” emotions. With respect to regret domains, older age was associated with describing fewer recent regrets of interpersonal nature and a higher likelihood of having no recent regrets to report.

The fifth column of Table 2 reports age-related differences in long-term regrets. As expected, older age was associated with reporting that more years had passed since the long-term regret originated. With age, long-term regrets also felt less controllable (as would be suggested by the motivational theory of life-span development), were less likely to be commission regrets, and elicited less intense “hot” emotions at the time of testing. There were no age-related differences in the domains associated with long-term regrets.

Regret Regulation Strategies

The frequency of regret regulation strategies and their regressions on age are summarized in Table 3. Separate analyses examined the repair-based (RBS) and decision-based (DBS) coding frameworks. The most commonly referenced strategies related to behavioral repair work (52%–67%: RBS) and, correspondingly, strategies aimed at decision alteration (58%–74%: DBS). Reliance on psychological repair work (22%–59%: RBS), affect-based strategies (9%–32%: DBS), and decision avoidance (9%–20%: DBS) was less common. In addition, some participants (12%–14%) reported using no specific strategy.

When comparing strategies targeting recent and long-term regrets (last column), present-oriented regret regulation strategies did not differ between recent and long-term regrets. In the future, participants planned on using psychological repair work (RBS) more frequently to address long-term regrets than recent regrets.

The third column of Table 3 reports age-related differences in managing recent regrets. With respect to present-oriented strategies, counter to both the motivational theory of life-span development and the socioemotional selectivity theory, older adults were less likely to rely on psychological repair work (RBS) or affect-based strategies (DBS). According to Supplemental Material C (Supplemental Table S2), these effects were mostly driven by older adults describing themselves as less likely to *justify* their decisions. With respect to future-oriented strategies, older adults were less likely to pursue behavioral repair work (RBS) or decision alteration (DBS)—which is well-aligned with the motivational theory of life-span development and socioemotional selectivity theory. According to Supplemental Material C (Supplemental Table S2), these effects were mostly driven

Table 2
Descriptive Statistics for and Differences Between Recent and Long-Term Regrets, as Well as Their Associations With Age

Variable	Recent regret		Long-term regret		V	χ^2
	M (SD)/n (%)	β_{age}	M (SD)/n (%)	β_{age}		
Number of regrets	2.82 (1.70)	$\beta = -0.13 [-0.15, 0.01], p = .233$, pseudo- $R^2 = .02$	3.33 (1.45)	$\beta = -0.19 [-0.20, -0.17], p = .083$, pseudo- $R^2 = .04$	291**	
Difficulty recalling regret	4.25 (2.21)	$\beta = 0.12 [0.09, 0.14], p = .288$, pseudo- $R^2 = .01$	3.71 (2.06)	$\beta = 0.11 [0.09, 0.14], p = .284$, pseudo- $R^2 = .01$	1,028.50*	
Years since regret	0.68 (0.59)	$\beta = 0.19 [0.18, 0.20], p = .186$, pseudo- $R^2 = .04$	20.01 (17.09)	$\beta = 0.56 [0.39, 0.73], p < .001^{***}$, pseudo- $R^2 = .31$	3***	
Self-rated regret severity	5.52 (1.78)	$\beta = -0.03 [-0.05, -0.01], p = .762$, pseudo- $R^2 = .00$	5.66 (1.57)	$\beta = -0.10 [-0.11, -0.08], p = .372$, pseudo- $R^2 = .01$	488	
Control over regret	5.05 (2.19)	$\beta = -0.11 [-0.13, -0.08], p = .336$, pseudo- $R^2 = .01$	5.13 (1.82)	$\beta = -0.22 [-0.24, -0.20], p = .042^*$, pseudo- $R^2 = .05$	838	
Commission (vs. omission) ^a	28 (31.11%)	$\beta = -1.07 [-1.05, -0.99], p = .046^*$, pseudo- $R^2 = .08$	31 (34.44)	$\beta = -1.11 [-1.08, -1.03], p = .028^*$, pseudo- $R^2 = .08$		0.00
Emotional responses						
“Hot” emotions	3.83 (1.75)	$\beta = -0.26 [-0.28, -0.24], p = .016^*$, pseudo- $R^2 = .07$	3.63 (1.89)	$\beta = -0.32 [-0.34, -0.30], p = .002^{**}$, pseudo- $R^2 = .10$	1,327	
“Despair” emotions	3.58 (1.84)	$\beta = -0.01 [-0.04, 0.01], p = .906$, pseudo- $R^2 = .00$	3.35 (1.72)	$\beta = -0.06 [-0.09, -0.04], p = .575$, pseudo- $R^2 = .00$	1,654.50	
“Wistful” emotions	2.88 (1.80)	$\beta = -0.07 [-0.09, -0.05], p = .516$, pseudo- $R^2 = .01$	3.41 (1.69)	$\beta = -0.06 [-0.08, -0.04], p = .605$, pseudo- $R^2 = .00$	743*	
Average emotional response	3.43 (1.38)	$\beta = -0.15 [-0.17, -0.13], p = .176$, pseudo- $R^2 = .02$	3.46 (1.37)	$\beta = -0.20 [-0.21, -0.18], p = .066$, pseudo- $R^2 = .04$	1,628.50	
Domain						
Career and self-development ^a	15 (16.67%)	$\beta = -0.39 [-0.41, -0.35], p = .615$, pseudo- $R^2 = .00$	21 (23.33%)	$\beta = 0.09 [0.06, 0.11], p = .883$, pseudo- $R^2 = .00$		0.96
Interpersonal ^a	28 (31.11%)	$\beta = -1.14 [-1.10, -1.04], p = .031^*$, pseudo- $R^2 = .08$	39 (43.44%)	$\beta = 0.17 [0.15, 0.20], p = .686$, pseudo- $R^2 = .00$		2.70
Leisure and lifestyle ^a	8 (8.89%)	$\beta = 0.89 [0.83, 0.91], p = .495$, pseudo- $R^2 = .01$	7 (7.78%)	$\beta = -0.15 [-0.19, -0.10], p = .921$, pseudo- $R^2 = .00$		0.00
Health and fitness ^a	12 (13.33%)	$\beta = 0.82 [0.77, 0.84], p = .369$, pseudo- $R^2 = .02$	8 (8.89%)	$\beta = 1.72 [1.68, 1.76], p = .159$, pseudo- $R^2 = .05$		0.45
Finances ^a	7 (7.78%)	$\beta = -0.75 [-0.77, -0.68], p = .618$, pseudo- $R^2 = .01$	6 (6.67%)	$\beta = -2.47 [-2.53, -2.41], p = .077$, pseudo- $R^2 = .11$		0.00
Off-topic or no regret ^a	20 (22.22%)	$\beta = 1.18 [1.16, 1.21], p = .049^*$, pseudo- $R^2 = .07$	9 (10.00%)	$\beta = -0.68 [-0.70, -0.62], p = .569$, pseudo- $R^2 = .01$		4.35*

Note. All intercepts: $\beta = .00, ps = .414$ to $<.001$. V = Wilcoxon test for paired samples comparing recent and long-term regrets for continuous measures (left column); McNemar's χ^2 test for paired samples with continuity correction for binary data (right column).

^a Binomial regression.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Strategy	Present-oriented regret regulation strategy			χ^2
	Recent regret	Long-term regret		
	<i>n</i> (%)	β_{age}	<i>n</i> (%)	β_{age}
RBS				
Behavioral repair work	53 (58.89)	$\beta = -0.37 [-0.39, -0.35], p = .396$, pseudo- $R^2 = .01$	47 (52.22)	$\beta = -0.45 [-0.47, -0.42], p = .293$, pseudo- $R^2 = .02$
Psychological repair work	31 (34.44)	$\beta = -1.07 [-1.04, -0.99], p = .033^*$, pseudo- $R^2 = .07$	37 (41.11)	$\beta = -0.52 [-0.54, -0.49], p = .238$, pseudo- $R^2 = .02$
DBS				
Decision avoidance	18 (20.00)	$\beta = 1.20 [1.11, 1.17], p = .079$, pseudo- $R^2 = .06$	13 (14.4)	$\beta = -1.12 [-1.16, -0.109], p = .174$, pseudo- $R^2 = .04$
Decision alteration	52 (57.78)	$\beta = 0.18 [0.16, 0.21], p = .673$, pseudo- $R^2 = .00$	53 (58.89)	$\beta = -0.72 [-0.73, -0.69], p = .108$, pseudo- $R^2 = .04$
Affect-based strategies	29 (32.22)	$\beta = -1.15 [-1.18, -1.13], p = .019^*$, pseudo- $R^2 = .09$	25 (27.78)	$\beta = -0.49 [-0.51, -0.46], p = .356$, pseudo- $R^2 = .01$
NA or no strategy	12 (13.33)	$\beta = 1.64 [1.60, 1.67], p = .057$, pseudo- $R^2 = .08$	11 (12.22)	$\beta = 2.04 [2.00, 2.08], p = .022^*$, pseudo- $R^2 = .12$
Strategy	Future-oriented regret regulation strategy			<i>V</i>
	Recent regret	Long-term regret		
	<i>n</i> (%)	β_{age}	<i>n</i> (%)	β_{age}
RBS				
Behavioral repair work	60 (66.67)	$\beta = -0.33 [-0.34, -0.33], p < .001^{***}$, pseudo- $R^2 = .15$	58 (64.44)	$\beta = -0.11 [-0.11, -0.10], p = .314$, pseudo- $R^2 = .02$
Psychological repair work	20 (22.22)	$\beta = -0.03 [-0.04, -0.03], p = .765$, pseudo- $R^2 = .00$	53 (58.89)	$\beta = 0.02 [0.02, 0.03], p = .829$, pseudo- $R^2 = .00$
DBS				
Decision avoidance	11 (12.22)	$\beta = 0.09 [0.09, 0.10], p = .392$, pseudo- $R^2 = .02$	8 (8.89)	$\beta = 0.10 [0.10, 0.10], p = .350$, pseudo- $R^2 = .04$
Decision alteration	66 (73.33)	$\beta = -0.38 [-0.38, -0.38], p < .001^{***}$, pseudo- $R^2 = .21$	67 (74.44)	$\beta = -0.17 [-0.18, -0.17], p = .100$, pseudo- $R^2 = .04$
Affect-based strategies	8 (8.89)	$\beta = 0.07 [0.07, 0.07], p = .510$, pseudo- $R^2 = .02$	14 (15.56)	$\beta = 0.06 [0.06, 0.07], p = .561$, pseudo- $R^2 = .01$
NA or no strategy	13 (14.44)	$\beta = 0.37 [0.36, 0.37], p < .001^{***}$, pseudo- $R^2 = .25$	11 (12.22)	$\beta = 0.03 [0.03, 0.03], p = .771$, pseudo- $R^2 = .00$

Note. All intercepts: $\beta = .00$, p s = .905 to $<.001$. McNemar's χ^2 test for paired samples with continuity correction. RBS = repair-based strategies; DBS = decision-based strategies; NA = not applicable.
* $p < .05$. *** $p < .001$.

by older adults describing themselves as less likely to try and *improve decision quality* or to *improve decision justifiability*. Older adults were also more likely to say they had no future strategies in mind.

Finally, the fifth column of Table 3 reports age-related differences in managing long-term regrets. Older adults were more likely to report that they used no strategy to manage their present long-term regrets. No age differences were found for future-oriented strategies to manage long-term regrets.

Covariate Analyses

Regret-related characteristics that varied with age were regressed on age and covariates that were associated with age and the characteristic in question (such as regret recency; see Supplemental Material E, Supplemental Tables S4–S10); each covariate was entered into its own regression model alongside age. Because we observed age-related differences in the perceived controllability of long-term regrets, we also examined the contribution of control perceptions. In cases in which there was no longer an age effect evident once we had accounted for a covariate measure, we considered this covariate as “accounting for” the previously observed age effect. For regret characteristics for which no variables could “account” for the age effect, we specify so. This was the case if either no covariate was linked simultaneously to age and the characteristic in question or when the age effect persisted despite including covariates in the same regression model.

When controlling for income, the association between age and the tendency to report more omission-based recent regrets was no longer significant.

Mental health accounted for the link between age and (a) “hot” emotions concerning recent regrets, (b) a lack of recent regrets, and (c) commission-based long-term regrets.

Physical health accounted for the link between age and recent interpersonal regrets.

Future time perspective (a covariate implicated by the socioemotional selectivity theory) accounted for the link between age and (a) recent interpersonal regrets and (b) a lack of present-oriented strategies to address long-term regrets.

Working memory accounted for the link between age and (a) the controllability of long-term regrets (as implicated by the motivational theory of life-span development) and (b) commission-based long-term regrets.

Numeracy accounted for the link between age and (a) the controllability of long-term regrets (as implicated by theory), (b) commission-based long-term regrets, and (c) a lack of present-oriented strategies to address long-term regrets.

Processing speed accounted for the link between age and (a) the controllability of long-term regrets (as implicated by theory), (b) commission-based long-term regrets, (c) present affect-based strategies (as implicated by the socioemotional selectivity theory), and (d) reporting no present-oriented strategies for addressing long-term regrets.

Finally, perceived controllability of long-term regrets accounted for the link between age and commission-based long-term regrets.

No covariates accounted for the link between age and (a) the recency of long-term regrets, (b) “hot” emotions tied to long-term regrets, (c) reliance on present-oriented psychological repair work to downregulate recent regrets, and (d) reliance on future behavioral repair work to address recent regrets.

There were no relevant covariates to test in the context of the link between age and a lack of future strategies to address recent regrets.

Discussion

The goal of the present study was to examine age-related differences in the response to and regulation of regrets over time and to determine to which extent age-related differences can be linked to covariate measures.

When examining recent regrets, we had expected older age to be associated with reporting fewer commission-based regrets and less pronounced negative emotional responses to regrets. Indeed, we observed that older age was associated with reporting fewer commission-based regrets (Newall et al., 2009; cf. Morrison & Roese, 2011; Wrosch et al., 2005) and less intense “hot” emotions such as anger or frustration. In addition, we found that older participants were more likely to have no recent regrets (Lecci et al., 1994; Timmer et al., 2005) and experienced fewer recent interpersonal regrets (cf. Jokisaari, 2003; Lecci et al., 1994).

When examining long-term regrets, we had expected to find age-related differences in the onset and controllability of regrets and more pronounced age-related differences in regret experience than for recent regrets. As predicted, with age, long-term regrets originated longer ago and felt less controllable (Morrison & Roese, 2011; Wrosch & Heckhausen, 2002). As was the case for recent regrets, older age was associated with reporting fewer commission-based long-term regrets and less intense “hot” emotions. In contrast, there were no age-related differences in the presence of long-term regrets. Thus, we did not find that overall, long-term regrets showed more pronounced age-related differences than recent regrets.

With respect to regret regulation strategies, based on past research and the two theoretical frameworks our work was based on, we had expected older adults to be more likely to rely on decision avoidance and affect-based strategies (within the DBS framework) or psychological repair work (within the RBS framework). At the same time, we had expected older adults to report less engagement in decision alteration (DBS) or behavioral repair work (RBS). We had also expected age-related differences to be more pronounced in the context of future- than present-oriented regret regulation attempts. However, we observed only a few age-related differences in regret regulation, and these were focused on the regulation of recent (vs. long-term) regrets. In addition, age differences were equally likely to affect present-oriented or future-oriented regret regulation attempts.

Finally, the direction of specific effects did not always align with our predictions. With respect to present-oriented strategies to manage recent regrets, older age was associated with less pronounced, rather than more pronounced, reliance on psychological repair work (RBS) or affect-based strategies (DBS; cf. Bjälkebring et al., 2013; Newall et al., 2009; Wrosch et al., 2000, 2005). According to Gross (1998), this suggests that older individuals are less likely to rely on late-stage regret regulation strategies such as those focusing on modulating one’s cognitions or responses concerning regret. Also, contrary to expectations, we found no age-related differences in the reliance on decision avoidance (DBS; cf. Bjälkebring et al., 2013). For present-oriented strategies to manage long-term regrets, we merely found that older participants were more likely to report no strategy at all.

With respect to future-oriented strategies to manage recent regrets, we found some of the expected effects, in that there was a

negative relationship between age and behavioral repair work (RBS) or decision alteration (DBS). In addition, older age was linked to having no future strategy in mind to address recent regrets. However, we found no age-related differences in psychological repair work (RBS), affect-based strategies (DBS), or decision avoidance (DBS; cf. Bjälkebring et al., 2013). The future regulation of long-term regrets did not vary by age either.

Overall, we found only limited support for our hypotheses regarding age-related differences in regret experience and regulation. Perhaps most surprisingly, when we controlled for age-related variations in the recency of regrets (a common confound in prior research) by asking participants to focus on regrets occurring over the past year, age-related differences in regret experience and regulation were more pronounced than for long-term regrets. Despite such deviations from predictions, some aspects of our findings align with prominent theoretical frameworks used to explain age variations in regret.

Role of Theoretical Frameworks

Based on the motivational theory of life-span development (Heckhausen et al., 2010; Schulz & Heckhausen, 1996; Wrosch & Heckhausen, 2002), we had hypothesized that with age, people would perceive less control over their long-term regrets. This was the case, with age-related differences in control perceptions being linked to older adults scoring lower on assessments of their working memory, numeracy, and speed. As such, lower levels of cognitive abilities may make it harder for older adults to exert—or to imagine exerting—control.

In turn, age-related differences in perceived control were linked to the positive relationship between age and omission-based long-term regrets. Regrets grounded in omissions are assumed to be harder to control and to cue more feelings of helplessness (Gilovich et al., 1998; Wrosch & Heckhausen, 2002). As a result, older adults' lack of perceived control may be specific to experiencing omission-based regrets. For instance, it is possible that older adults have already had more success at downregulating commission-based than omission-based regrets, making regrets stemming from omissions seem less controllable to this demographic.

In line with the socioemotional selectivity theory (Carstensen et al., 1999), we found that age was associated with a more limited future time perspective. This age effect was linked to older adults reporting fewer recent interpersonal regrets. The same was true for older adults reporting poorer levels of physical health. This is plausible since the socioemotional selectivity theory suggests that people whose time perspective is limited by advanced age or poor health prioritize emotionally meaningful experiences, in part by spending more time with close others (Lansford et al., 1998). Therefore, older adults' fewer interpersonal regrets may reflect a bigger investment in maintaining rewarding relationships.

In addition, future time perspective was linked to the relationship between age and a lack of present-oriented strategies to address long-term regrets. This could suggest that older adults' greater focus on emotionally meaningful and present-oriented goals might make them less likely to focus on their (past) regrets or ways to actively downregulate them.

In summary, both theoretical frameworks could add to our understanding of lifespan trends in the response to and regulation of regrets. At the same time, most observed age-related differences

were not linked to variables implicated in the above frameworks, including all observed differences pertaining to recent regrets.

Role of Covariate Measures

Indices of cognitive capacity and mental health were associated with several of the observed age differences in regret experience or regulation: Working memory, numeracy, and speed were all linked to the relationship between age and omission-based long-term regrets. By itself, working memory was linked to the relationship between age and experiencing less intense "hot" emotions in the face of recent regrets. By contrast, the finding that older adults were less likely to nominate strategies to address long-term regrets was linked to the relationship between age and numeracy. That age-related changes in cognitive abilities may make it harder to recall or address regrets is also evident when examining the contribution of processing speed: Older age was associated with lower levels of speed, and speed was linked to the relationship between age and present-oriented affect-based strategies. It was also linked to the finding that older adults were less likely to nominate present-oriented regulation strategies for long-term regrets.

In turn, higher levels of mental health among older adults were linked to the relationship between age and voicing fewer regret-related complaints. This included reporting experiencing less intense "hot" emotions linked to recent regrets, reporting fewer commission-based long-term regrets, or reporting no recent regrets to begin with.

Notably, several age-related effects could not be linked to covariates. This included reliance on present psychological repair work to downregulate recent regrets, future plans to alter decision engagement to address recent regrets, future behavioral repair work to address recent regrets, or voicing no future strategies to address recent regrets. This also included the recency of long-term regrets, a lack of "hot" emotions tied to long-term regrets, and the anticipation of future long-term regrets. Therefore, many age-related differences, particularly those concerning recent regrets, could not be readily explained by the covariates included in the data.

Limitations

The present study is subject to several limitations arising from the original study design. First, data collection focused on participants' two greatest regrets and assessed all outcome measures with regard to these specific complaints. As such, we could not quantify the relative frequency with which different regret domains or regret types (e.g., commission- vs. omission-based regrets) may occur. Similarly, we cannot speak to how frequently participants draw on specific regret regulation strategies when attempting to downregulate regrets other than their most severe ones. It is likely that different types of regrets elicit the use of different strategies. To illustrate, more recent regrets may be more reversible and call for behavioral repair work, whereas regrets that originated longer ago may not be reversible, thus cueing the use of more affect-based strategies. Therefore, we recommend that future research should focus not just on participants' greatest regrets but should consider a wider array of regretted choices or (in)actions.

Second, participants' open-ended responses only focused on their most prominent regret regulation strategies, which prevented us from exploring less commonly referenced regret regulation strategies in detail. Note, however, that we had also gathered

questionnaire-based responses that captured the full range of potential decision-based regret regulation strategies for each participant. As seen in Supplemental Material D (Supplemental Table S3), they did not yield any systematic age-related effects. This suggests that we did not overlook any age-related variations in less frequently used strategies.

Further, we acknowledge the possibility of age-related biases in participants' reporting of long-term regrets: In our data, some long-term regrets arose as early as 40, 50, or even up to 65 years prior to data collection. The strategies that participants had used in the past to address long-held regrets may have been misremembered, may have changed over the years, or may have already allowed participants to downregulate (some of) the negative feelings attached to regrets. In part, this may account for the unexpected result that age-related differences in the experience and regulation of regret were more pronounced for recent as compared to long-term regrets. Further, since we did not explore the efficiency of participants' chosen strategies, we cannot ascertain whether certain strategies were favored because participants found them to be efficient. In fact, the persistence of lifelong regrets might suggest that the reported strategies were not fully successful. Longitudinal or diary studies may be more apt at documenting the efficiency and stability of regulation strategies over time.

Constraints on Generalizability

The present analyses drew on a rather small convenience sample of participants recruited from the local community surrounding a large private university in South-Central New York. As such, the diversity of the sample and generalizability of our findings are limited to a predominantly non-Hispanic White and female demographic with above-average educational attainment. Regret domains and the feasibility of specific regret regulation strategies may vary depending on participants' socioeconomic or educational status and among racial and ethnic minorities that have historically had fewer rights or means to pursue choice options (e.g., with respect to leisure, career, or education). Our analyses did treat remarks that reflected disappointment and guilt rather than regret as "off-topic" statements. However, most participants did not provide sufficient context for us to fully rule out that a reported "regret" may actually describe a cohort or demographic difference in decision making and regulation opportunities rather than the consequence of an actual decision made (see Newton et al., 2012; Nolte & Löckenhoff, 2024). More work is therefore needed to examine whether our findings can be replicated in other populations and to distinguish true age effects from potential cohort effects.

Conclusion

In conclusion, we found that when differentiating between recent and long-term regrets, only a few age-related differences emerge with respect to how individuals react to or address regrettable choices. With respect to our categorization of regret regulation strategies, we observed no link between older age and a more pronounced reliance on decision avoidance to regulate or prevent regrets. Instead, we found that older adults were less likely to rely on affect-based strategies and were less willing to invest effort into making high-quality choices. Overall, older age was associated with reporting fewer regret-related concerns (i.e., fewer and less emotionally bothersome regrets) and a lower likelihood of actively downregulating one's regrets. Notably, the general pattern

of our findings held true when conducting supplementary analyses regarding individual regret regulation strategies, complementary questionnaire data, and the possible existence of curvilinear age-related effects.

With respect to theoretical explanations, the fact that older adults perceived lower levels of control and a more limited future time perspective did not account for most of the observed age-related differences. This suggests that differences do not primarily stem from decreasing opportunities to address or undo regrets now or in the future. Instead, regret experiences and regulation attempts were more closely linked to participants' emotional well-being and cognitive capacities and may thus be responsive to intervention attempts.

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