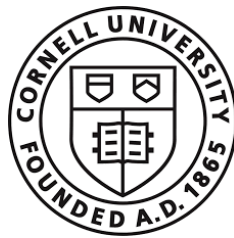


**THE AGE OF AVOIDANCE?  
THE ROLES OF CONTEXT, COGNITION, AND  
AFFECT IN ADULT AGE DIFFERENCES IN  
DECISION AVOIDANCE**



A Dissertation

Presented to the Faculty of the Graduate School  
of Cornell University

In Partial Fulfillment of the Requirements for the Degree of  
Doctor of Philosophy

by

Julia Nolte

August 2023

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**THE AGE OF AVOIDANCE?  
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Julia Nolte, Ph.D.  
Cornell University 2023

**Long Abstract**

Age-related increments in intentional decision avoidance pose risks to older adults' financial and physical well-being. Because the factors underlying older adults' avoidance tendencies remain understudied, this dissertation examines the potential roles of context, cognition, and affect across three decision avoidance phenomena: avoiding choice to maintain current circumstances, avoiding choice for the time being, and avoiding choice because not acting is preferred to acting. In a pre-registered online study,  $N = 500$  adults ( $M_{age} = 49.90$ ,  $SD_{age} = 19.34$ , 18–89) were given the choice between actively rejecting and passively accepting 15 pre-selected “default” options pertaining to property rentals (Nolte & Löckenhoff, 2022). Contrary to expectations, the preference for maintaining current circumstances did not differ by age, and older adults were less likely to endorse known correlates of decision avoidance (i.e., perceived endowment or ease). Across one online and one hybrid study ( $N_1 = 164$ ,  $M_{age\_1} = 50.71$ ,  $SD_{age\_1} = 18.70$ , 19–85;  $N_2 = 485$ ,  $M_{age\_2} = 51.08$ ,  $SD_{age\_2} = 19.63$ ), older age was associated with a higher likelihood of avoiding up to four health and consumer choices for the time being, with older and middle-aged but not younger adults reaping affective benefits post-avoidance (Nolte & Löckenhoff, in prep.). Higher perceived cognitive loads were linked to avoidant decision making but not the observed age-related differences. Finally,  $N = 90$  adults ( $M_{age} = 49.81$ ,  $SD_{age} = 18.71$ , 21–89) reported their most severe recent and long-term regrets in

a laboratory-based study. Older age was associated with more inaction-based (“omission”) regrets (Nolte et al., in prep.) but not with reliance on decision avoidance to down-regulate regrets. Older adults also indicated a decreased willingness to engage with the decision process to improve their decision making. In sum, we document adult age differences in avoidance of choice for the time being as well as the preference for inaction over action, but not in the preference for maintaining current circumstances. Implications for contextual, cognitive, and affective factors relating to age-related differences within each avoidance phenomenon are being discussed.

## **BIOGRAPHICAL SKETCH**

Julia Nolte was born in 1992 in Geseke, Germany, where she attended Alfred-Delp-Grundschule (1998–2002) and Gymnasium Antonianum (2002–2011). In 2014, Julia gained a B.Sc. in Psychology from Heidelberg University, Germany. At the same university, she obtained a consecutive M.Sc. in Developmental and Clinical Psychology in 2017. During her time in Heidelberg, Julia served as a 2015-2016 Fulbright Scholar and Heidelberg-Cornell Exchange Scholar at Cornell University’s Rational Decision Making Laboratory. Between 2013 and 2017, Julia also completed research internships and visits with Alzheimer’s Society London (2013), Harvard University’s Clinical and Developmental Psychology Laboratory (2016), Oxford University’s Health and Cognition Research Group (2016), and Cambridge University’s Winton Centre for Risk and Evidence Communication (2017). Since 2017, Julia has been a graduate student at Cornell University’s Psychology Department (formerly called the Human Development Department). There, she was awarded an M.A. in Developmental Psychology in 2020 and a Ph.D. in Developmental Psychology (2023). As a member of Dr. Corinna Löckenhoff’s Healthy Aging Laboratory, Julia researched age-related differences in the engagement with decisions, information, and media. Following graduation, Julia will be continuing these lines of research as a faculty member at Tilburg University’s Department of Communication and Cognition in the Netherlands.

To my parents, for never putting any limitations on what I could aspire to do or be.

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## LIST OF ABBREVIATIONS

al.	alia (Latin: “others”), as in “et alia” (Latin: “and others”)
BFI-10	Big Five Inventory-10 (10-item version)
B.Sc.	Bachelor of Science
Dr./Drs.	Doctor(s)
e.g.	exempli gratia (Latin: “for example”)
FTP	Future Time Perspective scale
i.e.	id est (Latin: “in other words” or “in essence”)
M.A.	Master of Arts
M.Sc.	Master of Science
NA/N.A.	not applicable
N.Y.	New York (state)
Ph.D.	Doctor of Philosophy
Prof./Profs.	Professor(s)
SF-12	Short Form Health Survey-12 (12-item version)
U.S./US	United States
vs.	versus

## LIST OF SYMBOLS AND STATISTICAL INDICES

$^2$	squared
$\alpha$	significance level in hypothesis testing
&	ampersand (“and”)
$b$	non-standardized regression weight
$\beta$	standardized regression weight
Cohen’s $d$	effect size index
Cronbach’s $\alpha$	internal consistency index
$df$	degree(s) of freedom
$f^2$	effect size index
H	hypothesis
$\kappa$	kappa
$M$	mean (average)
$N$	size of sample
$n$	size of sub-sample
$p$	probability of observing test result
p./pp.	page number/page numbers
%	percentage
phi	effect size index
power	a test’s likelihood of detecting a true effect
(pseudo-) $R^2$	amount of variance explained
Q	question
$r$	effect size index OR correlation coefficient

$r_s$	Spearman's rank correlation coefficient
$SD$	standard deviation
$SE$	standard error
\$	United States Dollar (USD)
Tolerance	multicollinearity index ( $1-R^2$ )
$V$	Wilcoxon signed-rank test index for related or matched samples
$VIF$	Variance Inflation Factor ( $1/Tolerance$ )
$W$	Wilcoxon rank-sum test index for independent samples
x or X	denotes interactions between variables (such as A x B)
$X^2$	Chi-Square test index
=	equal to
$\leq$	equal to or smaller than
$\geq$	equal to or larger than
<	smaller than
>	larger than
*	$p < .05$ (probability of observing test result is less than 5%)
**	$p < .01$ (probability of observing test result is less than 1%)
***	$p < .001$ (probability of observing test result is less than 0.1%)

## PREFACE

Two pivotal events happened the very same year I made my first steps as a psychologist: In 2011, when I first enrolled at Heidelberg University in Germany, my maternal grandfather succumbed to prostate cancer. Unfortunately, he had ignored his symptoms for too long to still benefit from treatment when he eventually tried. Just a few months later, within my first year of college, my mother was diagnosed with cancer following a routine breast cancer exam. Thanks to early detection, my mother has now been cancer-free since 2012. She is considered cured.

As a student new to Psychology, facing the loss of a grandparent and potential loss of a parent made me ask questions that still drive me today, 12 years later: Given how much they had in common – including genes and a shared environment – was the aging process to blame for how differently father and daughter approached making decisions? Why is it that someone experiencing symptoms (or some other problem) delays or avoids seeking help? And what can we do to encourage seeking information and making decisions, even if the process or potential outcome is an aversive one?

To answer such questions about lifespan development, decision making, and health, I have since conducted research at six institutions in three different countries. At Heidelberg University, I joined Prof. Joachim Funke's Problem-Solving Laboratory as a research assistant in 2013, a position I held until I left Heidelberg in 2017. Working with Drs. Daniel Holt and Katlehn Baum, I completed a bachelor's thesis on decision making and earned a B.Sc. in Psychology in 2014. During this time, I also interned with Alzheimer's Society in London (2013), which helped me better understand the role lifestyle factors and timely treatment play in addressing age-related disease processes.

Following my undergraduate degree, I obtained a consecutive M.Sc. in Clinical and Developmental Psychology (2017), also at Heidelberg University. Being supervised by Profs. Joachim Funke and Hans-Werner Wahl, my thesis examined whether adult age differences in pre-decisional information seeking can be explained through differences in the way younger and older adults process information. I continued this line of research by becoming an M.A./Ph.D. student at Cornell University in 2017, where I joined Prof. Corinna Löckenhoff's Healthy Aging Laboratory. Under the guidance of my committee, which also comprised Profs. Tom Gilovich and Anthony Ong, my research has since examined age-related differences in information seeking, construal, and avoidance, culminating in this dissertation on older adults' decision avoidance. At the same time, I was fortunate to study facets of aging, decision making, and health at other laboratories in my time as a graduate student as well. These opportunities have spanned invaluable and insightful research visits to the Rational Decision Making Laboratory at Cornell University (2015–16), the Clinical and Developmental Laboratory at Harvard University (2016), the Cognition and Health Research Group at Oxford University (2016), and the Winton Centre for Risk and Evidence Communication at Cambridge University (2017).

Although my dissertation cannot undo my grandfather's fate, my graduate work has helped me answer some of the questions that have been inspiring me ever since 2011: I now have a better understanding of how aging affects avoidance tendencies and have, through my research, begun exploring avenues for encouraging informed decision making among different age groups, especially adults over the age of 65. I hope that by providing a foundation for future research on this very important topic, my dissertation can make a small contribution to helping our loved ones live longer and healthier lives.

## CHAPTER 1

### GENERAL INTRODUCTION

Older – but not bolder? People around the globe are enjoying ever-longer lifespans (UN, 2019) as well as increasing strength in numbers: As the world’s most quickly expanding age group, older adults’ numbers are predicted to exceed 1.5 billion by the year 2050 (ibid.). This demographic shift necessitates research into the ways decision making changes with age (Carstensen & Hartel, 2006; Hanoch et al. 2007; Peters et al., 2000), especially given that older adults face highly consequential choices: Because those over 65 require more frequent medical care (e.g., Papanicolas et al., 2020) and command more wealth than younger age groups do (e.g., Bricker et al., 2017; Emmons & Noeth, 2013), older adults are major stakeholders in healthcare and consumer contexts.

Yet somehow, older adults’ decision-making opportunities and assets do not translate into an increased willingness to choose. Instead, older adults curtail the time and effort they sink into making decisions and often delay or forego making choices entirely. This reluctance can hurt both older adults’ well-being and their wallets, as failing to choose may prevent older adults from receiving timely treatment (e.g., Hudak et al., 2002; Wong et al., 2020) or reaping greater (financial) benefits (Fraenkel et al., 2015; Samuelson & Zeckhauser, 1988; Winter et al., 2006). Despite the risk intentional decision avoidance poses to an increasingly large segment of the population, age-related differences in this phenomenon still evade explanation (Löckenhoff, 2018). The purpose of this dissertation is to extend our understanding of the potential underlying reasons.

## 1.1 Decision Avoidance

Decision avoidance can be understood as an umbrella term for several related or synonymous phenomena, including “decision deferral” (Berens & Funke, 2020; Otto et al., 2016), “decision delegation” (Otto et al., 2016), “decision sidestepping” (Otto et al., 2016), “buck-passing” (Steffel et al., 2016), “option refusal” (Berens & Funke, 2020), “decision inertia” (Power & Alison, 2018), “decision paralysis” (Huber et al., 2012), and “decisional procrastination” (Anderson, 2003; Ferrari & Dovidio, 2000). Broadly, decision avoidance occurs when a decision is eschewed, postponed, or outsourced to another decision maker (e.g., Berens & Funke, 2020; Steffel et al., 2016). In addition, decision avoidance can entail upholding current circumstances or maintaining a decision that was previously made by the decision maker themselves or by another person or entity (e.g., Anderson, 2003; Otto et al., 2016). To provide one example of this type of avoidance, decision makers often forego making an active decision by passively accepting pre-selected choice options, a phenomenon known as the “default effect” (Jachimowicz et al., 2019).

More specifically, four types of decision avoidance motives or phenomena can be distinguished (Anderson, 2003): (1) *Avoiding decisions to maintain current circumstances* (~ status quo bias), (2) *avoiding decisions for the time being* (~ decision deferral), (3) *avoiding decisions because not acting is preferred to acting* (~ omission bias), and (4) *avoiding actions or decisions because a better option was previously foregone* (~ inaction inertia). Sensu Anderson (2003), status quo bias (1) occurs when a current state is being preserved and alternative options are being rejected, typically because switching away from the status quo would feel like a loss (Samuelson &

Zeckhauser, 1988). Decision deferral (2) occurs when a decision is temporarily or indefinitely delayed or avoided, for instance in order to evade responsibility or to gather more information. Omission bias (3) occurs when options that require no action are preferred to options that require action (Schweitzer, 1994). Finally, inaction inertia (4) occurs when decision makers reject an option that is similar to a previously rejected or missed option (Tykocinski et al., 1995). For instance, decision makers who fail to accept a 45% discount while it is available are more likely to reject a smaller, subsequent discount (e.g., 25%) as well.<sup>1</sup>

### ***1.1.1 Adult Age Differences in Decision Avoidance***

Most research linking aging to limited engagement in the decision process and heightened levels of decision avoidance stems from the medical domain, although research involving healthy older adults has come to similar conclusions. These studies find that older adults want to carry less responsibility when making hypothetical healthcare choices (Finucane et al., 2002) and both request and contemplate fewer choice options (Reed et al., 2008; Reed et al., 2013; Rydzewska et al., 2018; van Helverson & Mata, 2012; also see Szrek & Bundorf, 2011). Adult age differences also exist with regard to the four phenomena summarized by Anderson (2003):

**1.1.1.1 Avoiding Decisions to Maintain Current Circumstances.** When given the option to stay with an existing treatment or to switch to a new treatment that might

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<sup>1</sup> Note that it is sometimes impossible to differentiate between an active choice for the current state of affairs and a passive failure to opt away from the current state of affairs. However, decisions that uphold existing circumstances or options are often studied under conditions under which these circumstances are inferior to alternative choice options or acts of commission. As such, this dissertation will treat susceptibility to effects such as status quo bias, omission bias, default effects, inaction inertia, and the sunk-cost fallacy as indicative of intentional decision avoidance.

offer more benefits, older arthritis patients are more likely to display status quo bias than middle-aged adults are (Fraenkel et al., 2015). In a similar vein, older adults are more likely to hold on to their existing health insurance plan than younger adults are, even when they have the option to switch to a different, more beneficial plan (Samuelson & Zeckhauser, 1988). Thus, older adults appear to be more motivated to uphold current circumstances than their younger peers are. However, other avenues for maintaining current circumstances through passive or avoidant decision making have not yet been examined with regard to potential age-related differences.

**1.1.1.2 Avoiding Decisions for the Time Being.** Younger and older adults also differ in their likelihood of what Anderson (2003) labels “deferring” decisions, that is – at least temporarily – rejecting and postponing choice: When offered the opportunity to forego choice, older adults are more likely to avoid making decisions than their younger peers are (Calhoun & Hutchison Jr., 1981; Chen et al., 2011; Curley et al., 1984; Pethtel & Chen, 2013; Streufert et al., 1990). Furthermore, older patients often put off the decision to receive dialysis (Lovell et al., 2017), elective surgery (Hudak et al., 2002; Wong et al., 2020), or treatment for conditions ranging from hearing loss to myocardial infarct (Ainslie & Beisecker, 1994; Carson, 2005; Hwang & Jeong, 2012; Roberto et al., 2001). Likewise, millions of eligible US older adults (25%) did not enroll in a Medicare prescription drug plan when they first had a chance to (Winter et al., 2006). However, when only comparing those between 65 and 75+ years, age is not a significant predictor of enrollment (Szrek & Bundorf, 2011).

Finally, in an extension to Anderson’s (2003) definition of “deferral”, older as compared to younger adults are more likely to defer choice to other people. Specifically,

older adults often seek help from or outsource decisions to relatives (Roberto et al., 2001; Strough et al., 2002) or healthcare experts (Beisecker, 1988; Cassileth et al., 1980; Ende et al., 1989; Petrisek et al., 1997; Pinquart & Duberstein, 2004; Steginga & Occhipinti, 2002; Stiggelbout & Kiebert, 1997; Wetzels et al., 2004).

**1.1.1.3 Avoiding Decisions Because not Acting is Preferred to Acting.** Older adults may also be more susceptible to loss aversion, which can serve as a proxy of omission bias (e.g., Baron & Ritov, 1994): The term “loss aversion” refers to the phenomenon that a loss of a certain magnitude will result in more subjective displeasure than a gain of equivalent magnitude will result in subjective pleasure (“losses loom larger than gains“, Kahneman & Tversky, 1979, p. 279). Following from this phenomenon, avoiding a loss of a certain magnitude should be prioritized over obtaining a gain of the same magnitude. Because acting (or adopting a new choice option) means letting go of or “losing” current circumstances, action or active decision making tend to be perceived as more costly than inaction or passive acceptance of the reigning choice option (e.g., Gal, 2006; Gal & Rucker, 2018).

Several studies report heightened loss aversion or heightened memory for loss-related information among older adults (Byrne & Anaraky, 2020; Depping & Freund, 2013; Johnson et al., 2006; Mata & Hertwig, 2011; Mrkva et al., 2020). Following suit, older adults report more regrets relating to omissions (i.e., inaction; Newall et al., 2009), which might suggest older adults are more prone to favoring inaction when facing a choice. Conversely, other studies do not find age-related increments in loss aversion (Pachur et al., 2017; Seaman et al., 2018; Weller et al., 2011) or in omission regrets

(Morrison & Roese, 2011; Wrosch et al., 2005). As such, the relationship between aging and a preference for omissions/inaction is inconclusive.

#### **1.1.1.4 Avoiding Actions or Decisions Because a Better Option was**

**Previously Foregone.** Although adult age differences in susceptibility to inaction inertia have not yet been quantified,<sup>2</sup> inaction inertia has been linked (Tykocinski & Ortmann, 2011) to a similar phenomenon, the sunk-cost fallacy (see Van Putten et al., 2009, 2010). Decision makers commit this fallacy when they continue to invest resources such as time or money into an endeavor they have previously committed resources to (Arkes & Blumer, 1985), which resembles the aforementioned status quo bias and default effects. Both inaction inertia (Van Putten et al., 2009) and the sunk-cost fallacy (Van Putten et al., 2010) are associated with so-called state orientation (a preoccupation with other tasks, goals, or one's feelings that might interfere with current task performance (Diefendorff et al., 2000)). Older adults have been found to be less state-oriented (Backes et al., 2016; Gröpel et al., 2005; Hennecke & Freund, 2016) and to be less susceptible to the sunk-cost fallacy (Bruine de Bruin et al., 2012; Strough et al., 2011; Strough et al., 2016). Consequently, older adults may be less – rather than more! – likely to exhibit inaction inertia. If so, older age would be associated a lower likelihood of avoiding choice due to a previously foregone choice.

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<sup>2</sup> According to personal communication (Strough, November 20, 2020), no adult age differences in inaction inertia were observed in the context of Strough et al. (2019). However, said study only included middle-aged and older adults (31–94 years). It is therefore possible that adult age differences might emerge when comparing older adults to younger adults (18–30 years).

## 1.2 Scope of the Present Dissertation

In summary, older adults exhibit increased decision avoidance tendencies likely motivated by the desire to defer choice or uphold the status quo, and perhaps because they favor acts of omission over acts of commission. There is little to no evidence suggesting that older adults may avoid choosing because they have recently foregone better choice options. Correspondingly, the studies at the heart of this dissertation will only examine age-related differences in decision avoidance with regard to the first three of the four avoidance motives and phenomena singled out by Anderson (2003): *Avoiding decisions to maintain current circumstances*, *avoiding decisions for the time being*, and *avoiding decisions because not acting is preferred to acting*.

Although it is well-established that aging is linked to more pronounced decision avoidance tendencies, age-related increments in avoidant decision making remain an understudied topic: There is almost no psychological or experimental work on the topic, and none that has originated within the last decade (Calhoun & Hutchison Jr., 1981; Chen et al., 2011; Curley et al., 1984; Pethel & Chen, 2013). As a result, the mechanisms underlying older adults' avoidance tendencies are mostly unknown and require further inquiry (Löckenhoff, 2018). The present dissertation addresses this gap in the literature by examining the contribution of three types of mechanisms across one or more of the three aforementioned avoidance phenomena. Specifically, the dissertation will examine the roles of context, cognition, and affect with respect to age-related differences in intentional decision avoidance.

### *1.2.1 Context*

With respect to context, this dissertation touches on three types of circumstances: the design of the choice environment, the domain a decision falls under, and the temporal context of choice.

**1.2.1.1 Decision Environment.** Elements of the decision environment or “choice architecture” (Thaler et al., 2013) may nudge decision makers toward passive or avoidant decision making. These elements include pre-selecting certain choice options or allowing decision makers to put off, outsource, or sidestep choice (e.g., Chen et al., 2011; Jachimowicz et al., 2019; Otto et al., 2016; Pethtel & Chen, 2013). As previously noted, older adults appear more susceptible to status quo bias, which upholds existing circumstances by identifying one available option in the decision environment as the reigning “status quo.” Existing aging studies have examined status quo bias in contexts in which older adults themselves have set or experienced the status quo (Fraenkel et al., 2015; Samuelson & Zeckhauser, 1988), and might have personal reasons for not switching away from the status quo option other than being overly receptive to nudges. Thus, the present dissertation will examine whether older adults are more responsive to a choice environment in which somebody else pre-selects a choice option for them and in which they have had no prior personal experience living with the pre-selected option. It will also explore factors that could drive a preference for the avoidant option. Aside from evoking the aforementioned loss aversion, pre-selected options in the decision environment may elicit “avoidance to maintain current circumstances” for several reasons: Meta-analytic evidence (Jachimowicz et al., 2019) indicates that when choice architecture favors an option, this option is perceived as being recommended by others

and as “owned” by the decision maker already; pre-selected options may also require less effort to choose (Dinner et al., 2011). Older adults may be more susceptible to avoidance-leaning decisions environments specifically because they lean more on others to make choices for them (e.g., Pinqart & Duberstein, 2004; Strough et al., 2002; Wetzels et al., 2004), because they feel more strongly about options that they perceive they “own” (Johnson et al., 2006; Peters et al., 2007; cf. Kovalchik et al., 2005), and because they prefer to reduce decision-making effort (e.g., Besedeš et al., 2012; Löckenhoff, 2018; Mata et al., 2007; Strough et al., 2015). Therefore, this dissertation will explore not only whether older adults are more susceptible to pre-chosen options but also why that might be the case.

**1.2.1.2 Domain.** Age-related differences in decision making vary across decision domains (e.g., Bonem et al., 2015; Seaman et al., 2016). Most research into older adults’ intentional decision avoidance stems from healthcare contexts (Ainslie & Beisecker, 1994; Carson, 2005; Finucane et al., 2002; Hudak et al., 2002; Hwang & Jeong, 2012; Lovell et al., 2017; Roberto et al., 2001; Wong et al., 2020), or related applied disciplines (e.g., health insurance coverage; Szrek & Bundorf, 2011; Winter et al., 2006). Because older adults tend to experience more health issues and are more often faced with making health-related choices, they appear to be more invested in the decision process when choices pertain to healthcare questions: Age-related differences in decision making tend to be smaller in health contexts than non-health contexts (English & Carstensen, 2015; Mata & Nunes, 2010; Reed et al., 2008). Conversely, older adults tend to invest less time and effort when making consumer or financial decisions (Mata & Nunes, 2010; Reed et

al., 2008). As such, older adults may be more likely to avoid making non-health than health decisions.

Older adults' life regrets can also shed light on avoidance-relevant decision domains because older adults may experience more omission-based regrets (Newall et al., 2009) and many opportunities to address such omissions decrease with age (e.g., the chance to have children or to choose a certain college major, Wrosch & Heckhausen, 2002). In line with the idea that some opportunities vanish with age, older adults tend to report more educational (DeGenova, 1992; Hattiangadi et al., 1995; Lecci et al., 1994; Wrosch & Heckhausen, 2002) or parenting- and family-related regrets (Dijkstra & Barelds, 2008; Jokisaari, 2004; Lecci et al., 1994) than younger adults do. Hence, real-life inaction-based avoidance may especially apply to educational and family choices.

To study the role of domain across different avoidance phenomena, this dissertation will examine both hypothetical choice domains (pertaining to health and consumer contexts in which choice may be postponed or evaded) as well as real-life omission regrets that may span a variety of domains.

**1.2.1.3 Temporal Context.** Older adults' more advanced age means that this demographic has had more opportunities to make choices and gain experience than younger adults have had. On the one hand, the added expertise may serve as an asset to older adults' decision making (Bruine de Bruin et al., 2012; Li et al., 2015), for instance by making them less reliant on recommended choice options with which they are well-acquainted already (see Jachimowicz et al., 2019). On the other hand, it has given older adults more chances to accrue regrettable choices and for that regret to color future decision making – such as by making them more hesitant to choose in the first place.

At the same time, most older adults perceive themselves as having less time left to realize goals (or manage their regrets) than younger adults do. Socioemotional Selectivity Theory (Carstensen et al., 1999) assumes that decision makers' future time perspective informs goal pursuit and the allocation of resources toward said goal pursuit. Given their shorter time horizons, older adults are theorized to prioritize the present and their affective well-being, which is achieved by focusing more strongly on positively valenced stimuli or choice characteristics than negative ones (e.g., English & Carstensen, 2015; Löckenhoff & Carstensen, 2007, 2009). By contrast, younger adults' prolonged time horizons are theorized to motivate the pursuit of future-focused goals such as knowledge acquisition and information search (Fung & Isaacowitz, 2016). Drawing on this framework, we can presume that older adults may limit their investment in decision-making processes and to be highly motivated to evade negative affect. Therefore, older adults should avoid choice especially when choosing would be resource-intensive and/or likely to evoke negative affect (e.g., due to anticipated regret about the choice not turning out well – see section 1.2.3 on affect below). Since real-life opportunities to undo regrets diminish with age as well (Wrosch & Heckhausen, 2002), avoidant decision making may become especially attractive with respect to future and consequential choices that would be hard-to-impossible to address in the time older adults perceive having left.

To better understand the role time plays, this dissertation will examine older adults' perception of remaining time. In addition, it will assess how decision avoidance and the response to past choices/omissions differs with respect to (1) more versus less recent choices or (2) current versus future decision or regret regulation strategies.

## ***1.2.2 Cognition***

Age-related differences in decision making (e.g., Pachur et al., 2017; Sanfey & Hastie, 2000) are often thought to reflect age-related changes in cognitive functioning and capacity. Put differently, it is possible that older adults evade decisions more because the decisions exceed this demographic's cognitive abilities or resources.

**1.2.2.1 Information Processing Resources.** To begin, negative associations between aging and attention, processing speed, or learning ability (e.g., Kirasic et al., 1996; Salthouse, 1996; Salthouse & Ferrer-Caja, 2003) can interfere with older adults' ability to take in and process new information. This is especially true when multiple pieces of information have to be compared and integrated to make a decision (i.e., under high cognitive load, Mata & Nunes, 2010) or in contexts of high objective decision conflict or difficulty (e.g., Hanoch et al., 2011; Rosi et al., 2019). But whereas increased objective decision conflict leads to heightened decision avoidance among younger adults, this is not necessarily the case for older adults: Regardless of objective decision conflict or difficulty, older adults are more likely to avoid making decisions (Pethel & Chen, 2013), to report subjective decision conflict, and to voice more dissatisfaction with their choices than younger adults do (Peterson & Cheng, 2020). This could mean that the objective amount or content of information to be processed has little to do with adult age differences in avoidance strategies. Alternatively, it is possible that findings by Pethel and Chen (2013) and Peterson and Cheng (2020) point to the existence of ceiling effects among older decision makers.

**1.2.2.2 Fluid Abilities Including Working Memory and Executive Functions.** Beyond general changes in information processing resources, older adults also experience

changes in specific fluid cognitive abilities such as working memory span and other executive functions (Cavanaugh & Blanchard-Fields, 2015; Salthouse & Ferrer-Caja, 2003). Fluid cognitive abilities describe the capacity to integrate information, reason abstractly, and solve problems. Working memory refers to the amount of information a decision maker can temporarily hold and manipulate in their memory and the term executive functions describes a set of capacities that subsume not only working memory but also self-control/inhibition and flexible thinking.

Changes in these abilities contribute to age-related differences in the ability to correctly apply decision rules, that is, to pick the objectively “correct” choice option (Bruine de Bruin et al., 2012; Del Missier et al., 2011; Rosi et al., 2019). Similarly, age-related variations in fluid cognitive abilities help to explain adult age differences in information acquisition and strategy use (Mata et al., 2007): As previously stated, older adults prefer to choose among fewer alternatives (Reed et al., 2008; Reed et al., 2013; also see Szrek & Bundorf, 2011) and base their choices on both fewer options and fewer pieces of information (Bynum et al., 2014; Mata & Nunes, 2010; Meyer et al., 2007; Petrisek et al., 1997; Pierce, 1993; Rydzewska et al., 2018; van Helverson & Mata, 2012). This pattern of results might reflect an increased reliance on simpler, less cognitively demanding decision strategies with age (Besedeš et al., 2012). Older adults achieve this by “satisficing” rather than “maximizing,” that is, by aiming to identify acceptable rather than ideal choice options (Bruine de Bruin et al., 2016; Chen et al., 2011; Chen & Sun, 2003; Hanoch et al., 2011; Johnson, 1990; Mata & Nunes, 2010; Riggle & Johnson, 1996; Streufert et al., 1990): By foregoing the search for the “best” choice option, older adults limit the amount of information and number of comparisons

necessary to make a selection among the available choice options. Although this approach has been linked to the negative relationship between old age and fluid abilities (Mata et al., 2007), other studies have failed to link differences in information search or strategy selection to age-related cognitive changes (e.g., Hess et al., 2013; Nolte et al., 2022; Queen et al., 2012). Thus, differences in fluid and executive abilities cannot consistently be linked to adult age differences in decision avoidance tendencies.

**1.2.2.3 Numeracy.** Aside from affecting the aforementioned abilities, aging also impacts older adults' ability to work with numbers (i.e., numeracy; Bruine de Bruin, 2015; Fraenkel et al., 2015). This age-related change has yielded mixed associations with different age groups' avoidance tendencies: In samples that mostly consist of middle-aged and older adults, higher levels of decision avoidance and passive decision making are associated with decreased numeracy skills among those under 65 or 75 (Fraenkel et al., 2015; Szrek and Bundorf (2011). Among the old-old, avoidance tendencies seem to be more pronounced, regardless of numeric ability (Fraenkel et al., 2015). Hence, numeracy seems relevant to (older adults') decision avoidance, but ceiling effects may obscure the contribution of numeracy skills among the oldest decision makers.

**1.2.2.4 Cognitive Reflection Ability.** Similar to findings on numeracy, older adults demonstrate lower levels of cognitive reflection ability, that is, the ability to overrule impulsive responses in favor of reasoned responses (e.g., Hertzog et al., 2018). In one study, higher levels of decision avoidance were linked to limited cognitive reflection ability, but they could not explain why older adults were more likely to avoid decisions, seeing as limited cognitive reflection ability emerged as a better predictor of decision avoidance than actual age (Szrek & Bundorf, 2011).

**1.2.2.5 Summary.** In sum, the current literature offers mixed support for the assumption that cognitive changes drive decision avoidance among older adults. On the one hand, this is due to limitations of the extant literature: Cognitive abilities were not considered in relevant studies assessing adult age differences in decision avoidance (e.g., Chen et al., 2011; Pehhtel & Chen, 2013). On the other hand, age-related differences in objective cognitive abilities and resources may be insufficient to explain older adults' lack of engagement with the decision process. Instead, it is possible that heightened avoidance tendencies are linked to older adults' subjective decision preferences or subjective perceptions that they are not able to make sound choices: Relative to their younger peers, older adults consider their aptitude to make choices as more restricted (Bruine de Bruin et al., 2012), which can prompt this age group to defer choices to others (Strough et al., 2002). To clarify the role cognition plays in older adults' decision avoidance, this dissertation will explore the role of objective cognitive ability, subjective cognitive ability, and self-reported avoidance motives linked to cognitive effort (e.g., avoidance being perceived as less effortful).

### ***1.2.3 Affect***

With respect to affect, decision avoidance can aid emotion regulation purposes: Some decision makers may experience the decision process itself as emotionally bothersome, and will avoid exploring available information or making a decision simply to escape the process sooner (Janis & Mann, 1977; Otto et al., 2016). Such effects may be more pronounced in older adults because they have less confidence in their decision-making skills (Bruine de Bruin et al., 2012), report more decision difficulty (e.g., Peterson & Cheng, 2020), and experience less satisfaction after making decisions (ibid.).

Older adults' cognitive performance is also more susceptible to stress than is the case for younger age groups (Crosswell et al., 2021; Denburg et al., 2009; Rimmele et al., 2022). Given older adults stronger preference for experiencing positive affect, older adults may find challenging and stressful decision processes especially aversive, hence preferring avoidance.

Simultaneously, decision avoidance is closely linked to feelings of anticipated and experienced regret. When a choice is difficult – for example, when multiple options of comparable attractiveness are available or when options present a combination of desirable and undesirable characteristics (Anderson, 2003; Chen et al., 2011; Huber et al., 2012; Pehhtel & Chen, 2013) – decision makers may worry about making a suboptimal choice or suffering adverse consequences. Prior research has already established that higher levels of such anticipated regret are linked to higher levels of decision avoidance (Becerra Pérez et al., 2016; Brehaut et al., 2003; Diefenbach & Mohamed, 2007; Huber et al., 2012; Hung et al., 2007) and that older adults successfully down-regulate anticipated regret by favoring avoidance more than younger adults do (Bjälkebring et al., 2013). Likewise, decision making and avoidance are linked to experienced regret and other indices of post-decisional affect or satisfaction: Compared to younger adults, older adults report better post-decisional affect after avoiding rather than making a choice (Chen et al., 2011; Pehhtel & Chen, 2013). In sum, there is evidence that decision avoidance becomes a more frequent and more successful emotion regulation strategy for decision makers as they grow older.

Although extant research has already established links between aging, affect, and avoidance, the literature lacks a comprehensive assessment of older adults' affect prior to,

during, and following the decision (avoidance) process. This dissertation also expands on past work by examining older adults' emotional response to and regulation of decision (avoidance) regrets that have occurred recently, a long time ago, or may occur in the future. This will shed light on the immediate as well as long-term affective experience related to decision avoidance.

### **1.3 Dissertation Overview**

The present dissertation endeavors to identify *when* and *why* aging is linked to more pronounced decision avoidance tendencies. As specified in this introductory chapter, it does so by examining both different avoidance phenomena as well as different types of potentially relevant factors. Following Chapter 1, this dissertation spans three scientific articles – either published or in preparation for publication – and a fifth chapter containing concluding remarks. Notably, not all studies in Chapters 2 through 4 will touch on each type of avoidance or each potentially contributing factor.

#### **1.3.1 Chapter 2**

Chapter 2 makes minor formatting adjustments to an article recently published in the *Journal of Experimental Psychology: General* (Nolte & Löckenhoff, 2022). Utilizing experimental online data, this chapter examines whether age-related differences in decision avoidance reflect age-related increases in the susceptibility to elements of choice architecture that discourage active decision making (i.e., *avoiding choice to maintain current circumstances*). To this end, Chapter 2 tests the relationship between age and the passive acceptance of pre-selected “default” options (i.e., susceptibility to so-called “default effects”). Beyond observing objective choice behavior, this chapter also assesses possible age-related differences in the subjective motivation to comply with defaults: Are

older decision makers more likely to feel like they “own” default options, to be swayed by options “recommended” by others, to be put off by the effort of making a more active decision, more likely to perceive the choice as trivial, to feel like they lack the necessary expertise to overrule defaults, or to accept defaults in an effort to curb decision regret?

### ***1.3.2 Chapter 3***

Chapter 3, based on a manuscript by Nolte and Löckenhoff (in prep.), comprises one online and one hybrid study that each examine potential mechanisms theorized to underlie age-related differences in intentional decision avoidance (i.e., *avoiding choice for the time being*). Specifically, both Studies 1 and 2 explore the roles of age-related differences in perceived cognitive load (i.e., decision difficulty and effort) and in affective experiences occurring before, during, and after making or avoiding a decision. Study 2 expands on the design of Study 1 by also attempting to discourage decision avoidance, particularly among older decision makers. To this end, half of all younger, middle-aged, and older adults were randomized to an intervention condition that prompted them to evaluate the pros and cons of the available choice options in writing before being able to make (or avoid making) a selection. We hypothesized that writing about one’s choices would lower perceived difficulty and improve post-decisional affect, thus decreasing the need for avoidance.

### ***1.3.3 Chapter 4***

Chapter 4 is based on a manuscript by Nolte and colleagues (in prep.) and draws on a secondary analysis of data originally collected by the second and third author (Lewis, 2011). This chapter hones in on the role of experienced and anticipated decision regrets for age-related differences in decision making and intentional decision avoidance.

To this end, Chapter 4 examines the relationship between age and the management of regrettable decisions, many of which stem from omission bias (i.e., *avoiding choice because not acting is preferred to acting*). These decisions either originated within the year preceding the study (i.e., recent regrets), at a more distant time point in the past (i.e., long-term regrets), or could arise in the future. Using open-ended data, this chapter examines whether older decision makers use different current or planned strategies to down-regulate experienced and anticipated regrets than younger adults do. Given this dissertation's focus on decision avoidance, the examined strategies include attempts to defer choice (i.e., delay or avoid decision, transfer responsibility, or seek help) and to minimize the effort invested when choosing (e.g., decrease goal level or restrict size of choice set).

#### ***1.3.4 Chapter 5***

Finally, Chapter 5 provides a summary of the findings described across Chapters 2, 3, and 4. Specifically, this chapter highlights what each study contributes to our understanding of how context, cognition, and affect relate to age-related differences in decision avoidance. In addition, Chapter 5 identifies avenues for future research on the topic.

## 1.4 References

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## CHAPTER 2

### SUSCEPTIBILITY TO DEFAULT EFFECTS DOES NOT DIFFER BY AGE<sup>3</sup>

Decision makers are more likely to passively accept than to actively reject pre-selected default options. Age differences in such “default effects” have not been systematically examined, but prior research reports age-related variation in several known determinants of default effects suggesting that they may be more common in older as compared to younger adults. To address this question, a representative life span sample ( $N = 500$ ;  $M_{age} = 49.90$ ,  $SD_{age} = 19.34$ ; 51% female, 49% male; 67% Non-Hispanic White) responded to a pre-registered online study. Participants completed a default effect task comprising two conditions, one requiring opt-out and one requiring opt-in decisions (i.e., 15 vs. 0 pre-selected features each). Susceptibility to defaults was assessed as the discrepancy between the number of features selected within each condition. In addition, we collected data on known determinants of default effects (i.e., perceived endowment, endorsement, ease, experience making similar choices, importance of the choice, and affective responses to the choice). Finally, we screened demographic background, personality, socioemotional and health status, and cognitive ability. Susceptibility to default effects was evident both at the individual and the group level. Unlike hypothesized, older age did not predict greater susceptibility to defaults, and older adults were less likely to endorse determinants of default effect compliance. Of the covariates assessed, only identifying as Non-Hispanic White, greater perceived endorsement, greater perceived ease, and lower perceived importance of making the right choice predicted

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decision makers' susceptibility to default effects. Thus, our findings suggest that susceptibility to decision defaults does not vary by age.

## **2.1 Background**

### ***2.1.1 Age Differences in Engagement with the Decision Process***

Few groups enjoy as many opportunities to make decisions as older adults do: Although they only make up 16.5% of the US population, adults over the age of 65 command most of the nation's wealth (Bricker et al., 2017; Emmons & Noeth, 2013), leisure time (US Bureau of Labor Statistics, 2020), and voting power (US Census Bureau, 2017). Despite these assets and chances to engage in decision making, older adults demonstrate less effortful involvement in the decision process than other age groups do (for a review, see Löckenhoff, 2018). To illustrate, older adults are more likely to underuse and actively avoid decision-relevant information (Deng et al., 2022; Hertwig et al., 2021; Mata & Nunes, 2010), consider and desire fewer decision options (e.g., Reed et al., 2008; Rydzewska et al., 2018; van Helversen & Mata, 2012), and settle on an option faster (e.g., Meyer et al., 2007; van Helversen & Mata, 2012), often without looking for a second opinion.

This may reduce older adults' ability to make well-informed, beneficial choices, especially when making (expensive) purchases and financial investments: In a meta-analysis comparing younger and older adults' engagement in pre-decisional information seeking, Mata and Nunes (2010) found that age differences in engagement with the decision process were more pronounced in the context of consumer choices (such as when choosing among different cars, food options, or apartments) than in the context of health-related choices (such as when choosing among different physicians, medications,

or health insurance plans). Similarly, age differences in the desired number of available choice options are greater in the context of consumer products than when making a decision about one's health care (Reed et al., 2008). With regard to both of these findings, it is possible that older adults show more pronounced investment in the decision process when they face health-related choices because these types of choices become more relevant and risky or costly with age, seeing as older adults tend to experience more frequent and more serious health issues than younger adults (English & Carstensen, 2015; Mata & Nunes, 2010).

Thus, the present study will focus on consumer choices, considering they are known to elicit noticeable age differences with regard to various decision-making metrics. In detail, we evaluate whether older adults' tendency to limit active engagement with decision processes extends to default effects. Specifically, we assess whether older adults are more likely to passively accept pre-selected decision defaults when they are available.

### ***2.1.2 Default Effects***

In decision-making contexts, default effects can be defined as the “difference in choice between the opt-out condition versus that in the opt-in condition” (Jachimowicz et al., 2019, p. 4): When options or features are pre-selected by default (i.e., in an opt-out condition), they are more likely to be embraced than when they are not pre-selected by default (i.e., in an opt-in condition). Although defaults allow decision makers to override the pre-determined choice configuration, meta-analytic evidence suggests that people accept default selections more readily than they reject them (Jachimowicz et al., 2019). This “default effect“ bears resemblance to other strategies aimed at making choices

simpler or less effortful, such as choice delegation, status quo bias, and inaction inertia (Otto et al., 2016). Comparable to the default effect, the latter two describe strategies that uphold a previous choice or circumstance, even when said option or circumstance is not or no longer beneficial. As such, compliance with defaults is not necessarily in decision makers' best interests: Although defaults are often used to nudge people towards making favorable choices – such as encouraging retirement saving by auto-enrolling employees into a saving scheme (Thaler & Benartzi, 2004) – defaults can also discourage decision makers from pursuing options that would be more beneficial for them (e.g., rejecting unnecessary but expensive add-ons during a car purchase). As such, a heightened vulnerability to defaults may sometimes put decision makers at risk of making disadvantageous choices.

**2.1.2.1 Age Differences in Susceptibility to Default Effects.** Although default effects have been researched extensively, we know of no prior work that has systematically explored age-related differences in the susceptibility to default effects. In one of the only attempts to assess acceptance of defaults among older adults, Kressel and colleagues (2007) surveyed patients over the age of 65 with regard to end-of-life treatment preferences (i.e., accept or reject end-of-life care). Because patients were more likely to accept default care options than not, irrespective of whether the default favored receiving or rejecting care, we can conclude that older adults are generally susceptible to default effects. But since Kressel et al. (2007) did not recruit a comparison group, it is unclear whether older adults' vulnerability to defaults differs from that of younger or middle-aged adults. Beyond presenting a risk to consumers who are faced with defaults that entail additional, unwanted costs or other drawbacks, potential age differences in

susceptibility to defaults also have other important implications. For instance, behavioral interventions designed to encourage beneficial decision making may not be equally effective for all age groups, meaning less-receptive individuals may require additional support to adopt the intended choice options or behaviors.

Research concerning related phenomena – status quo bias and the sunk-cost fallacy – has yielded divergent age patterns. Status quo bias is observed when decision makers choose to preserve the current state of affairs rather than adopting a different choice option, typically because switching away from the status quo would feel like a loss (Samuelson & Zeckhauser, 1988). Although research on age-related differences in status quo bias is limited, older adults appear to be more likely to exhibit this bias: Older arthritis patients are more likely to prefer the existing treatment approach to a new treatment option than middle-aged patients are (Fraenkel et al. 2015). Similarly, compared to younger adults, older employees are more likely to prefer their existing health insurance plan, even when an objectively better plan is available (Samuelson & Zeckhauser, 1988). Sunk-cost fallacies, in turn, are observed when decision makers continue to invest into an endeavor they have already sunken resources into, even if a continued investment is no longer beneficial. In contrast to findings on status quo bias, older adults appear less vulnerable to committing sunk-cost fallacies than younger adults are (Strough et al., 2008, 2016).

In sum, age differences in default effects have not been systematically examined and the previous literature on related phenomena (i.e., the status quo bias and the sunk-cost fallacy) has yielded inconsistent patterns of age effects. However, there are several mechanisms which have been found to influence decision makers' compliance with

defaults and there is some evidence that these factors may vary age (Dinner et al., 2011).

**2.1.2.2 Endorsement.** Meta-analytic evidence shows that decision makers are more likely to accept a default if they perceive the default as the option “recommended” by the person or entity setting the default (i.e., perceived endorsement; Jachimowicz et al., 2019), and there is some indication that the tendency to yield to recommendations increases with age. In particular, research in medical settings indicates that older patients defer choices more often to their providers than younger patients do (Ende et al., 1989; Pinguart & Duberstein, 2004; Steginga & Occhipinti, 2002; Stiggelbout & Kiebert, 1997; Wetzels et al., 2004). There are several reasons why older adult may be more likely to embrace the choices that others make for them. First, older adults perceive their decision-making competence as more limited compared to their younger peers (Bruine de Bruin et al., 2012), with lower levels of perceived competence leading older adults to seek more help from others, such as family members, when solving problems (Strough et al., 2002). In addition, there may be cohort effects in accepting advice. Older adults grew up at a time when experts such as physicians made decisions for rather than in collaboration with their clients or patients, whereas younger generations are more used to being actively involved in the decision process (Mather, 2006).

**2.1.2.3 Endowment.** Acceptance of decision defaults has also been linked to perceived endowment, that is, the perception that one “owns” the default option and can either preserve it or part from it (Jachimowicz et al., 2019). Endowment effects are observed when already owned goods are valued more highly than goods a decision maker could choose to own. In practice, this means that sellers attach higher price tags to a good they are selling than buyers are willing to spend to obtain the same good (Kahneman et

al., 1991). Older adults exhibit endowment effects (Bernal, 2013; also see Mikels & Reed, 2009) and Peters and colleagues (2007) hypothesize that susceptibility to endowment effects increases with age. Indeed, in line with endowment effects, older motor vehicle buyers show bigger discrepancies between buying and selling tendencies than younger adults do (Johnson et al., 2006). Conversely, Kovalchik and colleagues (2005) did not observe age-related differences in either hypothetical or actual endowment effect tasks.

Endowment effects are often explained through the concept of loss aversion (Kahneman et al., 1991; Kahneman & Tversky, 1979): the notion that losing something “hurts” more than an equivalent gain would feel good. Correspondingly, several studies (Byrne & Anaraky, 2019; Depping & Freund, 2017; Johnson et al., 2006; Mata & Hertwig, 2011; Mrkva et al., 2020) describe age differences in decision making or recall of loss-related information that are in line with in age-related increments in loss aversion. However, other studies report no age differences in loss aversion in the context of gambling or risk taking tasks (Seaman et al., 2018; Weller et al., 2011) or find that in the context of risky monetary lotteries, older adults display no loss aversion at all (Pachur et al., 2017).

**2.1.2.4 Ease.** Whereas both endorsement and endowment perceptions have been found to moderate susceptibility to default effects (Jachimowicz et al., 2019), the role of another commonly cited factor, ease, is less clear. Some prior research suggests that defaults are more impactful when it is more difficult or effortful to opt out of the default and into a different choice option (e.g., Dinner et al., 2011). Counter to this finding, meta-

analytic evidence has failed to confirm a moderating role of ease (Jachimowicz et al., 2019).

If perceived ease influences compliance with defaults, does the effect of ease on decision making differ between age groups? In support of this notion, older adults have been shown to favor sure and simple options over uncertain and complex options (Mather et al., 2012; Zilker et al., 2020), which would pre-dispose older adults to prefer defaults over alternative choices. Older adults also invest less effort when searching for decision-relevant information or making decisions among different choice options (for reviews, see Löckenhoff, 2018; Strough et al., 2015). Often, such findings reflect shifts towards recruiting simpler, less cognitively demanding decision strategies with age (Besedeš et al., 2012; Mata et al., 2007). For instance, older adults are more likely to satisfice, that is, to look for choice options that are “good enough“ (Bruine de Bruin et al., 2016). In practice, this might mean accepting the first choice option that meets older adults’ decision threshold. By contrast, younger adults are more likely to maximize in their decision making, that is, to seek for the best possible choice option (Bruine de Bruin et al., 2016), even though this approach is more resource-intensive. Given these findings, older adults might be more likely to accept decision defaults than younger adults are, especially if complying with defaults is less effortful or allows older adults to make decisions they deem “good enough“ to meet their standards.

#### **2.1.2.5 Decision-making Experience and Perceived Importance of Choice.**

Susceptibility to default effects may also be attenuated among decision makers who have stronger choice preferences concerning the decision at hand or consider the decision to be more important (Jachimowicz et al., 2019). As choice preferences are

thought to be more established among decision makers with domain-specific knowledge or experience (e.g., Hoeffler & Ariely, 1999; Warren et al., 2011), age groups may differ in the strength of their preferences related to different choice contexts. Although older decision makers can sometimes rely on a lifetime of knowledge and experience not accessible to younger adults (e.g., Bruine de Bruin et al., 2012; Li et al., 2015), age does not always equate to higher levels knowledge or experience. Mrkva et al. (2020), for instance, found that older age was associated with less rather than more knowledge and experience concerning car purchases. However, the direction of such age-related differences or preferences will likely depend on the choice domain (e.g., Kim & Hasher, 2005): Compared to younger adults, older adults are less willing to engage in health/safety or ethical risk-taking and more motivated to obtain social or health-related rewards (Bonem et al., 2015; Seaman et al., 2016). Age groups also vary in their assessments of how relevant information or choices are (e.g., Habak et al., 2019), with older adults exhibiting stronger preferences for self-relevant information (e.g., Ennis et al., 2013; Hess et al., 2001; 2012). As a result, it is crucial to account for age-related differences in relevant experience as well as subjective importance when assessing susceptibility to default effects.

**2.1.2.6 Affect.** Finally, it seems feasible that compliance with defaults serves affect-based goals: Staying with a past or existing choice option is associated with lower levels of perceived responsibility and regret than making an active choice that deviates from this option (Kahneman & Tversky, 1982; Nicolle et al., 2011; Simonson, 1992; also see Johnson et al., 2006). As such, avoiding an active decision by passively accepting a default may help decision makers to down-regulate feelings of anticipated or experienced

regret (Bjälkebring et al., 2013; Simonson, 1992). Compared to younger adults, older adults are more likely to rely on decision avoidance to manage their regrets (Bjälkebring et al., 2013) and report more positive and less negative affect after avoiding instead of making a decision (Chen et al., 2011; Pethtel & Chen, 2013). Since the motivation to maintain positive and evade negative feelings shows age-related increments (e.g., Carstensen et al., 2003), older adults may be more likely to rely on defaults as a way to regulate their post-decisional affect.

### ***2.1.3 The Present Study***

To sum up, existing research indicates that older adults display default effects. Further, susceptibility to biases and reliance on mechanisms that are linked to the default effect is more pronounced among older than younger or middle-aged adults. Together, these findings imply that older adults might be more vulnerable to default effects than their younger peers are. However, adult age differences in compliance with defaults have not yet been systematically quantified. The present, pre-registered study addresses this gap by examining decision makers' relative vulnerability to default effects in a large and representative sample spanning the entire adult lifespan. To this end, we adapted an existing default effects task (Steffel et al., 2016) to derive an individual-level measure of default effect compliance: In a within-subjects design, decision makers completed one opt-in and one opt-out choice scenario, each requiring them to make decisions about 15 features that could either be included (opt-in) or excluded (opt-out) when renting a home or apartment. Consistent with definitions of the default effect, we hypothesized that participants would select fewer features in the opt-in than in the opt-out condition, that is, when the features were excluded by default versus when the features were included by

default (pre-registered H2.1). Extrapolating from existing research, we hypothesized that older adults would demonstrate a stronger susceptibility to default effects (pre-registered H2.2).

To better understand age-related differences in the compliance with defaults, we also explored two related research questions. In a first step, we assessed to which extent known determinants of the default effect would predict participants' acceptance of default options (pre-registered Q2.1). Specifically, we evaluated the roles of perceived endorsement, endowment, and ease (Dinner et al., 2011; Jachimowicz et al., 2019). Furthermore, we assessed participants' experience in making choices similar to the ones in our choice scenarios (as a proxy of how established participants' choice preferences may be) and the perceived importance of making correct choices in each scenario (Jachimowicz et al., 2019). Finally, participants rated their post-decisional affect.

We also assessed to which extent demographic, personality, socioemotional, or cognitive covariates would predict participants' susceptibility to default effects (pre-registered Q2.2). In this respect, we considered covariates that have been shown to be associated with age and/or decision preferences. Specifically, we assessed baseline affect at the beginning of the study, five-factor personality traits, self-rated physical and emotional health, subjective life position, and participants' motivation to pursue different types of life goals (e.g., Cavanaugh & Blanchard-Fields, 2015; Ebner et al., 2006; Rutt & Löckenhoff, 2016; Swift et al., 2014). Participants also completed cognitive measures including assessments of self-rated learning ability and memory, crystallized intelligence, numeracy, and cognitive reflection ability (Cavanaugh & Blanchard-Fields, 2015).

## 2.2 Methods

### 2.2.1 Transparency and Openness

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. The ‘Procedure’ section outlines measures included for the purpose of other studies, the ‘Analysis’ section outlines which software and analysis steps were used to derive the presented results. Data and analysis code are posted at [https://osf.io/xtd9z/?view\\_only=b8c544778aa74a10bac7bfe88d272ad6](https://osf.io/xtd9z/?view_only=b8c544778aa74a10bac7bfe88d272ad6) and study measures, including a complete version of the default task, can be found in Supplement 2.B. The study design was pre-registered with AsPredicted.org (<https://aspredicted.org/8yh6j.pdf>) and approved by Cornell University’s Institutional Review Board prior to data collection. Deviations from our pre-registration are summarized in Supplement 2.A.

### 2.2.2 Participants

Our target sample size was  $N = 500$ : We planned to recruit 90% of this sample ( $n = 450$ ) through Qualtrics.com, an online panel provider. The remaining 10% ( $n = 50$ ) was to be recruited from a local community in upstate New York. This was done to anchor the anonymous panel data with a local sample who had verified demographics and who could be reached to resolve any questions/concerns about the study content (none were reported).

An a priori power analysis conducted using G\*Power 3.1.9.6. suggested that  $N = 500$  would be sufficient to assess both H2.1 and H2.2 with a power of .80: In the context of H2.1, we found that we needed at least  $N = 106$  to detect a medium-sized effect ( $d = .50$ ) while using a Wilcoxon rank-sum tests for independent samples (note that

Jachimowicz et al., 2019, report  $d = .68$  as the average effect size for default effects). In the context of H2.2, we assessed the sample size needed to detect the contribution ( $R^2$  increase in linear multiple regression models) of predictor variables and their interaction with the ‘condition’ variable that assessed default effect compliance (e.g., endorsement and endorsement x condition, etc.). Given a small effect size of  $f^2 = .02$  and large total number of predictors or interaction terms (i.e., 20+), we found that we required a sample size of at least  $N = 485$ .

In Summer 2020, we collected  $n = 457$  responses through Qualtrics.com and  $n = 59$  responses from the local community ( $N = 516$ ). From this sample, we excluded 16 participants for quality reasons (for exclusion criteria, including attention check measures, see Supplement 2.B). The remaining sample consisted of  $N = 500$  adults between the ages of 18 and 89 years ( $M_{age} = 49.90$ ,  $SD_{age} = 19.34$ , 51% female, 49% male, 67% Non-Hispanic White). Broken up by age group, the sample included  $n = 176$  younger adults between the ages of 18 and 35 ( $M_{age} = 28.61$ ,  $SD_{age} = 5.04$ , 51% female, 48% male, 58% Non-Hispanic White),  $n = 149$  middle-aged adults between the ages of 36 and 65 ( $M_{age} = 49.11$ ,  $SD_{age} = 9.59$ , 52% female, 48% male, 68% Non-Hispanic White), and  $n = 175$  older adults 66 years and older ( $M_{age} = 71.98$ ,  $SD_{age} = 4.51$ , 51% female, 49% male, 74% Non-Hispanic White). Overall,  $n = 59$  participants (12%) identified as being of Hispanic, Latino, or Spanish origin ( $n_{younger} = 32$ ,  $n_{middle} = 15$ ,  $n_{older} = 12$ ). With regard to racial background, the sample included  $n = 62$  Black/African American participants (12%;  $n_{younger} = 22$ ,  $n_{middle} = 20$ ,  $n_{older} = 20$ ),  $n = 39$  Asian participants (8%;  $n_{younger} = 19$ ,  $n_{middle} = 10$ ,  $n_{older} = 10$ ), and  $n = 19$  participants of mixed background (2%;  $n_{younger} = 5$ ,  $n_{middle} = 2$ ,  $n_{older} = 2$ ) or of a racial group not listed (2%;

$n_{younger} = 2$ ,  $n_{middle} = 3$ ,  $n_{older} = 5$ ). Four identified as Native American, American Indian, or Alaskan Native (1%,  $n_{younger} = 1$ ,  $n_{middle} = 2$ ,  $n_{older} = 1$ ) and  $n = 2$  as Native Hawaiian or other Pacific Islander ( $< 1\%$ ;  $n_{younger} = 1$ ,  $n_{middle} = 0$ ,  $n_{older} = 1$ ). Additional sample characteristics are provided in Table 2.1. Compared to the online sample, the local sample reported higher educational attainment and was less likely to identify as Republican ( $ps < .001$ ).

### **2.2.3 Default Effect Tasks**

In a within-subjects design, participants responded to two choice scenarios, one of which was paired with an opt-in condition and one of which was paired with an opt-out condition (the complete wording of the task is included in Supplement 2.B). The choice scenarios asked participants to imagine they were moving into a new apartment complex and were touring a model apartment (adapted from Steffel et al., 2016) or that they were choosing a vacation home and were looking at a model rental. Both the model apartment and the model rental featured 15 premium amenities (e.g., programmable thermostat, memory foam mattress) that were either included in the cost of rent (opt-out condition) or not (opt-in condition). In the opt-out condition, participants could choose to forego any number of the 15 amenities, with the result of having a small amount of money deducted from their monthly apartment rent or daily vacation rent for each excluded amenity.

In the opt-in condition, participants could choose to add amenities by increasing their monthly or daily rent by a small amount of money for each chosen amenity. The order of scenarios and the pairing of scenarios with conditions was counter-balanced and randomized across participants.

**Table 2.1**

*Descriptive Statistics for Covariate Measures and Default Effect Determinants and Their Association with Age*

Variable	<i>M (SD)/%</i>	Correlation with age	
		<i>r<sub>s</sub></i>	<i>p</i>
<i>Demographic variables</i>			
Age	49.90 (19.34)	-	-
% Women	256 (51%)	-.03	.440
% Non-Hispanic White	333 (67%)	.17	< .001***
Education	3.68 (1.04)	-.05	.263
Income	4.08 (1.92)	-.08	.078
% Republican	153 (31%)	.12	< .01**
<i>Socioemotional and health variables</i>			
Baseline affect: Valence	4.62 (1.56)	.02	.734
Baseline affect: Activation	3.76 (1.70)	-.26	< .001***
Growth (vs. maintenance) goals	62.96 (25.34)	-.42	< .001***
Information (vs. affect) goals	64.47 (23.20)	-.15	< .001***
Life position	57.90 (25.03)	.67	< .001***
Self-rated physical health	3.34 (1.04)	-.17	< .001***
Self-rated emotional health	3.40 (1.06)	.16	< .001***
<i>Personality</i>			
Neuroticism	2.72 (0.99)	-.27	< .001***
Extraversion	2.85 (0.96)	-.02	.636
Agreeableness	3.66 (0.81)	.17	< .001***
Conscientiousness	3.90 (0.83)	.17	< .001***
<i>Cognitive variables</i>			
Self-rated learning ability	3.74 (1.00)	-.22	< .001***
Self-rated memory	3.40 (0.98)	-.12	< .01**
Crystallized intelligence	6.83 (2.95)	.35	< .001***
Numeracy	1.46 (1.08)	.02	.699
Cognitive reflection ability	0.43 (0.82)	.04	.445
<i>Default effect determinants</i>			
Endorsement	4.61 (1.34)	-.07	.117
Endowment	4.61 (1.49)	-.28	< .001***
Ease	4.14 (1.59)	-.21	< .001***
Experience	4.45 (1.63)	-.19	< .001***
Importance of choice	5.79 (1.01)	-.07	.135
Post-decisional change in valence	0.75 (1.62)	-.01	.817
Post-decisional change in activation	9.62 (1.61)	.04	.394

**Note.** For the covariate measures, descriptive statistics and associations with age were

previously published in Nolte et al. (2021). \*\*  $p < .01$ , \*\*\*  $p < .001$ .

This task type was chosen for three reasons. First, a recent meta-analysis (Jachimowicz et al., 2019) identified the default effect task we adapted from Steffel and colleagues (2016) as evoking stronger-than-average effect sizes. Second, unlike the many other studies that rely on a binary outcome measure (i.e., staying with a default option vs. deviating from the default option, Jachimowicz et al., 2019), the present task assesses a non-binary outcome variable (i.e., the number of amenities chosen). The use of a non-binary outcome variable enabled us to assess the relative degree to which individual participants were susceptible to default effects. Finally, the Steffel et al. (2016) task we adapted focused on choosing rental amenities, a choice domain which has been widely used in the prior literature on aging and decision making and is considered comparatively age-neutral (e.g., Johnson, 1993, 1997; Pethtel & Chen, 2013). Moreover, default effects are more pronounced in consumer contexts than other choice domains (e.g., the health domain, Jachimowicz et al., 2019), making our tasks likely to elicit default effects, especially given that age differences in pre-decisional info search and decision preferences are also pronounced in consumer contexts (Mata & Nunes, 2010; Reed et al., 2008).

Following the presentation of each of the two scenarios, participants responded to seven follow-up questions, all assessed using a 7-point Likert scale (see Supplement 2.B for the full wording of these items). *Endorsement* was measured by assessing agreement with the statement “It seemed like the landlord [rental service] thought it was best for me to choose all of the [none of the] premium amenities” (assessed on a scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree*). *Endowment* was measured by asking participants how much they felt the premium amenities “belonged” to the apartment or

vacation home they were considering (assessed on a scale ranging from 1 = *Not at all* to 7 = *A lot*). *Ease* was measured by assessing agreement with the statement “Staying with an option that was already chosen was easier than making a different choice,” using the same 7-point scale as we did for endorsement. *Experience* choosing apartments and vacation homes was measured by means of self-report (assessed on a scale ranging from 1 = *No experience at all* to 7 = *A lot of experience*). Perceived *importance* of making the right choices concerning apartments or vacation homes was assessed on a scale ranging from 1 = *Not at all important* to 7 = *Extremely important*. Finally, *post-decisional affect* was assessed with respect to valence (on a scale ranging from 1 = *Very negative* to 7 = *Very positive*) and activation level (on a scale ranging from 1 = *Very quiet/still* to 7 = *Very activated/aroused*; Nielsen et al., 2008). Because preliminary analyses indicated that baseline affect varied by age (see Table 2.1), we deviated from the pre-registration in our analyses of post-decisional affect. Instead of entering the raw post-decisional scores, we calculated change scores for valence and activation level by subtracting baseline scores from post-decisional scores (i.e., post-decisional valence – baseline valence; post-decisional activation – baseline activation).

#### **2.2.4 Measures**

**2.2.4.1 Demographic Background.** We included standard assessments of participants’ gender (options: 0 = *Male*, 1 = *Female*, 2 = *Other* (accompanied by free-response box); the  $n = 1$  *Other* response we observed was excluded from analyses involving gender) and age. Participants reported their ethnicity (“Are you of Hispanic, Latino, or Spanish origin?”: 0 = *No*, 1 = *Yes*) and race (options: *White*, *Black/African American*, *Asian*, *Native American/American Indian/Alaskan Native*, *Native Hawaiian or*

*Pacific Islander, Mixed* (accompanied by a free-response box), *Other* (accompanied by a free-response box)). Jointly, ethnicity and race were re-coded into a single index of racial/ethnic background (0 = *not Non-Hispanic White*, 1 = *Non-Hispanic White*). We indexed education using a 5-point scale (options: 1 = *Did not finish high school*, 2 = *Graduated from high school*, 3 = *Attended some college but did not finish a 4-year degree*, 4 = *Graduated from a 4-year college or more*, 5 = *Obtained a graduate/professional degree*). Income was measured using a 7-point scale (options: 1 = *Less than \$10,000*, 2 = *\$10,000 - \$30,000*, 3 = *\$30,000 - \$50,000*, 4 = *\$50,000 - \$70,000*, 5 = *\$70,000 - \$90,000*, 6 = *\$90,000 - \$110,000*, 7 = *More than \$110,000*). Participants could identify their political orientation as *Democrat, Republican, Independent, or Other* (accompanied by free-response box); we re-coded responses as 0 = *Democrat or Independent/Other*; 1 = *Republican*.

**2.2.4.2 Baseline Affect.** Participants rated their base-line valence (ranging from 1 = *Very negative* to 7 = *Very positive*) and activation level (ranging from 1 = *Very quiet/still* to 7 = *Very activated/aroused*) on 7-point Likert scales (Nielsen et al., 2008).

**2.2.4.3 Self-rated Health and Cognition.** Using 5-point Likert scales ranging from 1 = *Poor* to 5 = *Excellent*, participants provided subjective ratings of their physical health, emotional health, learning ability, and memory (Bowling, 2005; Sorokowski et al., 2017).

**2.2.4.4 Life Goals and Position.** Using a slider anchored at 0 = *Maintaining something or preventing a loss* on the left side and 100 = *Improving something or achieving something new* on the right side, we assessed how strongly participants pursued *growth (versus maintenance)* goals in their life (Ebner et al., 2006). Similarly, we used a

slider anchored at 0 = *Feelings and intuition* and 100 = *Facts and details* to assess how strongly participants pursued *information (versus affect) goals* (Mikels et al., 2010). A third slider anchored at 0 = *Birth* and 100 = *Death* was used to measure perceived *life position* (Hancock, 2010).

**2.2.4.5 Personality.** Using 5-point Likert scales anchored by 1 = *Disagree strongly* to 5 = *Agree strongly*, we assessed *neuroticism* (Cronbach's alpha = .51), *extraversion* (Cronbach's alpha = .51), *openness* (Cronbach's alpha = -.13), *agreeableness* (Cronbach's alpha = .17), and *conscientiousness* (Cronbach's alpha = .12) with the Big Five-Inventory 10 which includes two items for each trait (Rammstedt, & John, 2007). While low reliability scores are not uncommon for the 2-item scales of the BFI-10 (e.g., John et al., 2019), we dropped openness from all analyses because a negative reliability score was observed.

**2.2.4.6 Cognitive Measures.** To assess cognition, we collected data on participants' *numeric abilities* (0–3 correct responses; Lipkus et al., 2001), *crystallized abilities* (0–12 correct responses; Brown, 1960), and *cognitive reflection abilities* (0–3 correct responses; Frederick, 2005). Additional details are provided in Supplement 2.B.

### **2.2.5 Procedure**

After indicating informed consent, participants completed a 30 to 60-minute online survey. In a first step, participants provided information about their demographic background, baseline affect, life goals, life position, subjective health status, and personality. In a next step, we presented participants with the first half of the default effect task (e.g., the apartment scenario paired with the opt-in condition). Participants then completed a filler task: an information avoidance task not analyzed in the context of

the present paper (reported in Deng et al., 2022, Study 2). The filler task was followed by the second half of the default effect task (e.g., the vacation scenario paired with the opt-out condition) as well as assessments of participants' crystallized intelligence, cognitive reflection ability, and numeracy. In a final step, participants answered several question about their experiences during the COVID-19 pandemic that were part of a different research project (reported in Nolte et al., 2021) and are not analyzed here.

### **2.2.6 Analyses**

We used RStudio Version 1.3.1093 to conduct analyses. Because most variables violated the assumptions of parametric testing, we used Spearman's  $r_s$  to examine correlations between age and all covariate measures. Univariate outliers were winsorized; multivariate outliers were identified on the basis of Mahalanobis distance, with outliers yielding a  $X^2$  value for which the associated  $p < .001$  (such as  $X^2 > 13.816$  when  $df = 2$ ). These outliers were removed from the affected variable (i.e., equivalent to a missing data value on said variable) but participants whose responses led to outliers on select variables were retained in the dataset. To evaluate H2.1 (that participants would demonstrate default effects by choosing more amenities in the opt-out than in the opt-in condition of each scenario), we conducted two one-sided Wilcoxon rank-sum tests for independent samples ( $\alpha = .025$ , effect size index  $r$ ). H2.2 (that higher age would be associated with stronger susceptibility to default effects) and Q2.1 (concerning the role of known determinants of default effect compliance) were assessed using linear mixed models with standardized continuous variables predicting the number of amenities participants had chosen. Although the number of amenities chosen was not normally distributed, these models relied on a default Gaussian distribution because re-coding the

outcome variable to resemble a Gaussian distribution did not meaningfully alter the results. Question 2.2 (concerning the role of covariates in predicting susceptibility to default effects) was assessed using a generalized linear regression model also using a Gaussian distribution. For this model, *pseudo-R*<sup>2</sup> was calculated using the ‘Nagelkerke’ formula. Complementary Bayesian analyses are reported in Supplement 2.C.

## **2.3 Results**

### ***2.3.1 H2.1: Participants Will Select Fewer Premium Amenities in the Opt-in Condition Than in the Opt-out Condition.***

We had hypothesized that participants would select fewer premium amenities in the opt-in condition than in the opt-out conditions, thus exhibiting default effects. As pre-registered, we assessed this hypothesis using separate Wilcoxon rank-sum tests for the apartment and vacation scenarios ( $\alpha = .025$ ), each test comparing participants in the opt-in condition to participants in the opt-out condition. A one-sided, Bonferroni-corrected test confirmed that in the apartment scenario, participants in the opt-in condition chose fewer amenities ( $M = 6.03$ ,  $SD = 4.32$ ) than participants in the opt-out condition ( $M = 9.80$ ,  $SD = 4.03$ ),  $W = 46,033$ ,  $p < .001$ ,  $r = .42$  [ $CI: .34$  to  $.49$ ]. Similarly, in the vacation home scenario, participants in the opt-in condition chose fewer amenities ( $M = 5.78$ ,  $SD = 4.25$ ) than participants in the opt-out condition ( $M = 9.57$ ,  $SD = 4.00$ ),  $W = 46,322$ ,  $p < .001$ ,  $r = .41$  [ $CI: .34$  to  $.49$ ]. Thus, consistent with H2.1, default effects of medium effect size ( $.30 < r < .50$ ) were evident at the group level in both scenarios.

### ***2.3.2 H2.2: Older Age is Associated With Stronger Susceptibility to Default Effects.***

To assess whether higher age would be associated with a stronger susceptibility to default effects (H2.2), we utilized a linear mixed model (Model A) with standardized continuous variables predicting the number of amenities participants had chosen (Table 2.2, left). Model A contained age as a fixed<sup>4</sup> effect, as well as condition (0 = *Opt-in*, 1 = *Opt-out*), scenario (0 = *Apartment*, 1 = *Vacation home*), order (0 = *Opt-in first*, 1 = *Opt-out first*), and their interactions with age. Participants' susceptibility to default effects was encoded through the condition variable, and age-related differences in the susceptibility to default effects were encoded through the age x condition interaction effect. Given the within-subject design, participant ID was entered to model random intercepts.

Model A again confirmed that consistent with a default effect, more amenities were chosen in opt-out than in opt-in conditions across the two choice scenarios ( $\beta = .83$ ,  $p < .001$ ). Thus, default effects were evident at the individual level as well. Age was negatively associated with the number of amenities chosen ( $\beta = -.22$ ,  $p < .001$ ) but did not interact with condition ( $\beta = -.01$ ,  $p = .807$ ). Hence, counter to H2.2, susceptibility to default effects did not vary with age (see Figure 2.1). However, we observed an unexpected interaction effect between age and scenario ( $\beta = -.11$ ,  $p < .05$ ). Specifically, we found that age had a stronger negative association with the number of amenities chosen in the vacation scenario ( $\beta = -.33$ ) than in the apartment scenario ( $\beta = -.22$ ).

With respect to H2.2, we also explored the possibility that the relationship between age and default effects may be curvilinear. To this end, we repeated Model A

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<sup>4</sup> We follow the naming convention for “fixed” and “random” model elements as outlined by the R package ‘lmerTest.’

but replaced age with age<sup>2</sup> in all instances (Model A-2, Table 2.2, middle). Results did not meaningfully change.

### ***2.3.3 Q2.1: To What Extent Do Known Determinants of Default Effects***

#### ***Predict Susceptibility to Default Effects?***

Q2.1 evaluated whether known determinants of default effects predicted susceptibility to default effects. In a preliminary step, we first assessed correlations between age and these determinants (Table 2.1, bottom): Older adults were less likely to endorse measures of perceived endowment, ease, and experience (all  $ps < .001$ ). Age was not significantly associated with participants' ratings of perceived endorsement, perceived importance, or post-decisional changes in participants' valence or activation level.

In a second step, we assessed differences in ratings for default effect determinants between the two scenarios (Table 2.3, left columns) and experimental conditions (Table 2.3, right columns). Endowment and importance ratings were higher in the context of the vacation scenario than in the context of the apartment scenario ( $ps < .01$  to  $< .001$ ). Conversely, participants reported more experience choosing apartments than vacation rentals ( $p < .001$ ). With respect to experimental condition, perceived endorsement, endowment, and ease yielded higher scores in the opt-out than the opt-in condition ( $ps < .01$  to  $< .001$ ). Post-decisional improvements in valence were higher in the opt-out than opt-in condition, too ( $p < .05$ ).

**Table 2.2***Linear Mixed Models A, A-2, and B Predicting Number of Amenities Chosen Based on Age, Condition, Scenario, and Default Effect**Determinants*

	Model A		Model A-2 (Age <sup>2</sup> )		Model B	
	$\beta$ (SE)	<i>p</i>	$\beta$ (SE)	<i>p</i>	$\beta$ (SE)	<i>p</i>
Intercept	<i>b</i> = -.42 (.06)	< .001***	<i>b</i> = -.42 (.06)	< .001***	<i>b</i> = -.38 (.05)	< .001***
Age	-.22 (.06)	< .001***	-.22 (.06)	< .001***	-.10 (.04)	< .01**
Condition	.83 (.05)	< .001***	.83 (.05)	< .001***	.76 (.05)	< .001***
Scenario	-.05 (.05)	.306	-.05 (.05)	.312	-.07 (.05)	.161
Order	.05 (.06)	.398	.05 (.06)	.363	.05 (.05)	.331
Age x Condition	-.01 (.05)	.807	-.03 (.05)	.527	-	-
Age x Scenario	-.11 (.05)	< .05*	-.11 (.05)	< .05*	-.07 (.05)	.186
Age x Order	.09 (.06)	.131	.10 (.06)	.085	-	-
Endorsement					-.11 (.04)	< .01**
Endorsement x Condition					.13 (.06)	< .05*
Endowment					.35 (.04)	< .001***
Endowment x Condition					-.09 (.06)	.126
Ease					.02 (.04)	.605
Ease x Condition					.13 (.06)	< .05*
Experience					.06 (.04)	.117
Experience x Condition					-.03 (.05)	.619
Importance of choice					.11 (.04)	< .01**
Importance of choice x Condition					-.12 (.05)	< .05*
Post-decisional change in valence					.05 (.04)	.237
Post-decisional change in valence x Condition					-.06 (.05)	.251
Post-decisional change in activation					.03 (.04)	.489
Post-decisional change in activation x Condition					.04 (.05)	.445

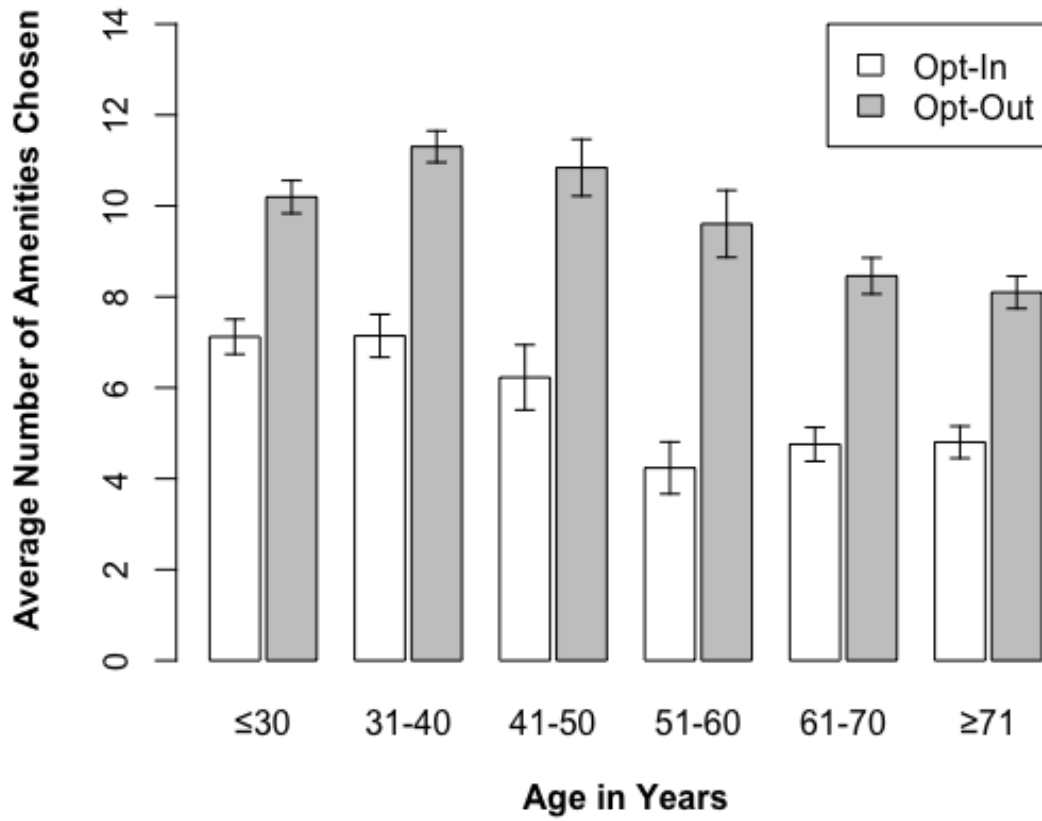
**Note.** Susceptibility to default effects is assessed through the variable ‘condition’. Condition (0 = *Opt-in*, 1 = *Opt-out*); Scenario (0 =

*Apartment*, 1 = *Vacation home*); Order (0 = *Opt-in first*, 1 = *Opt-out first*). † Regressions were conducted using standardized

continuous variables (e.g., age) but regression weights for intercepts were not standardized. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Figure 2.1**

*Average Number of Amenities Chosen in the Opt-in and Opt-out Conditions, Per Age Group*



*Note.* Error bars represent standard errors.

**Table 2.3***Comparison of Default Effect Determinants Across Scenario and Condition*

	Scenario				Condition			
	Apartment	Vacation	Signed-rank Test		Opt-in	Opt-out	Signed-rank Test	
	<i>M (SD)</i>	<i>M (SD)</i>	<i>V</i>	<i>p</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>V</i>	<i>p</i>
Endorsement	4.61 (1.72)	4.60 (1.72)	24,633	.953	4.24 (1.74)	4.97 (1.63)	12,620	< .001***
Endowment	4.49 (1.75)	4.73 (1.74)	21,300	< .01**	4.45 (1.77)	4.77 (1.71)	19,665	< .001***
Ease	4.16 (1.81)	4.13 (1.81)	19,473	.966	4.01 (1.76)	4.27 (1.84)	15,450	< .01**
Experience	4.70 (1.77)	4.20 (1.99)	37,024	< .001***	4.45 (1.91)	4.45 (1.89)	26,491	.848
Importance of choice	5.65 (1.23)	5.93 (1.12)	22,414	< .001***	5.78 (1.18)	5.80 (1.18)	15,607	.767
Post-decisional change in valence	0.73 (1.73)	0.77 (1.69)	3,512	.214	0.70 (1.70)	0.80 (1.72)	13,456	< .05*
Post-decisional change in activation	0.63 (1.71)	0.64 (1.73)	3,622	.887	0.60 (1.68)	0.65 (1.75)	15,842	.337

*Note.* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Finally, to assess Q2.1, we ran a linear mixed model (Model B, Table 2.2, right) with the same specifications as Model A, with two exceptions. First, as pre-registered, we excluded interaction effects that were not significant in Model A. Second, we introduced additional predictors (i.e., endorsement, endowment, ease, experience, importance of choice, post-decisional change in valence, and post-decisional change in activation level). For each predictor, the influence on susceptibility to default effects was encoded through the interaction effect between these predictors and condition.

As shown in Table 2.2 (right), condition ( $\beta = .76, p < .001$ ) and age ( $\beta = -.10, p < .01$ ) continued to predict number of amenities chosen even when accounting for common determinants of default effect susceptibility. Endorsement scores were negatively associated with the number of amenities chosen ( $\beta = -.11, p < .01$ ), whereas endowment scores ( $\beta = .35, p < .001$ ) and the perceived importance of choosing the right amenities ( $\beta = .11, p < .01$ ) were positively associated with the number of amenities chosen. Only endorsement ( $\beta = .13, p < .05$ ), ease ( $\beta = .13, p < .05$ ), and perceived importance ( $\beta = -.12, p < .05$ ) interacted with condition. Positive regression weights for endorsement and ease suggested that these two determinants increased participants' susceptibility to default effects. That is, participants who scored higher on endorsement and ease showed a stronger tendency to choose more amenities in the opt-out than the opt-in condition. Conversely, a negative regression weight for perceived importance suggested that those who felt that making a correct choice was more important showed a weaker tendency to choose more amenities in the opt-out than in the opt-in condition (i.e., showed less pronounced susceptibility to default effects).

As noted above, the pre-registered model to test Question 2.1 excluded any

interactions that were not significant in Model A (i.e., age x condition, age x order). In exploratory analyses, we re-ran Model B with these effects included. This allowed us to examine if any of the previously non-significant interactions reached significance once age differences in determinants of default effects were statistically controlled for. In the full model, both the age by condition interaction ( $p = .728$ ) and the age by order interaction ( $p = .126$ ) remained non-significant.

Further, in Model B, the interaction between age and scenario did no longer reach significance. Based on reviewer suggestions, we conducted exploratory analyses to examine which of the added determinants of default effects may render the interaction effect non-significant. To this end, we re-ran Model B but only included one determinant and its interaction term with the condition variable at a time. When accounting for either endowment ( $p = .078$ ), experience ( $p = .078$ ), perceived importance ( $p = .062$ ), or post-decisional change in valence ( $p = .052$ ), the age and scenario interaction effect was no longer observed.

In combination, these exploratory analyses indicated that age differences in determinants of default effects explained why older and younger adults responded differently to the apartment versus vacation rental scenarios. However, even when age differences in endowment, ease, and experience were controlled, no significant age differences in the tendency to show default effects were found.

**2.3.4 Q2.2: To What Extent Do Other Demographic, Personality, Socioemotional, or Cognitive Covariates Predict Susceptibility to Default Effects?**

Q2.2 evaluated how strongly the covariate measures predicted participants' susceptibility to default effects. Correlations between covariate measures and age are provided in Table 2.1 (top). Age was not associated with gender, education, or income. However, older adults were significantly more likely to identify as Non-Hispanic White or as Republican. Broadly consistent with the aging literature (e.g., Schaie & Willis, 2021), older adults scored higher on assessments of life position, self-rated emotional health, agreeableness, conscientiousness, and crystallized intelligence. Furthermore, older adults scored lower on assessments of activation level, growth (vs. maintenance) goals, information-seeking (vs. affective) goals, self-rated physical health, neuroticism, extraversion, self-rated learning ability, and self-rated memory.

Our pre-registered plan to assess Q2.2 entailed running a third linear mixed model combining the variables entered in Model A with all additional covariate measures. However, we deviated from this plan because Model A confirmed that neither order nor scenario influenced the number of amenities chosen. Thus, we were able to assess the role of covariates without the need for a linear mixed model design, which would have been exceedingly complex because it would have had to include both the main effect of each covariate and its interaction with condition. Instead we assessed susceptibility to default effects via a single variable: the difference between the amenities chosen in the opt-out and opt-in conditions. We then conducted a linear regression (Table 2.4, Model C,  $pseudo-R^2 = .73$ ) with a Gaussian distribution to address Q2.2. Results did

not meaningfully differ when running Model C as linear mixed model instead. Variance inflation factors (*VIF*) and tolerance results (Table 2.4) suggested there was no excessive multicollinearity among the variables in Model C ( $VIF \geq 2.50$  or tolerance  $\leq .40$ ).

Of all covariates considered, only racial/ethnic background was associated with decision makers' susceptibility to default effects. Specifically, Non-Hispanic White participants were more likely to display default effects than participants of other racial/ethnic backgrounds ( $\beta = .13, p < .05$ ). To explore whether our study yielded sufficient power ( $> .80$ ) to make inferences about racial/ethnic differences in the susceptibility to default effects, we ran a Wilcoxon rank-sum test for independent samples to compare our single-variable default effects index between the two groups. Those who identified as Non-Hispanic White ( $n = 333, M = 4.30, SD = 5.12$ ) showed a bigger discrepancy in the number of amenities chosen between the opt-out condition and the opt-in condition than those who did not identify as Non-Hispanic White ( $n = 167, M = 2.78, SD = 4.30$ ),  $W = 23,319, p < .01$ , Cohen's  $d = .29$ , power = .85.

**Table 2.4**

*Generalized Linear Model C Predicting Susceptibility to Default Effects Based on Age and Covariates*

	Model C			
	$\beta$	<i>p</i>	VIF	Tolerance
Intercept	.00	< .05*	-	-
<i>Demographic variables</i>				
Age	.09	.240	2.38	.42
% Female	.04	.556	1.47	.68
% Non-Hispanic White	.13	< .05*	1.16	.86
Education	-.03	.608	1.71	.59
Income	.03	.635	1.77	.56
% Republican	-.06	.253	1.22	.82
<i>Socioemotional and health variables</i>				
Affect: Valence	-.04	.430	1.29	.77
Affect: Activation	.03	.649	1.60	.62
Growth (vs. maintenance) goals	-.04	.501	1.49	.67
Information (vs. affect) goals	.01	.890	1.20	.83
Life position	-.03	.633	1.80	.56
Self-rated physical health	-.06	.421	2.09	.48
Self-rated emotional health	-.07	.375	2.26	.44
<i>Personality</i>				
Neuroticism	-.07	.282	1.65	.61
Extraversion	.02	.717	1.16	.87
Agreeableness	-.08	.125	1.21	.83
Conscientiousness	-.04	.424	1.27	.79
<i>Cognitive variables</i>				
Self-rated learning ability	.06	.362	1.95	.51
Self-rated memory	.07	.284	1.65	.61
Crystallized intelligence	-.11	.088	1.58	.63
Numeracy	.00	.978	1.45	.69
Cognitive reflection ability	.04	.497	1.35	.74

*Note.* Individual-level susceptibility to default effects was assessed by subtracting the number of amenities chosen in the opt-in condition of one scenario from the number of amenities chosen in the opt-out condition of the other scenario. *VIF* = variance inflation factor. \*  $p < .05$ .

## 2.4 Discussion

The present study examined age differences in decision makers' susceptibility to default effects when selecting amenities for rental properties. Consistent with H2.1, participants selected fewer add-on options when the add-ons were excluded by default and more add-on options when add-ons were included by default. This was the case both between participants and within participants. Thus, we replicated the existence of default effects at the group level (Jachimowicz et al., 2019) and extended the literature by also demonstrating default effects at the individual level. Other than predicted (H2.2), older adults were not more susceptible to default effects than their younger peers. In fact, supplementary Bayesian analyses yielded very strong evidence in favor of the null hypothesis, that is, an absence of age differences in default effects ( $BF_{10} = .02$ , see Supplement 2.C for details).

With respect to potential determinants of default effect susceptibility (Q2.1), decision makers were more likely to comply with defaults if they perceived default options as carrying someone else' endorsement or when sticking to the default was perceived as easier. Conversely, susceptibility to default effects was weaker among participants who perceived making the right decision as more important. However, we did not observe any association between vulnerability to default effects and other potential determinants (i.e., endowment, experience, or decision-related affect). Most of the covariate measures were not associated with default effects either (Q2.2), with one exception: Somewhat surprisingly, those identifying as Non-Hispanic White were more likely to embrace default options. If corroborated by future research with larger, more diverse samples, this could point to cultural differences in

responses to defaults. Future research should also include an alternative measure of personality, given the low reliability of the BFI-10.

Although we found no effect of age on compliance with defaults, we observed other, unexpected, age effects: Across experimental conditions, older adults selected fewer premium amenities than their younger peers, potentially reflecting cohort differences in spending patterns and frugality (Drolet & Yoon, 2021). Interestingly, these age differences in the number of selected amenities were more pronounced for the vacation than the apartment scenario. However, this interaction was no longer significant when statistically controlling for age differences in known determinants of default effects.

Specifically, age groups differed in the following determinants: perceived endowment, experience, and ease. With respect to endowment, older adults were less likely to perceive premium amenities as an integral part of the rental. Older adults also reported less experience with making apartment or vacation rental choices. This could be due to age differences in homeownership, which is highest among older adults and has been decreasing among younger generations, making older adults less likely to rent than younger adults are (Mather et al., 2019). Further, older adults were less likely to agree that complying with a default option was easier than actively deviating from it. In line with these findings, we found no support for the notion that older adults might rely on decision defaults to decrease effort, embrace simplicity, or to preserve cognitive resources: Even though older adults rated their memory and learning ability as more limited, these and other cognitive measures were unrelated to default effect compliance. However, we did not specifically assess fluid cognitive abilities. Prior research suggests

that age-related decrements in fluid abilities are associated with an increased use of simpler decision strategies as well as a decreased ability to correctly apply decision rules (Bruine de Bruin et al., 2012; Mata et al., 2007). It is possible that age differences in default compliance or associations between cognition and default compliance might have emerged under higher cognitive load or time pressure (Huh et al., 2014). In addition to including measures of fluid cognition, possible avenues for future inquiry therefore include manipulating cognitive resources or varying the difficulty of decision scenarios.

Independent of age, some of our findings on the determinants of default effect compliance deviate from past research. For endowment ratings, we found positive associations with the number of amenities selected, but this effect did not differ between the opt-in and opt-out conditions (cf. Jachimowicz et al., 2019). In part, this divergence from prior findings could reflect an artifact of how perceived endowment was assessed in the present study. Studies typically measure endowment effects by supplying decision makers with an asset (i.e., an item or money) they then “own” as a default option and can choose to part with. In contrast, the present choice scenarios (i.e., considering rental properties) did not lend themselves to a direct or tangible endowment at the individual level. Instead, participants rated how strongly they felt that the optional premium amenities ‘belonged’ to the rental properties they were reviewing. Hence, our scenarios might not have elicited the same sense of ownership that typical endowment effect measures or manipulations do.

For perceptions of ease, in turn, we found a significant association with the tendency to show default effects, even though a prior meta-analysis did not find this association (Jachimowicz et al., 2019). Although defaults are more likely to be accepted

when compliance is perceived as less effortful, this finding does not always replicate (Dinner et al., 2011). It is possible that self-reported ease emerged as a relevant determinant in the present sample because participants had to make 15 decisions for and against default options within each decision scenario, resulting in 30 decisions overall. By contrast, other studies (e.g., Dinner et al., 2011) have presented participants with a single decision default that likely took less effort to consider and less effort to opt out of than the effort elicited by our task design. Because ease has rarely been manipulated in the context of the existing default effect literature (Jachimowicz et al., 2019), more research will be needed to examine under which circumstances ease may play a role in decision makers' susceptibility to default effects.

Future research is also needed to replicate the observed null effect of age on default effects across a wider range of scenarios in order to ensure generalizability. As noted previously, real estate rentals are a popular domain for assessing age differences in decision making and are generally seen as fairly age-neutral (e.g., Johnson, 1993, 1997; Pethel & Chen, 2013). Nonetheless, future studies should examine a wider range of domains, not only in other areas of consumer choice (e.g. cars or appliances) but also with respect to more consequential outcomes such as medical choices. In a complementary approach, future studies might also examine context-free scenarios that do not specify a particular choice domain (see Besedeš et al., 2012). Compared to the present, context-rich setting, such scenarios would limit biases due to age differences in prior experiences or time horizons and may provide a clearer look at the role of cognitive factors in preferences for defaults.

Of course, our findings are also limited because we utilized hypothetical, non-

consequential choice scenarios. Hypothetical default effect tasks are common in the prior literature and were found to produce effect sizes similar to those observed in field experiments (Jachimowicz et al., 2021). However, it is conceivable that participants might have responded differently if they had to pay real money for each amenity. It is somewhat reassuring that participants rated the subjective importance of making good choices well above the mid-point of a 7-point scale ( $M = 5.79$ ,  $SD = 1.01$ ), which indicates that they took the choice scenario seriously. Nonetheless, further research is needed to study age differences in default effects in settings that involve realistic outcomes.

#### ***2.4.1 Implications***

Taken together, the present findings indicate that individual-level variations in the susceptibility to default effects are not linked to systematic differences in age or most other intra-individual characteristics. From a practical standpoint, this suggests that leveraging defaults to nudge people towards beneficial choices should be equally effective at all stages of the adult lifespan. Of course, default choices can also be used to decision-makers' disadvantage (e.g., by luring them to purchase unnecessary accessories). In this respect we found that decision makers of all ages proved more vulnerable to default effects if they reported greater perceived endorsement, greater perceived ease, and lower perceived importance of making a right choice. Thus, informed and value-consistent decision making might be enhanced by educating the public about aspects of choice architecture that drive default option compliance.

From a scholarly standpoint, the previous literature has established that aging is associated with decreased engagement with the decision process (see Löckenhoff, 2018)

and increased decision deferral (e.g., Pinqart & Duberstein, 2004; Wetzels et al., 2004). In particular, older adults are more likely to avoid making active decisions (i.e., Chen et al., 2011; Fraenkel et al. 2015; Pethel & Chen, 2013; Samuelson & Zeckhauser, 1988). The present study was motivated by the question whether older adults are also more responsive to pre-selected or “recommended” decision options, that is, an element of the decision environment known to encourage passive rather than active decision making. The observed null effect of age did not support this idea. However, decision avoidance is typically documented in high-stakes, real-life contexts in which older adults lack or perceive to lack (Bruine de Bruin et al., 2012; Strough et al., 2002) the necessary expertise to choose for themselves, or are forced to decide under stressful circumstances (e.g., medical contexts: Ende et al., 1989; Pinqart & Duberstein, 2004; Steginga & Occhipinti, 2002; Stiggelbout & Kiebert, 1997; Wetzels et al., 2004). This reiterates the aforementioned need to replicate the present findings in higher-stakes domains and more realistic settings.

#### ***2.4.2 Context***

This study is part of a broader, ongoing program of research that examines age differences in the engagement with decision-relevant information and the decision process as a whole (for an overview see Löckenhoff, 2018). Among other questions, this research has examined whether younger and older adults differ in the preferential acquisition of information based on its formatting and valence (e.g., Löckenhoff & Carstensen, 2007; 2008; Nolte et al., 2022), the avoidance of both hypothetical and real-world information (e.g., Deng et al., 2022; Nolte et al., 2021), and the construal of information on the basis of one’s feelings (e.g., Nolte & Löckenhoff, 2021).

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## CHAPTER 3

### TO CHOOSE OR NOT TO CHOOSE:

#### WHAT FACTORS ARE ASSOCIATED WITH AGE-RELATED DIFFERENCES IN INTENTIONAL DECISION AVOIDANCE?<sup>5</sup>

The age-related tendency towards intentional decision avoidance puts older adults at risk for adverse health or consumer outcomes. To examine why older adults avoid choices more, we conducted two pre-registered studies to evaluate the roles of perceived cognitive load and affective experience. Two adult U.S. samples ( $N_1 = 164$ ,  $M_{age\_1} = 50.71$ ,  $SD_{age\_1} = 18.70$ ;  $N_2 = 485$ ,  $M_{age\_2} = 51.08$ ,  $SD_{age\_2} = 19.63$ ) were tasked with making two health and two consumer choices each. In Study 2, half of the sample was also randomized to an intervention theorized to reduce decision avoidance by prompting participants to evaluate choice options in writing. For both studies, cognitive load was measured during the decision process, while measures of affect were collected before, during, and after. Further, we assessed demographic background, baseline affect, goal preferences, perceived life position, self-rated health status, personality, and self-rated cognition. Across both studies, older age was associated with a higher likelihood of avoiding choice and experiencing improved affect after doing so. Avoidance was more common among those who could be linked to older adults' avoidance tendencies. Participants randomized to the writing condition reported lower levels of cognitive load and more positive peri-decisional affect but were not less likely to avoid choice. In sum, the present studies bolster prior evidence for age differences in decision avoidance. They

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also link decision avoidance to inter-individual differences in both peri-decisional cognitive load and post-decisional affect, but these effects could not be linked to age-related differences, necessitating further research into potential explanations.

### **3.1 Background**

Older adults are more likely to avoid making decisions than younger adults are. This pattern holds true across both health and consumer contexts and has been documented in hypothetical laboratory scenarios (Calhoun & Hutchison Jr., 1981; Chen et al., 2011; Curley et al., 1984; Pethtel & Chen, 2013) as well as real-life settings (Ende et al., 1989; Pinguart & Duberstein, 2004; Steginga & Occhipinti, 2002; Stiggelbout & Kiebert, 1997; Wetzels et al., 2004). As a result, older adults may fail to obtain adequate medical care (Carson, 2005; Hudak et al., 2002; Hwang & Jeong, 2012; Lovell et al., 2017; Wong et al., 2020) or available insurance coverage (Winter et al., 2006) in a timely manner. Although adult age differences in decision avoidance can endanger older adults' physical and financial well-being, the underlying factors remain largely unexplored (Löckenhoff, 2018). The present research, spanning two studies, was designed to address this gap in the aging literature.

#### ***3.1.1 Decision Avoidance***

For the purpose of the present inquiries, decisions are considered as 'avoided' if they are being delayed, evaded, or delegated to another decision maker (e.g., Berens & Funke, 2020; Otto et al., 2016). Decision makers are more likely to avoid choices when choice options require trade-offs between more and less desirable choice attributes with no option dominating all other options (Chen et al., 2011; Huber et al., 2012; Pethtel & Chen, 2013). In other words, decisions are more likely to be avoided when options are of

comparable attractiveness: Selecting one option means foregoing other options that may be similar in kind or of similar appeal.

From a theoretical point of view, both cognitive and affective factors might contribute to instances of decision avoidance (e.g., Anderson, 2003; Chen et al., 2011). This includes objective trade-offs required when choosing among options (i.e., choice difficulty), the subjective cognitive effort involved in comparing available options, and the emotional toll of making a decision, including feelings of anticipated and experienced regret. In the following paragraphs, we summarize prior evidence concerning age-related differences in each of these factors.

### ***3.1.2 Cognitive Load***

**3.1.2.1 Objective Cognitive Load.** Decision avoidance is more common when it is more difficult and effortful to compare choice options, that is, under high objective choice conflict or cognitive load (Anderson, 2003; Chen et al., 2011; Huber et al., 2012; Pethtel & Chen, 2013). Specifically, choice conflict (and cognitive load) can intensify when there are more choice options to select from, more pieces of information to consider, or more trade-offs to be made between desirable and undesirable choice attributes (e.g., Luce, 1998; Peterson & Cheng, 2020; Pethtel & Chen, 2013).

As such, one might assume that age-related differences in decision avoidance are more apparent in contexts in which choosing is more objectively challenging, given that older adults experience decrements in various decision-relevant cognitive capacities (Cavanaugh & Blanchard-Fields, 2015). However, two experimental studies suggest a different pattern (Chen et al., 2011; Pethtel & Chen, 2013): Drawing on both consumer and health choices, Chen and colleagues (2011) manipulated whether choosing an option

involved objectively higher or lower cognitive trade-offs between choice attributes (e.g., by varying the ratio of positive to negative choice attributes per option). As would be expected, younger adults exhibited higher avoidance tendencies when confronted with high-conflict (ca. 26%) versus low-conflict decision contexts (ca. 2%). By contrast, older adults' avoidance tendencies were invariant across conditions (ca. 28%), with a similar pattern emerging in a follow-up experiment (Pethtel & Chen, 2013). Together, the two studies indicate that younger but not older adults' choices are sensitive to objective choice difficulty. Based on these considerations, the present studies utilized scenarios with moderately high objective difficulty to avoid artificially inflating age-related differences in decision avoidance and also rule out floor effects among younger participants.

**3.1.2.2. Perceived Cognitive Load.** Apart from the objective complexity of choices, avoidance behavior may be sensitive to perceived cognitive load, as indexed by perceived decision difficulty and effort. With respect to decision difficulty, older decision makers report more perceived difficulty than younger adults do, regardless of how objectively challenging a decision is (e.g., Peterson & Cheng, 2020) and they generally voice less confidence in their decision making abilities (Bruine de Bruin et al., 2012).

With respect to perceived effort, older adults report higher cognitive effort costs and perceive cognitive tasks as more subjectively costly when compared to younger adults (Crawford et al., 2023; Hess et al., 2016). In an increasingly effortful working memory task, for example, older adults reported higher levels of perceived physical, mental, and temporal demand as well as a higher perceived required effort than their

younger peers did (Hess et al., 2016). In addition, older adults have been found to discount cognitive effort more steeply than younger adults do (Westbrook et al., 2013).

In combination, prior findings suggest that older age is associated with both higher perceived decision difficulty and higher perceived effort in cognitive scenarios. Studies have further shown that older adults respond to higher perceived demands with a decreased willingness to engage in cognitively taxing tasks (Crawford et al., 2023; Hess et al., 2016) and they generally report less motivation to engage in more effortful decision making processes (Bruine de Bruin, 2016). However, prior research did not examine implications for decision avoidance scenarios. The present studies therefore assessed both perceived difficulty and perceived effort during the decision process.

### ***3.1.3 Affective Processes***

Complex choices not only elicit perceived difficulty and effort but may also challenge people's emotional well-being (Luce, 1998). Decision avoidance has been implicated as a possible strategy to manage decision-related affective responses (e.g., Bjälkebring et al., 2013; Luce, 1998). Research on age-related differences in such dynamics can be grouped into studies examining people's affective state before a decision (pre-decisional affect), during a decision (peri-decisional affect), and after the decision has been made (post-decisional affect). We now consider each of these categories in turn.

**3.1.3.1 Pre-decisional Affect.** Research on pre-decisional affect has focused on the role of ambient mood states in decision making. In younger adult samples, positive baseline affect has been linked to decision avoidance in choices requiring difficult trade-offs (Etkin & Pocheptsova Gosh, 2018). Specifically, it has been theorized (ibid.) that a

positive mood state can lead decision makers to focus more strongly on differences between choice options, that is, drawing attention to having to make trade-offs. This is believed to elicit higher levels of decision conflict, and as a result, higher levels of decision avoidance. Compared to younger adults, older adults often demonstrate more positive or less negative baseline affect in decision contexts (e.g., Löckenhoff et al., 2007, 2008; Nolte et al., 2021, 2022). Thus, older adults' relatively more positive baseline mood may predispose this age group to avoiding difficult choices. To index baseline affect, the present two studies will collect data on pre-decisional (i.e., baseline) valence and arousal levels.

**3.1.3.2 Peri-decisional Affect.** With respect to peri-decisional affective dynamics, a large body of literature has considered the role of anticipated regret, that is the regret people expect to feel after having made a suboptimal choice (Anderson, 2003; Huber et al., 2012). Notably, higher levels of anticipated regret are associated with a greater likelihood of avoiding decisions (Becerra Pérez, Menear, Brehaut et al., 2016; Brehaut et al., 2003; Diefenbach & Mohamed, 2007; Huber et al., 2012; Hung et al., 2007). In comparison to younger adults, older adults anticipate fewer and less intense regrets in their everyday decision making (Bjälkebring et al., 2013), possibly *because* older adults tend to disengage from difficult choices more often (Bjälkebring et al., 2013; also see van Helverson & Mata, 2012; Wrosch & Heckhausen, 2002; Wrosch et al., 2005). Further, Bjälkebring and colleagues (2013) found that in everyday decisions the relationship between higher age and lower levels of anticipated regret was mediated by the use of two regret regulation strategies. Specifically, older adults were found to be more likely to delay (i.e., avoid) choice and to brace themselves for the feeling of regret.

However, the implications of age-related differences in anticipated regret have yet to be examined in experimental decision avoidance scenarios.

Another peri-decisional affective response that may be associated with decision avoidance is experiencing decision making as stressful or bothersome. Perceiving decision making as more stressful or making decisions under stressful conditions is linked to higher levels of decision avoidance (Janis & Mann, 1977; Otto et al., 2016). Older adults' performance on cognitive and decision tasks has been shown to be affected more negatively by real or perceived stress than is the case for younger adults (Crosswell et al., 2021; Denburg et al., 2009; Rimmele et al., 2022). To explore the possibility that older adults avoid decisions more because they perceive decision making as more stressful, we will assess participants' perceived stress level during the decision process.

**3.1.3.3 Post-decisional Affect.** With respect to post-decisional affect, the emotion-regulatory implications of decision avoidance appear to vary by age. In two laboratory-based studies, older adults were found to report better post-decisional affect (i.e., higher positive affect, lower negative affect) after avoiding rather than making a decision (Chen et al., 2011; Pethtel & Chen, 2013). The opposite was true for younger adults, with younger adults who avoided making a decision reporting worse post-decisional affect. This pattern held true regardless of whether affect was indexed as the difference between pre- and post-decisional valence (Pethtel & Chen, 2013) or as the average of 11 negative post-decisional emotions (Chen et al., 2011).

Another line of research has specifically focused on post-decisional experienced regret, that is, the regret that people report after making suboptimal choices. In the context of everyday decision making, older adults have been shown to experience fewer,

more short-lived, and less intense regrets than younger adults do (Bjälkebring et al., 2013; Västfjäll et al., 2011). Some of these differences could be traced back to discrepancies in how younger and older adults manage feelings of regret (Bjälkebring et al., 2013): Aside from being more likely to avoid potentially regrettable decisions in the first place (thus *avoiding* experienced regrets), older adults were more likely to re-appraise their decision than younger adults were (thus *ameliorating* experienced regrets). However, findings on age-related differences in experienced regret are inconsistent, as other research reported no age-related differences in decision-related regret (Brown et al., 2019; Thomas et al., 2019) or even demonstrated *increased* regret among older adults (Becerra Pérez, Menear, Turcotte et al., 2016; Karuturi et al., 2019; Step et al., 2009).

Research on decision satisfaction is not unambiguous, either: Whereas some studies suggest that older adults are just as satisfied with their choices as their younger peers are (e.g., English & Carstensen, 2015; Nolte et al., 2022; also see Bjälkebring et al., 2016, Study 1), others find that older adults are less (Peterson & Cheng, 2020) or more content with their decisions (e.g., Bjälkebring et al., 2016 (Study 2); Löckenhoff & Carstensen, 2009, Bjälkebring et al., 2016 (Study 2)).

In sum, there is no consistent relationship between age and post-decisional affect, regret, or satisfaction, although it is possible that the relationship hinges on whether or not a decision was avoided, with older but not younger adults feeling better after foregoing a choice. To capture the effect of decision avoidance on post-decisional affect, the present studies will assess both post-decisional regret and choice satisfaction after every decision. In addition, participants will respond to assessments of post-decisional valence and arousal levels.

### ***3.1.4 The Present Studies***

In summary, it is well-established that older age is linked to higher levels of decision avoidance, but potentially contributing factors require further investigation. We addressed this gap in the literature by conducting two pre-registered studies examining the roles of perceived cognitive load and affective states in decision avoidance among U.S. adult lifespan samples.

Across both studies, participants responded to two consumer decision scenarios (cars, apartments) and two healthcare decision scenarios (physicians, health plans) adapted from Chen et al. (2011) and Pethel and Chen (2013). In each scenario, participants were asked to choose among four choice options (e.g., four cars) or to avoid making a decision. To examine the role of perceived cognitive load, participants self-reported peri-decisional decision difficulty and effort. To examine the role of affect, we assessed pre-, peri-, and post-decisional affect. In addition, Study 2 implemented an experimental manipulation aimed at reducing age effects by decreasing peri-decisional cognitive load and improving peri-decisional affect.

**3.1.4.1 The Role of Covariate Measures.** Studies 1 and 2 included demographic, personality, socioemotional, and health variables, as well as cognitive measures that might be associated with age-related differences in decision making or avoidance.

**3.1.4.1.1 Demographic Background.** We report standard measures of demographic background, including indices of socioeconomic status (i.e., education, income). Belonging to more privileged demographic groups might relate to decision makers' likelihood of rejecting or delaying choice when presented with the offer to settle for only non-optimal (i.e., not fully desirable) choice options.

**3.1.4.1.2 Socioemotional and Health Variables.** Older adults are more motivated to invest effort in personally meaningful decision contexts, such as health-related choices (e.g., English & Carstensen, 2015; Mata & Nunes, 2010), so we assessed self-rated physical and emotional health. As additional indices of decision-relevant motivation, we assessed two types of goal preferences: older adults' decreased willingness to pursue new goals (versus maintaining the status quo or preventing losses; Ebner et al., 2006) and older adults' decreased willingness to pursue information-based goals (versus affect-based goals; e.g., Deng et al., 2022): Age-related increments in the focus on present-focused and affect-based goals are theorized to be driven by the perception that with older age, one's time left in life is running out (Carstensen et al., 2003). As such, we also assessed participants' perceived proximity to the end of life.

**3.1.4.1.3 Personality.** Big Five personality traits were assessed because older adults report lower levels of openness and extraversion (Cavanaugh & Blanchard-Fields, 2015). More open individuals exhibit less avoidant and more active, problem-focused coping (Afshar et al., 2015; Watson & Hubbard, 1996). Similarly, more extraverted individuals are less likely to procrastinate on tasks or decisions (Milgram & Tenne, 2000; Schouwenburg & Lay, 1995), are less indecisive (Beswick & Mann, 1994), rely more strongly on active, problem-focused coping, and rely less on avoidant coping (e.g., Afshar et al., 2015; Watson & Hubbard, 1996).

**3.1.4.1.4 Cognitive Measures.** Because the present studies evaluated the role of perceived cognitive load, we included measures of self-rated learning ability and memory. An objective assessment of numeracy skills was included as well because older adults exhibit decrements in numeracy (Bruine de Bruin, 2015; Fraenkel et al., 2015) and

lower levels of numeracy have been linked to more passive decision making (ibid.; Szrek & Bundorf, 2011).

### **3.2 Study 1**

The purpose of Study 1 was two-fold. First, we aimed to replicate age-related differences in decision avoidance using four decision avoidance scenarios in two domains: Consumer and health choices. Second, we wanted to evaluate whether two types of theoretically implicated factors – subjective cognitive load and affective responses – are associated with age-related variations in decision avoidance.

Extrapolating from extant research (e.g., Chen et al., 2011; Pethtel & Chen, 2013), we hypothesized that age would be positively associated with decision avoidance (H3.1). Furthermore, we proposed that both decision avoidance (H3.2a) and age (H3.2b) would be positively associated with peri-decisional cognitive load and negatively associated with peri-decisional affect. Age-related differences in peri-decisional measures, in turn, would be linked to the expected age-related differences in decision avoidance (H3.2c). Finally, we predicted that decision avoidance would be associated with more favorable post-decisional affect (H3.3a), and that the effect of decision avoidance on post-decisional affect would be stronger for older adults (H3.3b). Study 1 further explored whether baseline affect or any of the other covariate measures were associated with age-related variations in decision avoidance (Q3.1).

#### **3.2.1 Methods**

Hypotheses, design, and the analytical approach for Study 1 were pre-registered prior to data collection (AsPredicted.org #105480).

**3.2.1.1 Participants.** To determine sample size, we conducted a priori power analyses involving G\*Power version 3.1.9.6 for  $\alpha = .05$  and power = .80. For the main effect of age on decision avoidance, we calculated an expected small-to-medium effect size equivalent to Cohen's  $d = .47$  or *Pearson's*  $r = .23$  (Chen et al., 2011; Pethel & Chen, 2013). A one-tailed test is able to detect this effect for  $N = 115$  in a correlational analysis. For the effect of decision avoidance on post-decisional affect, we calculated an expected medium-to-large effect size equivalent to Cohen's  $d = .56$  (Chen et al., 2011; Pethel & Chen, 2013). For a conservative, medium-sized effect of  $f^2 = .15$  and three predictors (age, avoidance, and their interaction term), we found  $N = 77$  is able to detect the contribution of each variable ( $R^2$  increase) in a linear regression model. To conduct a separate regression of affect on avoidance among young, middle-aged, and older adults,  $n = 55$  for each group (i.e.,  $N = 165$  total) would be required.

Data were collected from  $N = 166$  participants recruited via a Qualtrics.com panel. After excluding two participants (see Supplement 3.A for exclusion criteria), the final sample consisted of  $N = 164$  participants ( $M = 50.71$  years,  $SD = 18.70$  years,  $range = 19$ – $85$  years). Seventy-nine participants (48%) identified as women and  $n = 124$  as Non-Hispanic White (76%).

All analyses treated age as a continuous variable but to assess H3.3b, follow-up analyses were conducted on the basis of three separate age groups, comprising  $n = 56$  younger ( $M_{age} = 28.86$ ,  $Sd_{age} = 4.27$ ,  $range = 19$ – $35$  years),  $n = 54$  middle-aged ( $M_{age} = 53.30$ ,  $Sd_{age} = 8.84$ ,  $range = 36$ – $65$  years), and  $n = 54$  older adults ( $M_{age} = 71.80$ ,  $Sd_{age} = 4.38$ ,  $range = 66$ – $85$  years). Additional demographic information and the correlations between the covariate measures and age are provided in Table 3.1.

**Table 3.1**

*Descriptive Statistics, Correlations with Age, and Correlations with Decision Avoidance for Study 1 Covariate Measures*

Variable	<i>M</i> ( <i>SD</i> )/ <i>n</i> (%)	Spearman's $r_s$		
		Age	Decision avoidance (sum)	Partial correlation with decision avoidance (sum), controlling for age
<i>Demographic variables</i>				
Age	50.71 (19.71)	-	.36***	-
% Women <sup>x</sup>	79 (48.17%)	.03	.13	.13
% Non-Hispanic White <sup>x</sup>	124 (75.61%)	.27***	.12	.03
Education	3.23 (1.05)	.15	.03	-.02
Income	3.79 (1.79)	-.13	-.14	-.10
<i>Socioeconomic and health variables</i>				
Baseline valence	4.98 (1.53)	-.06	-.10	-.09
Baseline arousal	3.65 (1.67)	-.27***	-.24**	-.16*
Self-rated physical health	3.22 (1.02)	-.09	-.04	-.01
Self-rated mental health	3.26 (1.20)	.25***	.06	-.03
Information-based (vs. affect-based) goals	60.55 (26.49)	-.09	-.02	.02
Growth (vs. maintenance) goals	61.35 (26.29)	-.44***	-.21**	-.06
Perceived life position	60.16 (22.99)	.63***	.21**	-.02
<i>Personality</i>				
Neuroticism	42.71 (1.12)	-.14	.04	.10
Extraversion	2.87 (1.00)	.03	-.02	-.03
Openness	3.41 (0.87)	-.15	.01	.07
Agreeableness	3.71 (0.88)	.09	-.01	-.05
Conscientiousness	3.99 (0.83)	.19*	.04	-.02
<i>Cognition</i>				
Self-rated learning ability	3.84 (0.93)	-.15	-.10	-.05
Self-rated memory	3.42 (1.06)	-.01	-.16*	-.16*
Numeracy	1.25 (0.93)	-.01	.09	-.13

*Note.* <sup>x</sup> Point-biserial correlations. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

**3.2.1.2 Decision Avoidance Task.** Participants responded to four hypothetical decision tasks (i.e., choosing an apartment, car, physician, and health plan; adapted from Chen et al., 2011; Pethtel & Chen, 2013), the order of which was randomized. For each scenario, participants were able to choose one of four options (i.e., option A, B, C, or D) or to avoid choosing (“Not choose any of the [options] for the time being”). To create an individual-level index of decision avoidance, avoidant choices were summed up across scenarios (i.e., 0 to 4 avoided decisions).

Within each scenario, the decision avoidance task was presented across four consecutive survey screens. On the first screen, participants received information about four choice attributes on which their choices options would vary and explanations as to why each attribute was important. (All task materials are provided in Supplement 3.B).

On the next screen, participants reviewed the choice scenario for a minimum of 10 seconds, with the scenario presented as a four options (in rows) x four attributes (in columns) information grid: “Please take a few moments to review the different [...] until you have a good sense of what options are available. You don’t have to settle on one option yet. Then click the arrow to continue.” To make decisions challenging enough to provoke decision avoidance, each option ranked first (“very good”), second (“good), third (“poor”), and fourth (“very poor”) on one of the four choice attributes (e.g., Löckenhoff & Carstensen, 2007, 2009; Nolte et al., 2022). There was no option that was systematically better or worse than any other option.

This grid was repeated on the third screen, on which participants rated how difficult, effortful, and stressful it was to make the decision. Participants also indicated

feelings of anticipated regret. All four variables were assessed using 7-point Likert scales (1 = *Strongly disagree*, 7 = *Strongly agree*).

On the fourth screen, participants again saw the information grid and could either choose an option or avoid making a decision. On the same screen, participants responded to measures of post-decisional valence (1 = *Very negative*, 7 = *Very positive*), arousal (1 = *Very quiet/still*, 7 = *Very activated/aroused*), satisfaction (1 = *Strongly disagree*, 7 = *Strongly agree*), and regret (1 = *Strongly disagree*, 7 = *Strongly disagree*).

**3.2.2.2 Measures.** The following measures were used across Studies 1 and 2.

**3.2.2.2.1 Demographic Background.** Demographic measures included age, gender (coded as 0 = *Men*, 1 = *Women*), race and ethnicity (coded as 0 = *not Non-Hispanic White*, 1 = *Non-Hispanic White*), education (from 1 = *Did not finish high school* to 5 = *Obtained a graduate/professional degree*), and annual household income (from 1 = *Less than \$10,000* to 7 = *More than \$110,000*).

**3.2.2.2.2 Baseline Affect.** Baseline affect was assessed using 7-point Likert scales for valence (1 = *Very negative*, 7 = *Very positive*) and arousal (1 = *Very quiet/still*, 7 = *Very activated/aroused*; Nielsen et al., 2008).

**3.2.2.2.3 Goals and Life Position.** Slider scales anchored at the midpoint of 50 were used to assess pursuit of growth (vs. maintenance) goals (0 = *Maintaining something or preventing a loss*, 50 = *A mix between the two*, 100 = *Improving something or achieving something new*; Ebner et al., 2006), pursuit of information (vs. affective) goals (0 = *Feelings and intuitions*, 50 = *A mix between the two*, 100 = *Facts and details*; Mikels et al., 2010), and perceived life position (0 = *Birth*, 100 = *Death*; Hancock, 2010).

**3.2.2.2.4 Self-rated Health.** Participants rated their physical and emotional health using two 5-point scale items (1 = *Poor* to 5 = *Excellent*; Bowling, 2005; Sorokowski et al., 2017).

**3.2.2.2.5 Personality.** The Big Five personality traits *neuroticism*, *extraversion*, *openness*, *agreeableness*, and *conscientiousness* were measured using two items each that were then averaged (5-point Likert scales, 1 = *Disagree strongly* to 5 = *Agree strongly*; Rammstedt & John, 2007).

**3.2.2.2.6 Cognitive Measures.** *Self-rated learning ability* and *memory* were assessed using the same 5-point scale used to index health status (1 = *Poor* to 5 = *Excellent*; Bowling, 2005; Sorokowski et al., 2017). A 3-item *numeracy* measure tested participants' objective numeracy skills (0-3 correct answers; Lipkus et al., 2001).

**3.2.2.3 Procedure.** Participants provided informed consent and responded to an online survey that took approximately 30 to 60 minutes to complete; participants were compensated through Qualtrics.com. Deviations from the pre-registration are summarized in Supplement 3.C. The survey first assessed participants' demographic background, baseline affect, life goals, perceived life position, self-rated health and cognitive abilities, numeracy, and personality traits. Participants then responded to all four decision avoidance tasks, followed by post-decisional ratings. In the same session, participants also completed measures of self-continuity and of information seeking and processing preferences that were not part of the present study (see Lu & Löckenhoff, in prep.; Mei et al., in prep.).

**3.2.2.4 Analyses.** RStudio Version 1.3.1093 was used to complete analyses. Given that most variables were non-normally distributed, Spearman's  $r_s$  were used to

examine correlations between age, decision avoidance, and continuous covariates. Categorical variables were analyzed using biserial correlations. Univariate outliers ( $z > 3.30$ ) were addressed by winsorizing them (i.e., setting them to  $z_s = 3.30, 3.31$ , etc.). Multivariate outliers (Mahalanobis distance yielding  $X^2$  values for which the associated  $p < .001$ ) were addressed by excluding them from the affected variables. To evaluate H3.1, 3.2a, and 3.2b, we conducted correlation analyses. To evaluate H3.2c, 3.3a, 3.3b, and Q3.1, we computed generalized linear regression models and calculated Nagelkerke's *pseudo-R*<sup>2</sup>.

### **3.2.3 Results**

**3.2.3.1 Data Reduction Strategies.** As pre-registered, we examined the inter-correlations between the four peri-decisional measures (across scenarios) and between the four post-decisional measures (across scenarios and for each individual scenario, see Supplement 3.D). Because difficulty and effort shared a strong correlation ( $r_s = .83, p < .001$ ), they were averaged into a single measure of peri-decisional cognitive load (with higher scores indicating bigger load). Similarly, because stress and anticipated regret were strongly correlated ( $r_s = .84, p < .001$ ), they were averaged into a single measure of peri-decisional affect (reversed so that higher scores indicated more positive affect). We had pre-registered a plan to combine the four post-decisional affect measures into a single index. Valence, satisfaction, and regret shared significant inter-correlations ( $r_s = /.18|$  to  $/.81|, p_s = .020$  to  $< .001$ ); the association between and arousal and the other three measures was inconsistent ( $r_s = .00$  to  $/.36|, p_s = .963$  to  $.023$ ). The present analyses follow the pre-registered plan but as seen in Supplement 3.D, analyses which omitted arousal yielded a comparable pattern of results.

**3.2.3.2 Decision Avoidance.** Across scenarios, between 42% and 48% of participants avoided selecting a choice option. As summarized in Table 3.1, decision avoidance (summed up across scenarios:  $M = 1.73$  avoided choices,  $SD = 1.65$ ) was positively correlated with reporting a more advanced life position and negatively correlated with baseline arousal, pursuit of growth (vs. maintenance) goals, and self-rated memory. After accounting for age, decision avoidance was only correlated with lower baseline arousal and lower self-rated memory.

**3.2.3.3 H3.1: Age is Positively Associated with Decision Avoidance.** Older adults avoided a higher number of decisions,  $r_s = .36, p < .001$ .

**3.2.3.4 H3.2a: Decision Avoidance is Positively Associated with Peri-decisional Cognitive Load and Negatively Associated with Peri-decisional Affect.** We examined the correlations of decision avoidance with peri-decisional cognitive load and peri-decisional affect (for descriptive data concerning these variables, see Table 3.2). Decision avoidance was significantly associated with higher cognitive load ( $r_s = .23, p = .003$ ), but not significantly associated with more negative affect ( $r_s = -.07, p = .386$ ).

**3.2.3.5 H3.2b: Age is Positively Associated with Peri-decisional Cognitive Load and Negatively Associated with Peri-decisional Affect.** As summarized in Table 3.2, age was not associated with peri-decisional cognitive load or affect ( $r_s = .01$  to  $.12, ps = .131$  to  $.934$ ).

**3.2.3.6 H3.2c: Age Differences in Peri-decisional Measures Account for Age Differences in Decision Avoidance.** In a joint model, we regressed decision avoidance on age, peri-decisional cognitive load, and peri-decisional affect ( $pseudo-R^2 = .18$ ). Both older age ( $\beta = .36, p < .001$ ) and a higher perceived cognitive load ( $\beta = .22, p = .043$ )

predicted decision avoidance; affect did not ( $\beta = .10, p = .342$ ).

**3.2.3.7 H3.3a: Decision Avoidance is Positively Associated with Post-decisional Affect.**

**3.2.3.8 H3.3b: The Effect of Decision Avoidance on Post-decisional Affect is Stronger for Older Adults.** For each scenario, post-decisional affect was regressed on age, avoidance, and their interaction term (*pseudo-R*<sup>2</sup>s = .10 to .22). On their own, neither age nor avoidance were associated with post-decisional affect. However, interaction effects emerged in the context of apartment choices ( $\beta = .70, p = .005$ ) and health insurance choices ( $\beta = .54, p = .042$ ): Among those who avoided the decision, older age was associated with better post-decisional affect. In fact, this pattern was confirmed for every scenario when conducting separate regressions for younger, middle-aged, and older adults. Specifically, we found that for each choice scenario, avoidance was tied to better post-decisional affect among older adults ( $\beta$ s = .29-.42, *ps* < .05 to < .001, *pseudo-R*<sup>2</sup>s = .10 to .19) but not younger adults ( $\beta = -.15$  to  $.18, ps = .191$  to  $.603, pseudo-R^2s = .01$  to  $.03$ ). Middle-aged adults who avoided apartment ( $\beta = .42, p < .01, pseudo-R^2s = .19$ ) or car decisions ( $\beta = .58, p < .001, pseudo-R^2 = .36$ ) also indicated better post-decisional affect.

**3.2.3.9 Q3.1: Can Demographic, Personality, Socioemotional/Health, or Cognitive Variables Explain Age Differences in Decision Avoidance?** As summarized in Table 3.1, older adults were significantly more likely to identify as Non-Hispanic White, reported a lower level of baseline arousal, higher levels of self-rated mental health, a less pronounced interest in pursuing growth-based (vs. maintenance-based) goals, and a more advanced perceived life position.

Decision avoidance was separately regressed on age and each covariate measure that was associated with both age and decision avoidance (see Table 3.1): Baseline arousal, growth (vs. maintenance) goals, and perceived life position. None of the covariate measures could be linked to age-related differences in avoidance.

### ***3.2.4 Discussion***

Study 1 results indicated that older age, higher perceived cognitive load, lower levels of baseline arousal, and lower self-rated memory predicted higher levels of decision avoidance. Counter to expectations, older age was not associated with reporting higher peri-decisional cognitive loads or more negative peri-decisional affect; in addition, no other individual difference measures could be linked to the observed age-related differences in avoidance. In line with past research (Chen et al., 2011; Pethtel & Chen, 2013), we found that older adults but not younger adults reported better post-decisional affect after avoiding a decision (but we did not find worse affect among younger adults who did avoid decisions). In consumer but not health-related choice contexts, the affective benefit of avoidance was also observed among middle-aged adults.

### **3.3 Study 2**

Study 2 extended Study 1 in several respects. First, we recruited a larger sample ( $N = 507$ ), thus yielding more power to observe small and medium-sized effects of explanatory variables and covariates. Second, a subset of the participants ( $n = 53$ ) were tested in a laboratory setting, allowing us to verify participant characteristics and confirm that instructions were followed as intended and understood by all age groups.

**Table 3.2***Descriptive Statistics and Correlations with Age for Avoidance, Peri-, and Post-decisional Measures in Studies 1 and 2*

Variable	Study 1 ( <i>n</i> = 164)		Study 2 ( <i>n</i> = 485)		Study 2 ( <i>n</i> <sub>control</sub> = 258)	
	<i>M</i> ( <i>SD</i> )/ <i>n</i> (%)	<i>r</i> <sub><i>s</i>_age</sub>	<i>M</i> ( <i>SD</i> )/ <i>n</i> (%)	<i>r</i> <sub><i>s</i>_age</sub>	<i>M</i> ( <i>SD</i> )/ <i>n</i> (%)	<i>r</i> <sub><i>s</i>_age</sub>
<i>Decision avoidance</i>						
Decisions avoidance (sum)	1.73 (1.65)	.36***	1.82 (1.59)	.40***	1.77 (1.63)	.35***
Decision avoided (car)	68 (41.46%)	.29***	218 (44.95%)	.34***	116 (44.96%)	.24***
Decision avoided (apartment)	78 (47.56%)	.30***	232 (47.84%)	.34***	123 (47.67%)	.36***
Decision avoided (physician)	70 (42.68%)	.40***	223 (45.98%)	.36***	108 (41.86%)	.20**
Decision avoided (health plan)	68 (41.46%)	.29***	211 (43.51%)	.35***	109 (42.25%)	.35***
<i>Peri-decisional measures</i>						
Peri-decisional cognitive load	4.75 (1.48)	.12	4.55 (1.46)	.04	4.73 (1.44)	.12*
Peri-decisional affect	4.04 (1.61)	.01	3.95 (1.54)	.13**	3.78 (1.56)	.08
<i>Post-decisional measures</i>						
Post-decisional affect (total)	4.94 (0.93)	.25***	4.93 (0.85)	.19***	4.93 (0.86)	.18**
Post-decisional affect (car)	4.90 (1.04)	.18*	5.02 (1.02)	.13**	5.03 (1.03)	.14*
Post-decisional affect (apartment)	4.94 (1.12)	.26***	4.94 (1.11)	.17***	4.94 (1.15)	.17**
Post-decisional affect (physician)	4.93 (1.00)	.22**	4.91 (0.99)	.18***	4.89 (0.99)	.17**
Post-decisional affect (health plan)	4.98 (1.14)	.19*	4.88 (1.06)	.14**	4.85 (1.08)	.15*

*Note.* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

In addition, Study 2 attempted to experimentally reduce decision avoidance by randomizing half of the participants in each age group into a writing-based intervention. Participants were asked to write about what they liked and disliked about the available choice options before making or avoiding the decision. In prior studies, writing about choice options and/or one's choices preferences was shown to encourage active decision making (Steffel et al., 2016). Further, Study 1 found that, regardless of age, participants who perceive choices as more difficult or rate their own memory as more limited are more likely to avoid making decisions. We reasoned that writing about choice options would make participants' preferences more salient and lower working memory loads, thus reducing the tendency towards decision avoidance. Further, writing about a choice has been shown to improve choice satisfaction, particularly among older adults (Kim et al., 2008). As such, the intervention may help older adults to improve post-decisional affect without having to avoid the choice.

We considered the same covariates as in Study 1 but added one additional covariate, the tendency towards maximization – that is, towards making the best possible rather than a “good enough” decision (Nenkov et al. 2008). Older adults generally report lower maximization tendencies, with Chen and colleagues (2011) finding that maximization tendencies shape younger and older adults' decision avoidance differently: Older adults low in maximization tendencies are more likely to avoid choice, whereas the opposite is true for younger adults.

Hypotheses H3.1 to H3.3 were the same as in Study 1. In addition, Study 2 predicted differences between the intervention and control condition. Specifically, we hypothesized that participants in the intervention condition would exhibit lower levels of

decision avoidance (H3.4) and that age would interact with condition, such that the effect of condition on decision avoidance would be stronger for older adults (H3.5).

Furthermore, we predicted that participants in the intervention condition would report lower peri-decisional cognitive loads and more positive peri-decisional affect than participants in the control condition (H3.6a). In turn, the effect of the intervention on peri-decisional measures would be linked to its effect on decision avoidance (H3.6b). As in Study 1, Q3.1 explored the roles of baseline affect and other covariates with maximization being added to the covariates under consideration.

### **3.3.1 Methods**

**3.3.1.1 Sample.** We conducted additional a priori power analyses for  $\alpha = .05$  and power = .80 for Study 2 using G\*Power version 3.1.9.6. Because none of the covariate measures in Study 1 could be linked to the link between age and avoidance, we calculated the sample size required to detect the contribution ( $R^2$  increase) of a covariate measure when regressing avoidance on both age and the covariate (i.e., two predictors total). Assuming a very conservative small effect of  $f^2 = .02$ ,  $N = 485$  is sufficient to detect the effect of the covariate.

Data were collected from  $N = 507$  participants recruited via a Qualtrics.com panel ( $n = 454$ ) and our research laboratory ( $n = 53$ ). The complementary local sample was recruited to anchor the online sample with participants whose age and demographic status we could confirm prior to data collection. Regardless of age, participants in the laboratory sample followed instructions as intended and no difficulties in task comprehension were observed. The samples did not differ in the number of choices

avoided, peri-decisional cognitive load, peri-decisional affect, or post-decisional affect, and were therefore pooled into a single sample.

From this combined sample, a total of  $n = 22$  participants were manually excluded applying the same exclusion criteria also employed for Study 1 (see Supplement 3.A). The final sample consisted of  $N = 485$  participants ( $M = 51.08$  years,  $SD = 19.63$  years,  $range = 18$ – $96$  years).  $n = 245$  participants (51%) identified as women and  $n = 312$  as Non-Hispanic White (64%). All analyses treated age as a continuous variable but to assess H3.3b, follow-up analyses were conducted for separate age groups ( $n = 157$  younger ( $M_{age} = 27.98$ ,  $Sd_{age} = 4.99$ ,  $range = 18$ – $35$  years),  $n = 162$  middle-aged ( $M_{age} = 51.53$ ,  $Sd_{age} = 9.58$ ,  $range = 36$ – $65$  years),  $n = 164$  older adults ( $M_{age} = 72.88$ ,  $Sd_{age} = 5.71$ ,  $range = 66$ – $96$  years)). Additional demographic information and the correlation between all covariate measures and age are provided in Table 3.3. Older adults were significantly more likely to identify as Non-Hispanic White and report higher educational attainment. Age was positively associated with better self-rated mental health, more advanced perceived life position, and higher levels of agreeableness and conscientiousness. In turn, age was negatively associated with a focus of growth (versus maintenance) goals, maximization tendencies, and neuroticism.

**Table 3.3**

*Descriptive Statistics, Correlations with Age, and Correlations with Decision Avoidance for Covariate Measures in Study 2 (N = 485)*

Variable	M (SD)/n (%)	Spearman's $r_s$		
		Age	Decision avoidance (sum)	Partial correlation with decision avoidance (sum) controlling for age
<i>Demographic variables</i>				
Age	51.08 (19.63)	-	.40***	-
% Women <sup>x</sup>	245 (50.52%)	-.04	.02	.04
% Non-Hispanic White <sup>x</sup>	312 (64.33%)	.26***	.13**	.03
Education	3.36 (1.07)	.15**	.00	-.06
Income	3.82 (1.80)	.09	-.05	-.09
<i>Socioeconomic and health variables</i>				
Baseline valence	4.95 (1.40)	.08	.00	-.05
Baseline arousal	3.45 (1.51)	-.03	-.06	-.03
Self-rated physical health	3.09 (0.95)	-.08	-.10*	-.08
Self-rated mental health	3.15 (1.14)	.29***	.06	-.07
Information-based (vs. affect-based) goals	61.31 (22.28)	.06	-.03	-.05
Growth (vs. maintenance) goals	61.95 (24.31)	-.25***	-.20***	-.11*
Perceived life position	59.93 (22.03)	.70***	.28***	.03
Maximization tendencies	3.10 (0.67)	-.26***	-.20***	-.11*
<i>Personality</i>				
Neuroticism	2.84 (1.04)	-.29***	-.09*	.04
Extraversion	2.87 (0.98)	.03	-.03	-.05
Openness	3.45 (0.89)	.02	.03	.01
Agreeableness	3.58 (0.87)	.12**	.00	-.07
Conscientiousness	3.86 (0.86)	.23***	.10*	.01
<i>Cognition</i>				
Self-rated learning ability	3.67 (0.95)	-.08	-.13**	-.11*
Self-rated memory	3.20 (1.04)	.02	-.02	-.03
Numeracy	1.51 (1.07)	-.07	-.09	.04

*Note.* <sup>x</sup> Point-biserial correlations. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Out of this sample,  $n = 258$  were randomized to the control group and  $n = 227$  were randomized to the intervention group. Participants in the intervention group were less likely to identify as Non-Hispanic White (56% versus 72%,  $X^2$  ( $df = 1$ ,  $N = 485$ ) = 12.39,  $p < .001$ ), reported more positive baseline valence ( $M_{intervention} = 5.07$ ,  $SD_{intervention} = 1.41$ ,  $M_{control} = 1.39$ ,  $SD_{control} = 23.98$ ,  $W = 26,066$ ,  $p = .038$ ) and a stronger focus on growth (versus maintenance) goals ( $M_{intervention} = 64.19$ ,  $SD_{intervention} = 24.54$ ,  $M_{control} = 59.98$ ,  $SD_{control} = 23.98$ ,  $W = 26,176$ ,  $p = .044$ ). Because the final sample consisted of more control- than intervention-condition participants, it is possible that participants in the more work-intensive intervention conditions were more likely to quit the survey prematurely. If so, differences between control and intervention condition may reflect characteristics that made intervention-condition participants less likely to abandon the survey. Where appropriate, subsequent analyses controlled for the variables that differed between conditions.

**3.3.1.2 Measures.** Study 1 and Study 2 drew on the same measures. In Study 2, participants also responded to a maximization scale by Nenkov and colleagues (2008). ‘Maximizers’ high in tendency to maximize strive to make an ideal decision (e.g., “I never settle for second best.”), whereas ‘satisficers’ low in this tendency settle on options that are ‘good enough.’ Responses (gathered on a scale from 1 = *Strongly disagree* to 5 = *Strongly agree*) were averaged, with higher scores suggesting stronger maximization tendencies (Cronbach’s alpha = .54).

**3.3.1.3 Procedure.** Participants provided informed consent and responded to a pre-registered online survey (AsPredicted.org #116593) that took approximately 30 to 60 minutes to complete. Deviations from the pre-registration are summarized in Supplement

3.C. Qualtrics.com participants were compensated through Qualtrics; lab participants received \$25 cash. The survey assessed participants' demographic background, baseline affect, life goals, perceived life position, self-rated health and cognitive abilities, maximization tendencies, numeracy skills, and personality traits, in that order. Participants then responded to all four decision avoidance tasks. The survey ended after participants reported their birth year. In the same session, participants also reported to measures for unrelated, pre-registered projects involving self-continuity, temporal and social discounting, joint decisions, and information avoidance (see Lu & Löckenhoff, in prep., Mei et al., in prep., Wild & Löckenhoff, in prep.).

**3.3.1.4 Analyses.** Within the control condition, Study 2 used the same analytical approach as Study 1 to assess H3.1 to H3.3, and Q3.1. Supplement 3.E provides corresponding analyses conducted among the whole sample. H3.4, H3.5, and H3.6b were assessed using generalized linear regression models and calculating 'Nagelkerke's' *pseudo-R*<sup>2</sup>. H3.6a was assessed using correlation coefficients.

### **3.3.2 Results**

**3.3.2.1 Data Reduction Strategies.** As pre-registered, for the full sample, we examined the inter-correlations between the four peri-decisional measures (across scenarios) and between the four post-decisional measures (across scenarios and for each individual scenario, see Supplement 3.E). Because difficulty and effort were strongly correlated ( $r_s = .87, p < .001$ ), they were averaged into a single measure of peri-decisional cognitive load (with higher scores indicating bigger load). Similarly, because stress and anticipated regret were strongly correlated ( $r_s = .82, p < .001$ ), they were averaged into a single measure of peri-decisional affect (reversed so that higher scores indicated more

positive affect). We had pre-registered a plan to combine the four post-decisional affect measures into a single index. Valence, satisfaction, and regret were significantly correlated ( $r_s = |.36|$  to  $|.77|$ ,  $ps < .001$ ); the association between arousal and the other three measures was inconsistent ( $r_s = |.02|$  to  $|.26|$ ,  $ps = .649$  to  $< .001$ ). The present analyses follow the pre-registered plan; but see Supplement 3.E for analyses which omitted arousal.

**3.3.2.2 Decision Avoidance.** Across scenarios, between 44% and 48% of participants avoided selecting a choice option. As summarized in Table 3.3, for the full sample, decision avoidance (summed up across scenarios:  $M = 1.82$ ,  $SD = 1.59$  choices) was positively correlated with age, identifying as Non-Hispanic White, advanced perceived life position, and conscientiousness. In turn, avoidance was negatively correlated with self-rated physical health, pursuing growth (versus maintenance) goals, maximization tendencies, neuroticism, and self-rated learning ability. After accounting for age, decision avoidance was only correlated with lower pursuit of growth (versus maintenance) goals, lower maximization tendencies, and lower self-rated learning ability.

**3.3.2.3 H3.1: In the Control Condition, Age is Associated with Higher Decision Avoidance.** In the control condition, older adults avoided a higher number of decisions,  $r_s = .35$ ,  $p < .001$ .

**3.3.2.4 H3.2a: In the Control Condition, More Negative Peri-decisional Affect and Higher Peri-decisional Cognitive Load are Associated with Higher Decision Avoidance.** We examined the correlations of decision avoidance with peri-decisional cognitive load and peri-decisional affect (for descriptive data concerning these variables, see Table 3.2). In the control condition, decision avoidance was significantly associated

with higher cognitive load ( $r_s = .21, p < .001$ ), but not significantly associated with more negative affect ( $r_s = -.10, p = .097$ ).

**3.3.2.5 H3.2b: In the Control Condition, Age is Associated with More Negative Peri-decisional Affect and Higher Peri-decisional Cognitive Load.** As evidenced in Table 3.2, in the control condition, age was associated with peri-decisional cognitive load ( $r_s = .12, p = .048$ ) but not affect ( $r_s = .08, p = .205$ ).

**3.3.2.6 H3.2c: In the Control Condition, Age Differences in Peri-decisional Measures Account for Age Differences in Decision Avoidance.** In a joint model, we regressed decision avoidance on age, peri-decisional cognitive load, and peri-decisional affect for the control condition ( $pseudo-R^2 = .14$ ). Only older age ( $\beta = .35, p < .001$ ) predicted decision avoidance.

**3.3.2.7 H3.3a: In the Control Condition, Decision Avoidance is Associated with More Positive, Less Activated Post-decisional Affect.**

**3.3.2.8 H3.3b: In the Control Condition, the Effect of Decision Avoidance on Post-decisional Affect is Stronger for Older Adults.** For each scenario, post-decisional affect was regressed on age, avoidance, and their interaction term for the control condition ( $pseudo-R^2s = .04$  to  $.08$ ). We observed no main or interaction effects ( $ps > .05$ ). Because these results conflicted with findings from Study 1, we conducted separate regressions for younger, middle-aged, and older adults for each scenario. For the car scenario, avoidance was tied to better post-decisional affect among middle-aged ( $\beta = .22, p = .049, pseudo-R^2s = .05$ ) and older adults ( $\beta = .26, p = .014, pseudo-R^2s = .07$ ), but not younger adults ( $p = .053$ ). For the apartment scenario, avoidance was tied to better post-decisional affect among older adults ( $\beta = .27, p = .014, pseudo-R^2s = .07$ ), but not

middle-aged or younger adults ( $ps = .054$  to  $.120$ ). Similarly, for the physician scenario, avoidance was tied to better post-decisional affect among older adults ( $\beta = .23$ ,  $p = .033$ ,  $pseudo-R^2s = .06$ ), but not middle-aged or younger adults ( $ps = .212$  to  $.281$ ). Finally, for the insurance scenario, avoidance was not tied to better post-decisional affect among any of the age groups ( $ps = .122$  to  $.441$ ). (Note that whole-sample analyses replicated the general pattern of results observed in Study 1; see Supplement 3.E).

**3.3.2.9 H3.4: Participants in the Intervention Condition Show Lower Decision Avoidance than Participants in the Control Condition.**

**3.3.2.10 H3.5: Age Interacts with Condition such that the Effect of Condition on Decision Avoidance is Stronger for Older Adults.** In a joint model, we regressed decision avoidance (sum score) on age, condition, and their interaction effect for the whole sample ( $pseudo-R^2 = .17$ ). Only older age predicted avoidance ( $\beta = .35$ ,  $p < .001$ ), suggesting that the intervention did not lower avoidance intentions and that the effect of the intervention on avoidance did not vary by age.

**3.3.2.11 H3.6a: Participants in the Intervention Condition Report More Positive Peri-decisional Affect and Lower Peri-decisional Cognitive Load.**

Completing the writing condition (coded 0 = *Control*, 1 = *Intervention*) was associated with lower levels of peri-decisional cognitive load ( $r_s = -.13$ ,  $p = .004$ ) and more positive peri-decisional affect ( $r_s = .12$ ,  $p = .008$ ).

Because groups differed with regard to race/ethnicity, baseline valence, and the pursuit of growth (versus maintenance) goals, we conducted partial correlations accounting for said covariates. Results did not change.

**3.3.1.12 H3.6b: The Effects of the Intervention on Peri-decisional Measures Account for its Effects on Decision Avoidance.** In a joint model, we regressed decision avoidance (sum score) on condition, peri-decisional cognitive load, and peri-decisional affect for the whole sample ( $pseudo-R^2 = .01$ ). None of the predictors were linked to decision avoidance.

**3.3.1.13 Q3.1: Does the Relationship between Age and Decision Avoidance Remain Significant after Accounting for Demographic, Personality, Socioemotional/Health, and Cognitive Variables?** For the whole sample, decision avoidance (sum score) was separately regressed on age, condition, and each covariate measure that was associated with both age and decision avoidance (see Table 3.3: racial/ethnic background, pursuit of growth (versus maintenance) goals, perceived life position, maximization tendencies, neuroticism, and conscientiousness). Because age did not interact with condition (H3.5), the condition term was omitted from analyses. None of the covariates could be linked to the observed age effect.

### **3.3.2 Discussion**

Study 2 results were broadly consistent with those of Study 1, indicating that older age and higher perceived cognitive load predicted higher levels of decision avoidance, with older and sometimes middle-aged adults reaping affective benefits from evading choice. However, links between avoidance and either baseline arousal or self-rated memory could not be replicated in Study 2. Instead, we found that avoidance was tied to lower levels of growth goal pursuit, maximization tendencies, and self-rated learning ability. In deviation from Study 1 results, age was associated with higher peri-decisional cognitive load in Study 2, although cognitive load – and other covariates – did

not be linked to older adults' more pronounced avoidance tendencies. As expected, writing about one's choice options lowered participants' cognitive load and improved peri-decisional affect. However, avoidance tendencies did not significantly differ between the control and intervention condition.

### **3.4 General Discussion**

Because older adults are more likely to avoid making choices, we recruited two US adult lifespan samples to assess the possible underlying mechanisms (Studies 1 and 2). We also tested an intervention to lower age-related differences in decision avoidance tendencies (Study 2).

#### ***3.4.1 Role of Predicted Mechanisms***

We had hypothesized that older age would be associated with decision avoidance (H3.1) and that both avoidance (H3.2a) and older age (H3.2b) would be linked to experiencing higher peri-decisional cognitive loads and more negative peri-decisional affect. In both samples, we observed positive relationships between decision avoidance tendencies and older age as well as higher levels of cognitive load (i.e., perceived difficulty and effort). Neither avoidance nor age were associated with experiencing more negative affect (i.e., higher levels of stress or anticipated regret). In the larger Study 2 sample, older adults were found to experience higher cognitive loads, but this relationship did not reach significance in the smaller Study 1 sample. Unlike hypothesized (H3.2c), age-related differences in peri-decisional cognitive load or affect could not be linked to older adults' stronger avoidance preferences.

Aside from evaluating how the experience of the choice process would influence participants' likelihood of avoiding choice, we also wanted to assess whether post-

decisional affect (i.e., valence, arousal, satisfaction, and regret) would differ between participants who made versus avoided choice. In line with hypotheses, avoidance was linked to improved post-decisional affect (H3.3a), albeit only for some of the decision contexts. Consistent with H3.3b, the effect of avoidance on affect varied by age, with older and sometimes middle-aged adults being more likely to report post-decisional affective benefits than younger adults.

Unlike hypothesized, completing the writing intervention in Study 2 did not lower participants' levels of decision avoidance (H3.4) and the effect of the intervention did not interact with participants' age (H3.5). However, as expected, participants in the writing condition reported lower levels of peri-decisional cognitive load and more positive peri-decisional affective experience (H3.6a). This suggests that writing about one's choice options made the decision process less onerous or emotionally challenging. Still, contrary to predictions (H3.6b), improved peri-decisional cognitive load and affect in the intervention condition did not affect decision avoidance levels.

Why did the intervention improve the decision experience but fall short of encouraging a more active choice? Notably, avoidance levels observed across scenarios in the present two studies (Study 1 = 42–48%, Study 2 = 44–48%) were higher than those reported by previous studies (ca. 15–28% in Chen et al., 2011; 12–38% in Pehotel & Chen 2013) although very similar decision contexts were used. It is possible that these differences reflect the fact that in our research, choice attributes were balanced so that there were no systematically better or worse choice options (i.e., the choices were hard). By contrast, some options received more positive/fewer negative attributes in the studies conducted by Pehotel, Chen and colleagues (2011; 2013), indicating that it was easier to

identify “good” or “best” options in their research. The writing intervention in our Study 2 may have failed to lower avoidance levels precisely because the presented choices were highly challenging: Although this difference did not reach significance, participants in the intervention condition avoided somewhat *more* ( $M = 1.89, SD = 1.55$ ) rather than *fewer* choices than participants in the control condition did ( $M = 1.77, SD = 1.63$ ). It is possible that by clarifying their thoughts and preferences in writing, participants in the intervention condition may have become more aware of unwanted trade-offs and therefore found the choice options less appealing. Alternatively, pondering choice options may have reinforced the impression that all choice options were of similar attractiveness (with none standing out as preferable to others). If so, writing about one’s options may be a more effective strategy in choice contexts that make it possible to identify objectively “better” or “best” options, and less effective in contexts in which there are no truly “good” options or options of highly similar attractiveness. In sum, we find that the intervention’s benefits lay in improving the subjective experience of the decision process and not in its encouragement of active decision making.

### ***3.4.2 Role of Covariate Measures***

Across both Studies 1 and 2, we explored whether adult age differences in decision avoidance may reflect differences in participants’ baseline affect or a variety of other covariate measures. Several covariates were linked to both age and avoidance tendencies, but only few variables were associated with avoidance when age was partialled out. These remaining covariates were inconsistent across studies. In Study 1, avoidance was more pronounced among those with lower arousal levels and lower levels of self-rated memory. In Study 2, avoidance was more pronounced among those with

stronger growth (vs. maintenance) goal orientation and lower levels of self-rated learning ability. However, none of these four variables statistically explained for why older adults avoided choice more.

Overall, we found that self-rated cognitive challenges – regardless whether they were assessed as peri-decisional load or as self-rated learning ability or memory – put decision makers at higher risk of avoiding choice. Further, both baseline affect and post-decisional affect were linked to decision avoidance, but this relationship and its variation with age were inconsistent across samples or scenarios. Surprisingly, peri-decisional affect did not meaningfully contribute to participants' avoidance tendencies and was not linked to age, which is at odds with prior research (e.g., Becerra Pérez, Menear, Brehaut et al., 2016; Bjälkebring et al., 2013; Brehaut et al., 2003; Huber et al., 2012). It is possible that this is the case because participants responded to a high number of affect assessments in quick succession, and that measures of peri-decisional affect were impacted by the assessments of post-decisional affect that preceded them (i.e., from an unrelated choice scenario). In addition, affect was assessed with different pre-decisional (i.e., valence, arousal), peri-decisional (i.e., stress, anticipated regret), and post-decisional (i.e., valence, arousal, satisfaction, post-decisional regret) measures. As summarized in Supplements 3.D and 3.E, we did observe (highly) significant inter-correlations among most of these pre-, peri-, and post-decisional measures of affect. Although this suggests that we captured comparable dimensions of affect at all stages of the decision process, future research may benefit from keeping affect assessments identical throughout the decision process.

### 3.4.3 Limitations

Beyond variations in how we assessed affect, the present studies are also subject to other imitations worth nothing.

First, it is possible that our avoidance data do not reflect participants' true preferences for intentional decision avoidance: As ours were (predominantly) online surveys rather than laboratory-based or real-world decision contexts, participants' choice options were hypothetical and did not proffer tangible consequences. Nevertheless, the use of hypothetical choice scenarios is well-established in aging research contexts (e.g., English & Carstensen, 2015; Johnson, 1993, 1997; Löckenhoff & Carstensen, 2007), with present scenarios directly based on prior research (Chen et al., 2011; Pethtel & Chen, 2013). Average scores above the scale midpoint of 4 (out of 7) suggest that participants did indeed perceive making choices as difficult ( $M_{s1} = 4.77$ ,  $SD_{s1} = 1.55$ ;  $M_{s2} = 4.55$ ,  $SD_{s2} = 1.46$ ). It is also noteworthy that a majority of participants (S1: 52-58%, S2 = 52%-56%) chose *not* to avoid decisions, instead investing time to evaluate their choice options. Although this suggests that the participants took the decision scenarios seriously, more research is needed to verify whether the present results replicate in lab-based settings or in decision contexts with real-world outcomes.

Second, it is possible that some participants may have chosen the avoidant decision option in an effort to save time: Skipping a decision meant that participants did not have to consider the available choice options and information, thus reaching the end of the survey faster. In both studies, we counter-acted this tendency by preventing participants from advancing the survey the first time a new decision information grid was

being shown. Participants had to examine each new decision grid for at least 10 seconds before being able to answer any questions or make (or avoid) a decision.

Third, our project cannot rule out that age-related differences in characteristics not assessed in our studies may explain the observed age-related differences in avoidance tendencies. The extant literature suggests that older age is associated with changes in various areas of cognitive functioning (Cavanaugh & Blanchard-Fields, 2015), including decision-relevant capacities such as the abilities to memorize information and to learn new decision rules (e.g., Bruine de Bruin et al., 2012; Mata et al., 2007; Del Missier et al., 2011; Rosi et al., 2019). Both studies incorporated a well-validated measure of numeracy which was not associated with any of the variables of interest. However, we did not obtain any other objective assessments of possibly relevant cognitive abilities such as working memory and information processing speed. Instead, we relied on self-assessments of memory and learning ability. Past research from our laboratory suggests that such self-report measures of cognitive abilities are positively correlated with objectively measured cognitive abilities such as working memory (Nolte et al., 2022). Similarly, other studies have found that self-assessments of cognitive skills such as memory correspond to actual cognitive performance (Rickenbach et al., 2015). Given that lower self-rated learning ability and memory did predict higher avoidance levels, future research would benefit from administering a thorough cognitive test battery in a controlled laboratory environment to identify and replicate correlates of age differences in decision avoidance.

### **3.5 Conclusion**

Consistent with past research (Chen et al., 2011; Pethtel & Chen, 2013), we found that the tendency to avoid hypothetical decisions is positively associated with older age, possibly in an effort to improve post-decisional affect. Although decision makers of all ages are more likely to avoid choices that they perceive as more challenging, down-regulating perceived cognitive load by writing about one's options was not sufficient to deter avoidance. Across a large number of covariates – spanning participants' demographic background, socioemotional and goal preferences, self-rated health status, personality, and cognitive ability – none could be linked to age differences in the tendency to avoid choices.

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## CHAPTER 4

### ADULT AGE DIFFERENCES IN THE RESPONSE TO AND REGULATION OF RECENT VERSUS LONG-TERM REGRETS<sup>6</sup>

Prior research indicates that people's perceived control over regrets and future opportunities to exert this control vary by age. Hence, the present study evaluated age-related differences in the experience and regulation of regrets.  $N = 90$  U.S. adults ( $M_{age} = 49.81$ ,  $SD_{age} = 18.71$ , 21–89 years) reported and rated their most severe recent and long-term regrets. Current and future regret regulation strategies were assessed with respect to decision-avoidant, decision-engaged, and affect-focused approaches. In addition, we assessed demographic, socioemotional, health, personality, and cognitive covariates, including perceived control and future time perspective. For recent regrets, older age was associated with a lower likelihood of reporting regrets, and said regrets were less severe, more omission-based, and less likely to be interpersonal. Reliance on affect-based strategies to address recent regrets and decision engagement to address similar regrets in the future became less common with age. For long-term regrets, age was associated with reporting regrets that originated longer ago, felt less controllable, were more omission-based, and were less likely to be down-regulated. Age-related decrements in perceived control over long-term regrets were associated with differences in omission-based regrets, and age-related decrements in future time perspective were associated with differences in recent interpersonal regrets. Several of the observed age effects,

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<sup>6</sup> Chapter 4 represents a secondary analysis of previously unpublished data (Lewis, 2011) and will be submitted for publication by Nolte, Lewis, and Löckenhoff. It is included in this dissertation with written approval by Cornell University's Graduate School Thesis & Dissertation staff, co-authors Drs. Justine Lewis and Corinna Löckenhoff, and dissertation committee members Drs. Anthony Ong and Tom Gilovich.

particularly those linked to long-term regrets, were also associated with age-related 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 in regret experience, management, and their correlates.

#### **4.1 Background**

Unique to the context of decision making (Zeelenberg & Pieters, 2007), regret is an unpleasant “cognitively based emotion that we experience when realizing or imagining that our present situation would have been better, had we decided differently” (Zeelenberg, 1999, p .94). With age, decision makers undergo changes in their perceived control over the regrets they experience and in future opportunities to exercise this control (e.g., Newall et al., 2009; Timmer et al., 2005; Wrosch & Heckhausen, 2002). However, most research on age-related differences in the response to and management of regrets has not considered the fact that older adult have already had more opportunities to down-regulate past regrets but have fewer opportunities to down-regulate regrets in the future. To address this gap in the literature, the present study considers such age-related confounds. First, we assess both severe *recent* regrets that have originated in the last year (i.e., same timeline for decision makers of different ages) as well as severe *long-term* regrets that could have originated at any time in the past (i.e., different timeline for decision makers of different ages). Second, we examine both current and future regret regulation strategies pertaining to the reported recent and long-term regrets. Finally, we systematically explore covariate measures that may contribute to the way adults of different ages perceive or respond to regrets (i.e., demographic, socioemotional, health,

personality, and cognitive variables). In particular, we assess decision makers' perceived control over regrets and their perceived future time perspective.

#### **4.1.1 Regret**

Below, we introduce the regret characteristics that we will assess and summarize extant research with respect to age-related differences in these characteristics.

**4.1.1.1 Number, Intensity, and Domain of Regrets.** Enduring life regrets plague nine out of ten people (Bauer & Wrosch, 2011; Landman, 1987; Wrosch et al., 2005, 2007), with representative studies and meta-analytic analyses (Dijkstra & Barelds, 2008; Morrison & Roese, 2011; Roese & Summerville, 2005) suggesting that education and love regrets represent the most prevalent or intense life regrets. These are followed by life regrets revolving around one's career or family/parenting; fewer regrets revolve around issues of leisure, spirituality, friends, or the community. Life regrets are reported among circa 90% of older adults (Wrosch et al., 2007), which is comparable to the base rate of the general population (Bauer & Wrosch, 2011; Landman, 1987; Wrosch et al., 2005).

Although there is no clear consensus concerning age-related differences in the number of regrets, older adults are sometimes found to experience fewer life regrets than is the case for younger adults (Dijkstra & Barelds, 2008; Lecci et al., 1994; Timmer et al., 2005). It is possible that over time, older adults will have already undone or down-regulated life regrets that troubled them earlier in life. By contrast, the intensity of life regrets appears to remain stable with age (Morrison & Roese, 2011; Thomas et al., 2019; Västfjäll et al., 2011).

With respect to regret domains, some studies (e.g., Morrison & Roese, 2011; Wrosch & Heckhausen, 2002) find that the relevance of regret domains is stable across

the lifespan, and that, in line with meta-analytic results (Roese & Summerville, 2005), education is the domain most often regretted by older adults (DeGenova, 1992; Hattiangadi et al., 1995; Lecci et al., 1994; Wrosch & Heckhausen, 2002). In contrast, other studies indicate that older adults experience more family/parenting-related regrets and fewer education- or leisure-related regrets than their younger peers do (Dijkstra & Barelds, 2008; Jokisaari, 2004; Lecci et al., 1994).

**4.1.1.2 Commission versus Omission Regrets.** The intensity of regrets also depends on people's perceived agency and differs between so-called commission regrets and omission regrets. Commission or "action" regrets follow an active choice, such as marrying the 'wrong' person. Omission or "inaction" regrets follow inaction or a passive acceptance of pre-selected choice options, such as choosing not to have children. In the short run, commissions evoke more frequent or intense regrets than omissions do ("action effect," e.g., Kahneman & Tversky, 1982) and trigger more "hot" negative emotions, such as irritation (Gilovich et al., 1998): Commissions convey more responsibility and may require more justification than is the case for omissions (Gilovich & Medvec, 1995; Sprance et al., 1991; also see Zeelenberg & Pieters, 2007). But whereas commission regrets diminish with time, omission regrets tend to linger longer, are associated with increased rumination, and are more likely to be remembered (e.g., Gilovich & Medvec, 1994; 1995; Leach & Plaks, 2009; Savitsky et al., 1997). In part, this is due to more active down-regulation of commission regrets (Gilovich et al., 1995), more abstract perception of omission than commission regrets (Leach & Plaks, 2009), and decreasing opportunities to remedy omission regrets (e.g., becoming too old to have children; Wrosch & Heckhausen, 2002). Correspondingly, omission regrets also cue more

“despair” or “wistful” negative emotions, including helplessness and sentimentality (Gilovich et al., 1998). Newall et al. (2009) suggest that older adults are more likely to report omission than commission regrets, which is plausible considering that older adults’ life regrets (e.g., concerning career, education, or family-related choices) may have originated a longer time ago. Conversely, others (Morrison & Roese, 2011; Wrosch et al., 2005) have observed no relevant age-related differences concerning commission versus omission regrets.

**4.1.1.3 Controllability of Regrets.** Some regrets are experienced as more or less controllable or “fixable” than others, with important implications for decision makers’ well-being. To illustrate, commission regrets that stem from identifiable decisions or actions (such as 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).

Age groups do not differ in how controllable they perceive recent regrets but age does impact the perceived controllability of long-term regrets (Wrosch & Heckhausen, 2002), with older adults voicing fewer perceived opportunities for control (Morrison & Roese, 2011; Wrosch & Heckhausen, 2005). Specifically, older adults are less likely to perceive control over long-term regrets that might be difficult or impossible to undo with age (Timmer et al., 2005; Wrosch & Heckhausen, 2002). However, when they do perceive themselves as having high internal control over such regrets, older adults are more likely to experience high-intensity regret, “hot” emotions, and intrusive thoughts

(Wrosch & Heckhausen, 2002). In contrast, younger adults with high internal-control attributions experience low-intensity regrets, fewer “hot” emotions, fewer “despair”-related emotions, and fewer intrusive thoughts. As such, internal control attributions appear to interact with perceived future opportunities to exert control over regrets (ibid.).

**4.1.1.4 Anticipated versus Experienced Regrets.** Regret also varies dynamically over time. *During* the evaluation of choice options, decision makers have to envision how a choice – or its consequences – will make them feel (e.g., Loomes & Sugden, 1982). This can result in feelings of anticipated (i.e., future) regret. *After* an option has been chosen, realizing that a different option would have led to a better outcome will often result in feelings of experienced regret.

A week-long diary study has shed light on age-related differences in anticipated and experienced regrets in day-to-day decision making, with older adults anticipating fewer and less intense regrets than younger adults do (Bjälkebring et al., 2013): Using a 5-point scale (ranging from 1 = *Not at all* to 5 = *Very much*), younger adults have been found to rate their regret intensity on a level above 1 in 45% of their decisions, whereas older adults only do so for 20% of their decisions. Similarly, whereas younger adults predict regret in nine out of ten decisions, older adults only predict regret in six out of ten. In the present study, we conceptualize experienced regrets as recent and long-term regrets, and study anticipated regrets from the angle of future regulation strategies.

In a similar vein, some researchers find that older adults experience fewer, shorter, and less intense everyday regrets than younger adults do (Bjälkebring et al., 2013; Västfjäll et al., 2011), with decision makers regretting an average of three out of 10 decisions (Bjälkebring et al., 2013). Yet other research finds no age-related differences in

experienced regrets (Brown et al., 2019; Thomas et al., 2019; also see English & Carstensen, 2015) or demonstrates increased decision regret among older adults (Becerra Pérez, Menear, Turcotte et al., 2016; Karuturi et al., 2019; Step et al., 2009). However, because these studies did not necessarily focus on long-term regrets, it is unclear whether the same patterns hold for more consequential decisions or enduring regrets.

#### ***4.1.2 Regret Regulation***

Decision makers have many strategies at their disposal to down-regulate feelings of regret. For instance, Zeelenberg and Pieters (2007) identify over a dozen strategies aimed at addressing experienced/current or anticipated/future regrets, including undoing a decision, pursuing a new course of action, justifying one's decision, rejecting the responsibility of choice, anticipating future feelings of regret, and avoiding choice to begin with. According to Gilovich and Medvec (1995), most regulation strategies broadly fall into one of two categories: Behavioral repair work strategies attempt to course-correct one's behavior or undo regrets by "fixing mistakes." By contrast, psychological repair work strategies attempt to change the way regrettable decisions are being appraised (e.g., by focusing on silver linings) or experienced.

Drawing on the literature on age-related differences in decision making and affect regulation, we propose a related but more fine-grained categorization of regret regulation approaches: Strategies that delay, defer, or avoid decisions or decision responsibility altogether (thus avoiding regret *before* it occurs), strategies that alter engagement with the decision process (e.g., by *increasing* or *decreasing* one's efforts to choose well), and strategies aimed at improving one's affective response to regrettable decisions. Whereas the first two categories may share some overlap with behavioral repair work strategies,

the third category may share some overlap with psychological repair work strategies. In the following paragraphs, we consider prior evidence for age-related differences the three categories of decision-based strategies.

**4.1.2.1 Decision Avoidance.** Decision avoidance – here defined as delaying, sidestepping, or outsourcing decisions and the associated responsibility to others – is more pronounced among older rather than younger adults: Older adults are more likely to put off (e.g., Hudak et al., 2002; Lovell et al., 2017; Winter et al., 2006) or avoid choices altogether (e.g., Calhoun & Hutchison Jr., 1981; Chen et al., 2011; Curley et al., 1984; Pethtel & Chen, 2013; Streufert et al., 1990). They tend to voice less confidence in their ability to make (good) choices and prefer not to be given the responsibility to choose when asked (Bruine de Bruin et al., 2012; Finucane et al., 2002). As a result, older adults are more likely to entrust decision making to others, such as their physicians or family members (e.g., Roberto et al., 2001; Pinquart & Duberstein, 2004; Strough et al., 2002; Wetzels et al., 2004). In fact, compared to younger adults, older adults have been found to down-regulate regrets by seeking help from others or delaying the decision, with reliance on decision avoidance moderating age-related differences in the experience of regrets (Bjälkebring et al., 2013).

**4.1.2.2 Decision Engagement.** In general, older adults tend to limit their active engagement with or investment in the decision-making process. Compared to younger adults, older adults prefer to make decisions among more limited choice sets and explore fewer choice options or information about these options prior to choosing (Mata & Nunes, 2010; Reed et al., 2008; Reed et al., 2013; Ryzewska et al., 2018; van Helverson & Mata, 2012). Older adults also decrease the goal level of their decisions by relying on

simpler, less cognitively effortful decision strategies and by settling for options that are “passable” rather than “optimal” (Besedeš et al., 2012; Bruine de Bruin et al., 2012; Mata et al., 2007). Since older adults experience decrements in many decision-relevant capabilities (Bruine de Bruin et al., 2012; Del Missier et al., 2011; Mata et al., 2007), older adults may curb their decision-making efforts to preserve cognitive resources, even if it means that they invest less to avoid regrettable choices.

**4.1.2.3 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, 2008). Decision makers who exhibit such a bias tend to report greater decision satisfaction or better post-decisional affect (English & Carstensen, 2015; Levin et al., 2021; Löckenhoff & Carstensen, 2008) and 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 down-regulating experienced or anticipated regrets, such as by re-appraising their situation in a new light (Bjälkebring et al., 2013; Newall et al., 2009; Wrosch et al., 2000, 2005). Re-appraisal, too, accounts for the relationship between older age and fewer reported regrets in day-to-day decision making (Bjälkebring et al., 2013).

#### ***4.1.3 The Roles of Perceived Control and Future Time Perspective***

To better understand the relationships between aging and the experience or management of regrets, it is important to consider the possible explanatory mechanisms underlying these relationships. To illustrate, age-related differences in the use of specific

regret regulation strategies may reflect age variations in future time perspective and associated control perceptions, as outlined by two prominent aging theories:

According to the Motivational Theory of Life-span Development (Heckhausen et al., 2010), regrets can either be tangibly “undone” (i.e., through primary control, which is similar to behavioral repair work) or emotionally “deactivated” (i.e., through secondary control, which is similar to psychological repair work). Primary control can be relied upon when decision makers have the chance or ability to change their circumstances. Secondary control attempts to alter the internal response to regret and may be relied upon when opportunities for primary control are slim. Opportunities to exert primary control diminish with advancing age (e.g., Lecci et al., 1994; Wrosch et al., 2005; Wrosch & Heckhausen, 2002). Given their more limited time perspective, older adults may perceive their ability to exercise primary control as constrained and may increasingly rely on secondary control (Newall et al., 2009; Timmer et al., 2005; Wrosch & Heckhausen, 2002). Consequently, older adults’ tendency to avoid choices or to limit their investment in the decision process could reflect decrements in their perceived ability to exert (primary) control.

According to Socioemotional Selectivity Theory (Carstensen et al., 1999), a finite sense of time also motivates decision makers to invest more in present-oriented and emotion-regulatory goals than in information or knowledge-based goals that optimize future goals or decisions (Fung & Isaacowitz, 2016). As a result, hypotheses about age-related differences in regret regulation goals can be derived from this framework: Specifically, those who perceive more limited future time perspectives (i.e., older adults) might curb their engagement with the decision process by under-exploring available

choice options or decision-relevant information (e.g., English & Carstensen, 2015; Löckenhoff & Carstensen, 2007, 2009). As such, older adults should become more likely to avoid choice and less likely to try and improve their decision-making efforts. At the same time, decision makers 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), 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.

#### ***4.1.4 The Present Study***

The present study attempts to parse apart age-related and time-based differences in the experience and regulation of regrets. For this reason, we focused on severe regrets that may linger for a longer time, rather than smaller everyday regrets. Severe recent regrets originating in the past 12 months may expose differences based on participants’ chronological age (e.g., with age, decision makers may experience regrets differently or may prefer different regret regulation strategies). Conversely, severe long-term regrets may vary in recency depending on the age of the decision maker. Thus, long-term regrets may reflect how the recency of a regret influences its experience or regulation (i.e., more versus less recent regrets call for different strategies). Because age changes the perceived availability of future opportunities, this study also distinguishes between currently used strategies to address the aforementioned regrets as well as future plans to rely on regret regulation strategies.

**4.1.4.1 Hypotheses.** Because most past work has relied on studying long-term regrets that have originated at different timelines for younger and older decision makers, we expect to replicate findings referenced in the extant literature on aging and regret: With respect to *long-term regrets*, we hypothesized that with age, decision makers would report fewer (Dijkstra & Barelds, 2008) and less recent regrets that would be grounded in omissions (Newall et al., 2009), harder to recall (because they originated longer ago), harder to control (Morrison & Roese, 2011), and cue fewer “hot” emotions but more “despair”-related or “wistful” emotions (Gilovich et al., 1998; Wrosch & Heckhausen, 2002). Furthermore, we expected older decision makers’ long-term regrets to focus more on career or interpersonal regrets (Dijkstra & Barelds, 2008; Jokisaari, 2004; Lecci et al., 1994; Wrosch & Heckhausen, 2002). We did not expect differences with respect to regret severity (Morrison & Roese, 2011; Thomas et al., 2019; Västfjäll et al., 2011).

With respect to *recent regrets* that have occurred at a similar timeline for decision makers of all ages, however, we expected to observe few age-related differences. Specifically, we hypothesized that there would be no age effects concerning the number, recency, severity, control over, or domains of regret; we also did not expect differences with respect to difficulty in recalling recent regrets. Nevertheless, following from past research and 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; Pethtel & Chen, 2013) and less pronounced negative emotional responses to 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, older age should be associated with lower levels of behavioral repair work and increased reliance on psychological repair work (e.g., Bjälkebring et al., 2013; Newall et al., 2009; Wrosch et al., 2000, 2005). When applying the decision-based categorization of strategies, we expected to observe the following patterns: Due to age-related changes in the preference and ability to make choices, older age would be associated with a higher likelihood of relying on decision avoidance and a lower likelihood of relying on strategies that aim to improve decision making or that require added effort/investment in choices. Due to age-related changes in the preference for experiencing positive affect, older age would be associated with a higher likelihood of relying on affect-based strategies. Finally, because of age-related changes in the availability of future opportunities to address regrets, age-related differences in strategy use would be more pronounced with regard to future (versus present) strategies.

**4.1.4.2 Covariate Measures.** To test the assumptions of both the Motivational Theory of Life-span Development (Heckhausen et al., 2010) and Socioemotional Selectivity Theory (Carstensen et al., 1999), we measured participants' perceived control over regrets and their future time perspective. To test whether age-related differences in the recall of regrets, decision engagement, or decision avoidance stem from differences in cognitive abilities, we also report on 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 changes in affective states, we assessed participants' baseline arousal and valence. Finally, we measured 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.

## **4.2 Methods**

The present study presents a secondary data analysis of previously unpublished data (Lewis, 2011). Because data were collected in 2011, the hypotheses and analyses in this manuscript were not pre-registered. 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.

### **4.2.1 Participants**

Data were collected from an  $N = 90$  adult lifespan sample (21–89 years,  $M_{age} = 49.81$ ,  $SD_{age} = 18.71$ , 63% women, 96% Non-Hispanic White) tested in a lab setting at a large university in south-central New York.

Post-hoc power analyses were conducted in G\*Power version 3.1.9.6 for  $N = 90$  and  $\alpha = .05$  to determine which effect size we could observe with power = 80. When examining correlations between age and another variable, the present sample was sufficient to observe a medium-sized effect of  $\phi = .29$ . When regressing outcome variables on age, the present sample was sufficient to observe  $R^2$  increase for a small-to-medium effect of  $f^2 = .09$  (when regressing outcome variables on age and a covariate at the same time, analyses were powered to detect  $f^2 = .11$ ).

**Table 4.1**

*Descriptive Statistic for Demographic and Covariate Measures as well as Their Correlations With Age*

<b>Variable</b>	<b><i>M</i> (<i>SD</i>)/<i>n</i> (%)</b>	<b><i>r</i><sub>s_age</sub></b>	<b><i>p</i></b>
<i>Demographics</i>			
Age	49.81 (18.71)	-	-
% Women <sup>1</sup>	57 (63.33%)	-.04	.726
% Non-Hispanic White <sup>1</sup>	75 (83.33%)	.09	.374
Education	5.08 (1.91)	.10	.362
Income	2.37 (1.03)	.33	.001**
<i>Socioemotional and health variables</i>			
Baseline arousal	3.33 (1.57)	.09	.424
Baseline valence	5.02 (1.23)	.16	.144
Mental health	47.25 (12.13)	.37	< .001***
Physical health	50.26 (9.25)	-.33	.002**
Future time perspective	4.66 (1.54)	-.50	< .001***
<i>Personality</i>			
Neuroticism	2.92 (1.01)	-.18	.093
Extraversion	3.30 (0.97)	.13	.217
Openness	3.93 (0.86)	-.01	.910
Agreeableness	3.54 (1.02)	.17	.106
Conscientiousness	3.97 (0.78)	.06	.603
<i>Cognitive measures</i>			
Working memory	0.78 (0.23)	-.27	.009**
Numeracy	1.67 (1.10)	-.31	.003**
Processing speed	57.21 (14.56)	-.62	< .001***
Vocabulary	16.92 (4.92)	.44	< .001***

**Note.** <sup>1</sup>Point-biserial correlations. \*\*  $p < .01$ , \*\*\*  $p < .001$ .

## 4.2.2 Measures

Coding for all open-ended questions was carried out by the first author and a research assistant.<sup>7</sup> After assessing inter-rater agreement using  $\kappa$ , disagreements were resolved by the first author.

**4.2.2.1 Regrets.** Participants nominated up to five recent and long-term regrets, with sentence stems adapted from Timmer and colleagues (2005; “When looking back over [the past year/my life], I regret...”). Difficulty recalling regrets was measured on a 7-point difficulty scale (from 1 = *Very easy* to 7 = *Very difficult*). In a next step, participants identified the most severe recent and long-term regret each. The remaining questions only pertained to these most severe regrets. Participants indicated how long ago the regrets had originated (recoded in years). To assess self-rated severity, participants rated how “regretful” they felt on a scale from 1 = *Not at all* to 7 = *Very much*. Using the same scale, participants also rated to which degree they felt “hot” ( $\alpha = .81$ ), “wistful” ( $\alpha = .77-.81$ ), or “despairing” ( $\alpha = .79-.82$ ) emotions with regard to their most severe regrets. Each category of emotions was assessed using three items that were then averaged (Gilovich & Medvec, 1995; 1 = *Not at all*, 7 = *Very much*, see Supplement 4A for the full scale of items). Participants also indicated how much control they perceived themselves as having over their most severe recent and long-term regrets (7-point scale, from 1 = *None at all* to 7 = *A lot*).

The chosen recent and long-term regrets were coded for severity based on Morrison and Roesse (2011): 0 = *No regret*, 1 = *Mild regret* (e.g., commonplace occurrences, such as staying up too late or getting a parking ticket), 2 = *Moderate or*

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<sup>7</sup> We are grateful to Lauren Mei for providing data coding support.

*short-term regret* (e.g., a bad grade, loss of short-term relationship or friendship, a disagreement, financial loss), 3 = *Severe or long-term regret* (e.g., occupation loss, loss of a significant or long-term relationship or friendship, loss of a loved one). Due to low inter-rater agreement when differentiating between moderate and severe regrets, the last two categories were combined as 2 = *Moderate or severe regrets*. Final  $\kappa$ s varied between .49 and .86 for recent regrets and between .36 and .56 for long-term regrets.

Regrets were further coded to reflect whether they indicated a *Commission regret* (coded as 1), *Omission regret* (coded as 0), or *Neither* (coded as NA,  $\kappa$ s = .83–.95; Gilovich & Medvec, 1995).

Regret domains were identified based on guidelines we adapted from Wrosch et al. (2002, here referred to as “original domains”):

- *Career & Self-Development* regrets combined the original domains of *Work-Education* and *Self-Development* regrets (i.e., work, education, time management, and skill development regrets:  $\kappa$ s = .73–.80).
- *Interpersonal* regrets combined the original domains of *Family-Partnership*, *Friendship*, and *Social Engagement* regrets (i.e., family, partnership, friendships, social relationships, and broader society regrets:  $\kappa$ s = .73–.92).
- *Leisure & Lifestyle* regrets were adapted from the original domain of *Leisure* regrets (i.e., moving, travel, and recreation regret:  $\kappa$ s = .35–.62).
- *Health & Fitness* regrets were adapted from the original domain of *Health* regrets (i.e., physical, emotional, and spiritual regrets:  $\kappa$ s = .52–.89)
- *Finance* regrets reflected the original domain of the same name (i.e., money, investments, and purchase regrets:  $\kappa$ s = .72–.90).

- *Off-topic* regrets (i.e., participants voice disappointment, guilt, or issues outside of their control) and the category *None* (i.e., “No regrets”) were combined and are reported jointly ( $\kappa_s = .82-.93$ ).

**4.2.2.2 Regret Regulation.** Current regret regulation strategies were prompted with “In a few sentences, describe your strategy for dealing with your greatest regret;” future regret regulation strategies were prompted with “In a few sentences, describe your strategy for avoiding similar regrets in the future.” Strategies were coded on the basis of a codebook first developed by the second and third author and adapted by the first author (see Supplement 4.A for measures and the codebook).

In a first step, we coded whether strategies suggested either behavioral or psychological repair work (Gilovich & Medvec, 1995): Behavioral repair work included adapting one’s actions, making a plan, or actively addressing the source of one’s regret ( $\kappa_s = .41-.77$ ). Psychological repair work included adapting one’s viewpoint, feelings, mental state, or other strategy aimed at changing one’s psychological response to regret ( $\kappa_s = .32-.63$ ).

In a second step, responses were coded sensu the strategies identified by Pieters & Zeeleneberg (2007) and Zeelenberg & Pieters (2007), to which we added two further categories: religious/spiritual strategies and denial (e.g., not anticipating upcoming regrets). A single response could be assigned multiple codes, if adequate (see Supplement 4.A for detailed definitions). In total, we identified 10 specific regret regulation strategies aimed at ameliorating experienced regrets. Reliance on these strategies was then summed up within the three decision-based categories established in the introduction.

- Decision avoidance strategies (coded as 0–2) included *Deny responsibility* ( $\kappa_s = .71-.85$ ) and *Seek help* ( $\kappa_s = .78-.95$ ).
- Strategies aimed at changing one’s decision approach or the effort invested (coded as 0–3) included *Undo* ( $\kappa_s = .37-.64$ ), *Reverse* ( $\kappa_s = .69-.80$ ), and *Decrease goal level* ( $\kappa_s = .66$ ).
- Affect-based strategies (coded as 0–5) included *Re-appraise alternative(s)* ( $\kappa = .39$ ; NA for life regret), *Silver linings* ( $\kappa_s = .78-.85$ ), *Justify* ( $\kappa_s = .78-.88$ ), *Suppress/deny* ( $\kappa_s = .88-.94$ ), and *Religion/spirituality* ( $\kappa_s = 1.00$ ).
- Finally, if participants provided no answer or stated they were not attempting to regulate their regret, we coded this as *No Strategy* (coded as 0–1;  $\kappa_s = .62-.91$ ).

Furthermore, we identified 11 specific regret prevention strategies also adapted from Pieters & Zeelenberg (2007) and Zeelenberg & Pieters (2007) that were aimed at ameliorating anticipated regrets. Again, strategies were summed up with in each of the three decision-based categories.

- Decision avoidance strategies (coded as 0–2) included *Delay/avoid choice* ( $\kappa_s = 1.00$  for recent regrets; NA for life regrets) and *Transfer responsibility/seek help* ( $\kappa_s = .73-.88$ ).
- Strategies aimed at changing one’s decision approach or the effort invested (coded as 0–5) included *Ensure decision reversibility* (NA), *Decrease goal level* ( $\kappa_s = .66-.85$ ), *Improve decision quality* ( $\kappa_s = .73-.95$ ), *Improve decision justifiability* ( $\kappa_s = .78-.83$ ), *Restrict/enlarge choice set size* ( $\kappa_s = .55-.82$ ).

- Affect-based strategies (coded as 0–4) included *Avoid feedback* (NA), *Anticipate regret* ( $\kappa = .85$  for recent regret, NA for life regrets), *Denial* ( $\kappa s = .49-.64$ ), and *Religion/spirituality* ( $\kappa s = 1.00$ ).
- Again, if participants provided no answer or stated they were not attempting to prevent future regret, we coded this as *No strategy* (coded as 0–1;  $\kappa s = .62-.76$ ).

Analyses involving individual regret regulation strategies rather than higher-level categories are summarized in Supplement 4.B. In Supplement 4.C, we also report data gathered via a set of newly developed questionnaires that assessed the same current and future-oriented regret regulation responses as the open-ended coding categories reported above. No systematic age effects emerged and questionnaire data were therefore omitted from the remainder of the manuscript.

#### **4.2.3 Covariate Measures**

Inter-correlations between all covariate measures are summarized in Supplement 4.D.

**4.2.3.1 Demographic Background.** 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).

**4.2.3.2 Baseline Affect.** Two items adapted from Nielsen and colleagues (2008) assessed baseline arousal (on a 7-point Likert scale ranging from 1 = *Not aroused at all* to 7 = *Very aroused*) and baseline valence (on a 7-point Likert scale ranging from 1 = *Very negative* to 7 = *Very positive*).

**4.2.3.3 Physical and Mental Health.** We used the 12-Item Short Form Health Survey (SF-12) by Ware and colleagues (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, scores for mental health varied from 15 to 61. Higher scores suggested better well-being.

**4.2.3.4 Future Time Perspective.** How much time participants perceived as having left in life was assessed through the 10-item Future Time Perspective scale (Carstensen & Lang, 1996). Responses were recorded on a 7-point Likert scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree* and averaged (Cronbach's alpha = .94), with higher scores suggesting more expansive time horizons.

**4.2.3.5 Personality.** Participants responded to assessments of their Big Five personality traits (Rammstedt & John, 2007), each measured using two 5-point Likert-scaled items that were then averaged into single scores for *neuroticism*, *extraversion*, *openness*, *agreeableness*, and *conscientiousness*.

**4.2.3.6 Cognitive Measures.** Cognition was measured through four indices: *Working memory* was assessed through a letter-based 2-back task with 50 trials (proportion of correct response trials (0.00-1.00); Ragland et al., 2002). *Numeracy* was assessed through a 3-item numeracy test (0-3 correct responses; Lipkus et al., 2001). *Processing speed* was assessed through a 90-second Digit-Symbol task (Wechsler, 1981). *Vocabulary* was assessed through 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; Brown, 1960).

#### 4.2.4 Procedure

Participants were recruited from the Ithaca, New York area for a laboratory-based study that included both 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 SF-12, and described both recent and long-term regrets (which were presented in counterbalanced order and assessed using paper forms). For their worst recent and worst long-term regret, participants indicated how long ago their regret had originated, which emotions they felt with regard to regret, and how much control they thought they had over their regret. They also responded to questions concerning current and future 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 manuscript (Löckenhoff et al., 2012; Rutt & Löckenhoff, 2016). Participants were paid a base rate of \$15.

#### 4.2.5 Analyses

RStudio version 1.3.1093 was used to conduct analyses. We computed Spearman's rank correlations and generalized linear models for continuous variables, point-biserial correlations and binomial regressions for analyses involving both continuous and dichotomous variables, and quasi-poisson regressions for analyses involving both continuous and categorical variables. The relationship between two dichotomous variables was assessed using  $X^2$  tests. For the sake of consistency and comparability, we report standardized regression weights and *pseudo-R*<sup>2</sup> (assessed via the

Nagelkerke formula) across all types of regression models. Because some subsamples were very small (e.g., only  $n = 2$  participants reporting use of a specific regulation strategy), we did not assess age-related differences or differences between recent and life regrets for variables referenced by fewer than  $n = 5$  participants. Analyses exploring curvilinear rather than linear age effects are reported in Supplement 4.E and yielded only few significant effects, all of which pertained to recent regrets.

### **4.3 Results**

As summarized in Table 4.1, older age was associated with reporting higher income, better mental health, poorer physical health, and shorter future time horizons. With regard to cognitive measures, older age was associated with scoring lower on assessments of working memory, numeracy, and processing speed, but higher on assessments of vocabulary.

#### **4.3.1 Regret**

Characteristics of recent and long-term regrets, as well as their regression on age, are displayed in Table 4.2. When comparing regret types (Table 4.2, last column), long-term regrets were more plentiful than recent regrets, easier to recall, occurred a longer time ago, were coded as more severe, and were associated with more “wistful” feelings. The most common recent regrets focused on interpersonal issues (31%) and career or self-development issues (17%); many 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%). Again, many participants indicated no regrets or made off-topic comments (10%). Participants were more likely to have no recent regrets than no long-term regrets.

The third column of Table 4.2 reports age-related differences in recent regrets. Older age was associated with reporting fewer commission regrets, lower rater-coded regret severity, and experiencing less intense “hot” emotions. In terms of regret domains, older age was associated with describing fewer interpersonal regrets and a higher likelihood of having no recent regrets to report.

The fifth column of Table 4.2 reports age-related differences in long-term regrets. With age, regrets originated longer ago, felt less controllable, were less likely to be commission regrets, and elicited fewer “hot” emotions at the time of testing. There were no age-related differences in long-term regret domains.

#### ***4.3.2 Regret Regulation Strategies***

The frequency of regret regulation strategies and their regressions on age are summarized in Table 4.3. The most commonly referenced strategies related to behavioral repair work (52%–67%) and, correspondingly, strategies aiming at changing one’s decision approach or effort (58%–74%). Reliance on psychological repair work (22%–59%), affect-based strategies (9%–32%), and decision avoidance (9%–20%) was less common. In addition, many participants (12%–14%) reported using no specific regulation strategy.

When comparing regret regulation strategies targeting recent and long-term regrets (Table 4.3, last column), current regret regulation strategies did not differ between recent and long-term regrets. With regard to future regret regulation strategies, participants planned on using psychological repair work more frequently to address long-term regrets than recent regrets.

**Table 4.2**

*Descriptive Statistics for and Differences between Recent and Long-term Regrets, as well as Their Associations with Age*

Variable	M (SD)/n (%)	Recent Regret		Long-term Regret		V
		$\beta_{age}$		$\beta_{age}$		
Number of regrets	2.82 (1.70)	$\beta = -.13, p = .233, pseudo-R^2 = .02$	3.33 (1.45)	$\beta = -.19, p = .083, pseudo-R^2 = .04$	291**	
Difficulty recalling regret	4.25 (2.21)	$\beta = .12, p = .288, pseudo-R^2 = .01$	3.71 (2.06)	$\beta = .11, p = .284, pseudo-R^2 = .01$	1,028.50*	
Years since regret	0.68 (0.59)	$\beta = .19, p = .186, pseudo-R^2 = .04$	20.01 (17.09)	$\beta = .56, p < .001***, pseudo-R^2 = .31$	3***	
Self-rated regret severity	5.52 (1.78)	$\beta = -.03, p = .762, pseudo-R^2 = .00$	5.66 (1.57)	$\beta = -.10, p = .372, pseudo-R^2 = .01$	488	
Coded regret severity	1.54 (0.72)	$\beta = -.16, p = .021*, pseudo-R^2 = NA$	1.96 (0.15)	$\beta = -.06, p = .262, pseudo-R^2 = NA$	10***	
Control over regret <sup>1</sup>	5.05 (2.19)	$\beta = -.11, p = .336, pseudo-R^2 = .01$	5.13 (1.82)	$\beta = -.22, p = .042*, pseudo-R^2 = .05$	838	
Commission (vs. omission) <sup>2</sup>	28 (31.11%)	$\beta = -1.07, p = .046*, pseudo-R^2 = .08$	31 (34.44)	$\beta = -1.11, p = .028*, pseudo-R^2 = .08$	182	
<u>Emotional responses</u>						
“Hot” emotions	3.83 (1.75)	$\beta = -.26, p = .016*, pseudo-R^2 = .07$	3.63 (1.89)	$\beta = -.32, p = .002**, pseudo-R^2 = .10$	1,327	
“Despair” emotions	3.58 (1.84)	$\beta = -.01, p = .906, pseudo-R^2 = .00$	3.35 (1.72)	$\beta = .02, p = .575, pseudo-R^2 = .00$	1,654.50	
“Wistful” emotions	2.88 (1.80)	$\beta = -.07, p = .516, pseudo-R^2 = .01$	3.41 (1.69)	$\beta = -.06, p = .605, pseudo-R^2 = .00$	743*	
<u>Domain</u>						
Career & self-development <sup>2</sup>	15 (16.67%)	$\beta = -.39, p = .615, pseudo-R^2 = .00$	21 (23.33%)	$\beta = .09, p = .883, pseudo-R^2 = .00$	135	
Interpersonal <sup>2</sup>	28 (31.11%)	$\beta = -1.14, p = .031*, pseudo-R^2 = .08$	39 (43.44%)	$\beta = .17, p = .686, pseudo-R^2 = .00$	247	
Leisure & lifestyle <sup>2</sup>	8 (8.89%)	$\beta = .89, p = .495, pseudo-R^2 = .01$	7 (7.78%)	$\beta = -.15, p = .921, pseudo-R^2 = .00$	64	
Health & fitness <sup>2</sup>	12 (13.33%)	$\beta = .82, p = .369, pseudo-R^2 = .02$	8 (8.89%)	$\beta = 1.92, p = .159, pseudo-R^2 = .05$	126	
Finances <sup>2</sup>	7 (7.78%)	$\beta = -.75, p = .618, pseudo-R^2 = .01$	6 (6.67%)	$\beta = -3.91, p = .077, pseudo-R^2 = .11$	49	
Off-topic or no regret <sup>2</sup>	20 (22.22%)	$\beta = 1.26, p = .049*, pseudo-R^2 = .07$	9 (10.00%)	$\beta = -.68, p = .569, pseudo-R^2 = .01$	204*	

**Note.** 1 = Quasi-Poisson regression. 2 = Binomial regression. All intercepts:  $\beta = .00, ps = .414$  to  $< .001$ . V = Wilcoxon test for paired samples comparing recent and life regrets. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Table 4.3**

*Open-ended Responses Regarding Current and Future Regret Regulation Strategies and Their Associations With Age*

Current Regret Regulation Strategies						
Strategy	n (%)	Recent Regret		Long-term Regret		V
		$\beta_{age}$		$\beta_{age}$		
Repair work coding						
Behavioral repair work	53 (58.89%)	$\beta = -.37, p = .396, pseudo-R^2 = .01$		47 (52.22%)	$\beta = -.45, p = .293, pseudo-R^2 = .02$	429
Psychological repair work	31 (34.44%)	$\beta = -1.07, p = .033^*, pseudo-R^2 = .07$		37 (41.11%)	$\beta = -.52, p = .238, pseudo-R^2 = .02$	312
Strategy coding						
Decision avoidance	18 (20.00%)	$\beta = 1.20, p = .079, pseudo-R^2 = .06$		13 (14.4%)	$\beta = -.124, p = .174, pseudo-R^2 = .04$	195
Change decision approach/effort	52 (57.78%)	$\beta = .18, p = .673, pseudo-R^2 = .00$		53 (58.89%)	$\beta = -.72, p = .108, pseudo-R^2 = .04$	420
Affect-based strategies	29 (32.22%)	$\beta = -1.24, p = .019^*, pseudo-R^2 = .09$		25 (27.78%)	$\beta = -.49, p = .356, pseudo-R^2 = .01$	370
NA or no strategy	12 (13.33%)	$\beta = 1.87, p = .057, pseudo-R^2 = .08$		11 (12.22%)	$\beta = 2.56, p = .022^*, pseudo-R^2 = .12$	81
Future Regret Regulation Strategies						
Strategy	n (%)	Recent Regret		Long-term Regret		V
		$\beta_{age}$		$\beta_{age}$		
Repair work coding						
Behavioral repair work	60 (66.67%)	$\beta = -.33, p < .001^{***}, pseudo-R^2 = .15$		58 (64.44%)	$\beta = -.11, p = .314, pseudo-R^2 = .02$	390
Psychological repair work	20 (22.22%)	$\beta = -.03, p = .765, pseudo-R^2 = .00$		53 (58.89%)	$\beta = .02, p = .829, pseudo-R^2 = .00$	200***
Strategy coding						
Decision avoidance	11 (12.2%)	$\beta = .09, p = .392, pseudo-R^2 = .02$		8 (8/89%)	$\beta = .10, p = .350, pseudo-R^2 = .04$	56
Change decision approach/effort	66 (73.33%)	$\beta = -.38, p < .001^{***}, pseudo-R^2 = .21$		67 (74.44%)	$\beta = -.17, p = .100, pseudo-R^2 = .04$	272
Affect-based strategies	8 (8.89%)	$\beta = .07, p = .510, pseudo-R^2 = .02$		14 (15.56%)	$\beta = .06, p = .561, pseudo-R^2 = .01$	42.50
NA or no strategy	13 (14.44%)	$\beta = .37, p < .001^{***}, pseudo-R^2 = .25$		11 (12.22%)	$\beta = .03, p = .771, pseudo-R^2 = .00$	95

**Note.** All intercepts:  $\beta = .00, ps = .905$  to  $< .001$ . V = Wilcoxon-test for paired samples. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

The third column of Table 4.3 reports age-related differences in strategies to manage **recent regrets**. With respect to *current strategies to manage recent regrets*, older age was associated with a decreased likelihood of relying on psychological repair work or affect-based strategies. According to Supplement B, these effects were mostly driven by age-related decrements in the likelihood of justifying one's decisions. With respect to *future strategies to manage recent regrets*, older age was associated with a lower likelihood of pursuing behavioral repair work and lower likelihood of changing one's decision-making approach. According to Supplement B, these effects were mostly driven by age-related decrements in attempts to improve decision quality or justifiability. Furthermore, older age was associated with a higher likelihood of having no future regret regulation strategies in mind.

Finally, the fifth column of Table 4.3 reports age-related differences in strategies to manage **long-term regrets**. No age-related differences in current or future regret regulation strategies were observed, although older age was associated with a higher likelihood of reporting no strategy to manage current long-term regrets.

#### ***4.3.3 Analyses involving Covariate Measures***

Outcome variables that varied with age were jointly regressed on (1) age and (2) those covariate measures that were correlated with both age and the outcome variable (see Supplement 4.D). Because we observed age-related differences in the perceived controllability of long-term regrets, we also examined the contribution of control perceptions.

In a first step, we explored the role of our two theory-based covariate measures: control perceptions and future time perspective.

*Perceived controllability* of long-term regrets was associated with the link between age and commission-based long-term regrets.

*Future time perspective* was associated with the link between age and (1) recent interpersonal regrets and (2) a lack of current strategies to address long-term regrets.

In a second step, we examined the role of the remaining covariate measures.

*Income* was associated with the link between age and the tendency to report more omission-based recent regrets..

*Mental health* was associated with the link between age and (1) the coded severity of recent regrets, (2) the reported severity of recent regrets, (3) “hot” emotions tied to recent regrets, (4) a lack of recent regrets, and (5) commission-based long-term regrets.

*Physical health* was associated with the link between age and recent interpersonal regrets.

*Working memory* was associated with the link between age and (1) “hot” emotions tied to recent regrets, (2) the controllability of long-term regrets, and (3) commission-based long-term regrets.

*Numeracy* was associated with the link between age and (1) the controllability of long-term regrets, (2) commission-based long-term regrets, and (3) a lack of current strategies to address long-term regrets.

Finally, *processing speed* was associated with the link between age and (1) the controllability of long-term regrets, (2) commission-based long-term regrets, (3) current affect-based strategies, (4) reporting no current strategies for addressing long-term regrets.

No covariates were associated with the link between age and (1) reporting less recent long-term regrets, (2) experiencing fewer “hot” emotions tied to long-term regrets, (3) decreased reliance on current psychological repair work to down-regulate recent regrets, and (4) a lack of 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.

#### **4.4 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 are associated with covariate measures. From a theoretical standpoint, we were particularly interested in the roles played by perceived control over regrets (sensu the Motivational Theory of Life-span Development; Heckhausen et al., 2010) and future time perspective (sensu Socioemotional Selectivity Theory; Carstensen et al., 1999).

When examining regret experience, we had expected to observe only few age-related differences with respect to people’s recent regrets that had originated in the year preceding the study. However, we found a number of significant age effects that were broadly aligned with the prior literature. Specifically, we found that with age, participants reported less severe recent regrets (Bjälkebring et al., 2013; Västfjäll et al., 2011; cf. Morrison & Roese, 2011; Thomas et al., 2019; Västfjäll et al., 2011), 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). In line with our hypotheses concerning recent regrets, age was also associated with reporting more

omission-based regrets (Newall et al., 2009; cf. Morrison & Roese, 2011; Wrosch et al., 2005) and fewer “hot” emotions such as anger or frustration. In sum, when respondents reflected on regrets that originated in the past year, older age was associated with fewer regret-related complaints.

With respect to long-term regrets, we 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, 2005). As was the case for recent regrets, older age was associated with reporting more omission-based long-term regrets and a lower likelihood of experiencing “hot” emotions. However, in contrast to findings concerning recent regrets, there were no age-related differences in the severity of long-term regrets or the tendency to report an absence of long-term regrets. Thus, we did not find the expected pattern that long-term regrets would show more pronounced age-related differences than recent regrets.

When examining regret regulation strategies, we had expected age-related increments in the reliance on decision avoidance and affect-based/psychological repair work strategies. At the same time, we expected age-related decrements in decision engagement/behavioral repair work. Age-related differences were also expected to be more pronounced in the context of future than current regret regulation attempts. Counter to predictions, we observed only very few age-related differences in regret regulation and the effects we did observe were focused on the regulation of recent (vs. long-term) regrets and equally likely to affect current versus future regret regulation attempts. Moreover, the direction of specific effects did not always align with our predictions.

With respect to *current strategies* to manage recent regrets, older age was associated with decreased, rather than increased, reliance on psychological repair work or affect-based strategies (cf. Bjälkebring et al., 2013; Newall et al., 2009; Wrosch et al., 2000, 2005). Also, contrary to expectations, we found no age-related differences in the reliance on decision avoidance strategies (cf. Bjälkebring et al., 2013). For current strategies to manage long-term regrets, we merely found that with age, 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 the reliance on behavioral repair work or the willingness to change one's decision approach. In addition, older age was linked to a higher likelihood of having no future strategy in mind to address recent regrets. However, we found no age-related differences in psychological repair work, affect-based strategies, or decision avoidance (cf. Bjälkebring et al., 2013). Also, the future regulation of long-term regrets did not vary by age at all.

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 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.

#### ***4.4.1 Role of Theoretical Frameworks***

Based on the Motivational Theory of Life-span Development (Heckhausen et al., 2010), we had hypothesized that with age, decision makers would perceive less control over their long-term regrets. This was the case, with age-related differences in control perceptions being linked to age-related decrements in working memory, numeracy, and speed. As such, decrements in cognitive abilities may make it harder for older adults to exert – or to imagine exerting – control over long-term regrets.

In turn, age-related differences in perceived control were linked to the 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), so 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 down-regulating commission-based than omission-based regrets, making regrets stemming from omissions seem less controllable to this demographic.

In line with Socioemotional Selectivity Theory (Carstensen et al., 1999), we found age-related limitations in future time perspective. These decrements were linked to the relationship between age and recent interpersonal regrets. The same was true for age-related decrements in physical health. This is plausible since Socioemotional Selectivity Theory suggests that people whose time perspective is limited by advanced age or poor health prioritize emotional meaningful experiences, in part by spending more time with close others (Lansford et al., 1999). Therefore, older adults' lower interpersonal regrets may reflect a greater investment in maintaining rewarding relationships.

In addition, future time perspective was linked to the relationship between age and a lack of current strategies to address long-term regrets. This could suggest that in an effort to avoid negative affect, older adults do not actively think about or attempt to address their long-term regrets, not even by actively distracting themselves from thinking about regret.

In summary, both theoretical frameworks could add to our understanding lifespan trends in the response to and regulation of regrets. At the same time, however, most observed age-related differences were not linked the above frameworks, including all observed differences pertaining to recent regrets.

#### ***4.4.2 Role of Other Covariate Measures***

Beyond control perceptions and time perceptions, both indices of cognitive capacity and mental health were associated with several of the observed age-related 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 fewer “hot” emotions in the face of recent regrets, whereas numeracy was linked to the relationship between age and a lack of strategies to address long-term regrets. That age-related changes in cognitive abilities may make it harder address current regrets is also evident when examining the contribution of processing speed: Age-related decrements in speed were linked to a reduced tendency to employ affect-based strategies for managing recent regrets and an absence of regulation strategies for addressing long-term regrets.

In turn, age-related increments in mental health were linked to the relationship between age and voicing fewer regret-related complaints. This included reporting less severe recent regrets, experiencing fewer “hot” emotions linked to recent regrets, reporting fewer commission-based long-term regrets, or reporting no recent regrets to begin with.

Notably, several age effects were not linked to covariate measures. With regard to recent regrets, this included reliance on current psychological repair work to down-regulate 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. With regard to long-term regrets, this included the recency of long-term regrets, a lack of “hot” emotions tied to these 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 our study.

#### ***4.4.3 Limitations***

The present study is subject to several limitations arising from the choice of our study design. First, we chose to only focus on participants’ two biggest regrets and assessed all outcome measures with regard to these specific complaints. As such, we cannot quantify the relative frequency with which different regret domains or regret types (e.g., commission versus omission-based regrets) may occur. Similarly, we cannot speak to how frequently participants draw on specific regret regulation strategies when attempting to down-regulate 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' biggest 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 the questionnaire-based responses which captured the full range of potential regret-regulation strategies for each participant (Supplement 4.C) did not yield any systematic age effects, suggesting 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, with some long-term regrets arising as early as 40, 50, or even up to 65 years prior to data collection. The strategies used to address long-held regrets may have been misremembered, may have changed over the years, or may have already allowed participants to down-regulate (some of) the negative feelings attached to regrets. In part, this may be linked to 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' preferred strategies, we cannot ascertain whether strategies were favored because they had proven successful or whether the mere existence of life-long regrets might suggest that the reported strategies were actually proving inefficient. Longitudinal or diary studies

may be more apt at documenting the efficiency and stability of regulation strategies over time.

#### **4.5 Conclusion**

In conclusion, we found that when differentiating between recent and long-term regrets, only few age-related differences emerge with respect to how decision makers react to or address regrettable choices. With respect to our categorization of regret regulation strategies, we observed no link between older age and increased reliance on decision avoidance to regulate or prevent regrets. Instead, we found age-related decrements in the reliance on affect-based strategies and the willingness to invest more effort into making high-quality choices. Overall, older age was associated with reporting fewer regret-related concerns (i.e., fewer, less severe, and less emotionally bothersome regrets) and a lower likelihood of actively down-regulating one's regrets. Notably, the general pattern of our findings held true when conducting supplementary analyses on individual regret regulation strategies, complementary questionnaire data, and on the possible existence of curvilinear age effects.

With respect to theoretical explanations, age-related decrements in control perceptions and future time perspective could not be linked to 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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## CHAPTER 5

### CONCLUSION

The overarching goal of this dissertation was to determine *when* and *why* older adults are more likely to avoid making decisions than their younger peers are.

#### 5.1 Aging and Decision Avoidance

This dissertation has documented age-related increments in decision avoidance with regard to two phenomena described by Anderson (2003): First, as evidenced by Chapter 3, older age is associated with a higher likelihood to *avoid choice for the time being* when facing high-conflict decisions and being proffered the option not to choose “for now.” Second, according to Chapter 4, older age was associated with reporting more recent and long-term regrets stemming from omissions (i.e., inaction), which may be indicative of a higher likelihood to *avoid choice because not acting is preferred to acting*. Note, however, that it is also possible that older adults do not make more inaction-based decisions than younger adults do. Instead, it could be that over time or with age, omission regrets are easier to remember or more difficult to down-regulate than action-based regrets that originated at the same time. By contrast, Chapter 2 of this dissertation demonstrated no age-related differences in the tendency to *avoid choice to maintain current circumstances*, as indexed by decision makers’ susceptibility to default effects. Furthermore, Chapter 4 did not find support for age-related increments in the self-reported reliance on decision avoidance to down-regulate current or future regrets. As a result, this dissertation adds to a body of literature suggesting that older age may indeed be “the age of avoidance,” while simultaneously highlighting that age-related differences in decision avoidance appear to vary across avoidance phenomena or the way avoidance

is being assessed. Because this dissertation only examined certain types of decision avoidance, additional research will be needed to explore age-related differences in other variations of avoidance, such as in the delegation of choice to close others and trusted experts (Beisecker, 1988; Cassileth et al., 1980; Ende et al., 1989; Petrisek et al., 1997; Pinquart & Duberstein, 2004; Roberto et al., 2001; Steginga & Occhipinti, 2002; Stiggelbout & Kiebert, 1997; Strough et al., 2002; Wetzels et al., 2004).

## **5.2 The Roles of Context, Cognition, and Affect**

This dissertation strove to identify potential links between older adults' decision avoidance and contextual, cognitive, and affective factors.

### ***5.2.1 Context***

The present dissertation explored age-related differences in decision avoidance with regard to three types of circumstances: decision environment (Chapter 2), domain (Chapters 3 and 4), and temporal context (Chapter 4). As summarized below, contextual factors only played a minor part in older adults' decision avoidance.

**5.2.1.1 Decision environment.** Chapter 2 demonstrates that older adults are indeed susceptible to default effects when making choices, that is, they are responsive to choice architecture that discourages active decision making. However, counter to expectations, the likelihood of passively relying on default choice options does not appear to increase with age. However, the findings of Chapter 2 do not rule out the possibility that aging may affect decision makers' vulnerability to other elements of decision environments that drive or deter decision avoidance. For example, it is already known that preferences for the size of choice sets and sequence of choice environment elements differ with age (Löckenhoff et al., 2012; 2020; Mata & Nuns, 2010; Reed et al.,

2008). Choice architects may take these elements into account when optimizing decision environments for different age groups or different purposes (e.g., to encourage or discourage active choice). Furthermore, Otto and colleagues (2016) have found that decision makers with a high need for closure – that is, the desire to down-regulate ambiguity in choice contexts – are more susceptible not only to default effects but also to three other effects that encourage decision avoidance: inaction inertia, status quo bias, and option fixation. Similar to default effects, these effects can be elicited or supported by the way the choice environment or context is set up. Because older adults express a higher need for closure than younger adults do (Kossowska et al., 2012), additional research is needed to assess how aging relates to decision avoidance in the contexts of inaction inertia, status quo bias, and option fixation.

**5.2.1.2. Domain.** Chapters 3 and 4 also touched on the role of decision domains (whereas Chapter 2 only examined one domain – consumer choices in the context of real estate rentals).

In Chapter 3, older age was associated with a stronger preference for delaying choice across both consumer choices (i.e., choosing an apartment or car) and health-related choices (i.e., choosing a physician or health plan). As such, the age-related preference for *avoiding choice for the time being* seems domain-independent (sensu Pethel & Chen, 2013), although other research often finds that age effects in decision contexts are more pronounced in consumer than health domains (English & Carstensen, 2015; Mata & Nunes, 2010; Reed et al., 2008). Note, however, that the effect of avoidance on age differences in participants' post-decisional affect *did* differ by domain: In Study 1 of Chapter 3, middle-aged adults described improved affect after avoiding

apartment and car choices but not health choices; similarly, in Study 2, middle-aged adults benefitted from avoiding car choices but no other choices. Older adults, in contrast, felt better after avoiding choices in any domain. As such, it appears that the emotional benefit of avoiding choice becomes apparent earlier in life for consumer choices than health choices. This roughly maps onto findings by Pethel and Chen (2013), who found that older adults benefitted from avoiding consumer but not health choices and that younger adults experienced more negative affect after avoiding to choose a physician (but not after avoiding other types of decisions).

Chapter 4 found that with respect to long-term regrets that could have occurred at any point in decision makers' past – which tended to be much longer ago for the older adults than for their younger peers – decision domains did not vary between age groups. This might suggest that there are no age-related differences in how regrettable different long-term regret domains appear or how frequently the regrets within a certain domain originate. Alternatively, it is possible that age-related differences existed at some point but by the time the study was conducted, participants had already succeeded at down-regulating regrets that would have otherwise led to differences in reported regret domains. With respect to regrets that had originated recently (i.e., in the year preceding the study), age effects were indeed observed, as older age was associated with reporting fewer interpersonal regrets. The relationship between age and interpersonal regrets was linked to both physical health and participants' future time perspective. Thus, as suggested by Socioemotional Selectivity Theory (Carstensen et al., 1999) – which proposes that older adults prioritize close social relationships and emotionally meaningful experiences – it is possible that older adults might prioritize positive social interactions

more. Given the pattern of our results, this could be because with age, decision makers perceive their time left in life as more limited, which may be exacerbated by experiencing health issues later in life. Because the likelihood of reporting no recent regrets was higher with older age, it is possible that Chapter 4 underestimates the occurrence of age-related differences in regret domains because older adults did not report as many regrets.

To advance our understanding of how aging and avoidance relate to choice domains not represented in the present dissertation, additional work is needed to examine older adults' decision avoidance in other domains known to elicit age-related differences in decision making, such as moral, financial/investment, and environmental contexts (Bonem et al., 2015, Rolison et al., 2014, Wilson et al., 2022).

**5.2.1.3. Temporal Context.** Socioemotional Selectivity Theory (Carstensen et al., 1999) suggests that older age is linked to perceptions of shorter future time horizons. Whereas expansive time horizons should motivate decision makers to pursue future-oriented goals (such as information- and knowledge-based ones), shorter time horizons should motivate decision makers to pursue present-oriented goals (such as establishing or maintaining positive affect). As outlined above, this may, in part, be accomplished by investing more into close social relationships.

Chapter 4 documented differences in participants' perceptions of how much "future time" they had available to them. Sensu Socioemotional Selectivity Theory, older age was associated with perceiving one's remaining time as less expansive. This age effect helped to explain age-related differences in interpersonal regrets. However, other age effects in the experience or regulation of regrets could not be linked to the way participants perceived their personal temporal context. (Although only Chapter 4

included the Future Time Perspective Scale (Carstensen & Lang, 1996), note that the three studies conducted in Chapters 2 and 3 all assessed self-rated life position using a single-item measure, each documenting a strong effect of age on the perceived proximity to the end of one's life. In Chapter 2, life position was not associated with susceptibility to default effects. In Chapter 3, a more advanced life position was associated with stronger decision avoidance for both Studies 1 and 2 but accounting for this covariate did not affect the relationship between age and avoidance.)

In addition to global time horizons, Chapter 4 examined the role of temporal context with respect to two additional dimensions: First, Chapter 4 differentiated regrets that originated at any point in the past from recent regrets. This was done because the recency of long-term regrets was likely associated with the age of the decision maker (i.e., older adults would report less-recent regrets), whereas recent regrets were of comparable recency for all participants. Second, participants reflected on both current and future approaches to down-regulate their recent and long-term regrets. This was done because with age, decision makers may perceive less plentiful opportunities to address or undo regrets in the future.

With regard to both recent and long-term regrets, older age was associated with a higher likelihood of experiencing regrets stemming from inaction-based (or avoided) choices. In addition, older age was linked to being less troubled by recent and long-term regrets. Counter to our expectations that long-term regrets would be associated with more age-related differences than recent regrets, the few differences we did observe were not more likely to affect long-term than recent regrets.

Across both current and future regret regulation strategies, older age was associated with more passive regret regulation approaches but there was no indication that avoidance-based approaches were linked to older age. Because Chapter 4 did not draw on objective or behavioral data, this dissertation cannot speak to how well participants' self-reports may map onto their actual decision or regulation strategies. For instance, in other work from our research team, we find that older adults are sometimes more likely to avoid decision-relevant information but do not subjectively describe themselves as more avoidant than their younger peers are (Deng et al., 2022; Nolte et al., 2021). Therefore, future research would benefit from studying older adults' subjectively reported and objectively observed reliance on avoidant coping in tandem.

### ***5.2.2 Cognition***

Cognitive measures were included across all studies reported in Chapters 2, 3, and 4, with Chapter 3 putting a specific emphasis on how cognitively taxing – that is, as how difficult and effortful – the decision-making process was being perceived prior to making or avoiding choices. Across all studies, we generally found that older age was associated with demonstrating and reporting lower levels of fluid cognitive abilities pertaining to memory and learning ability (as well as other fluid abilities, such as processing speed) but higher levels of crystallized intelligence/knowledge. We did not observe age-related differences in cognitive reflection ability and inconsistent links between aging and numeracy skills.

In Chapter 2, cognitive variables were not linked to decision makers' susceptibility to default effects. Likewise, accounting for age-related differences in cognitive covariates did not reveal a previously missed link between age and acceptance

of default options. Thus, cognition did not seem to contribute to (age-related differences in) decisions that are being avoided *to maintain current circumstances*.

In Chapter 3, higher levels of decision avoidance were linked to lower levels of self-reported memory (Study 1) and learning ability (Study 2). In addition, across both studies, those more likely to avoid choice reported higher peri-decisional cognitive loads, as indexed by how difficult and effortful participants described the choice process. Although in Study 2, older age was associated with higher perceived cognitive load, neither cognitive load nor any of the cognitive covariates could be linked to older adults' more pronounced avoidance tendencies. Thus, cognition did not seem to contribute to age-related differences in decisions that are being avoided *for the time being*.

In Chapter 4, age-related decrements in working memory, numeracy, and speed were linked to a variety of age-related differences in the experience and management of regrets, including those most relevant to the topic of decision avoidance. First, all three variables were associated with age-related differences in the report of omission-based long-term regrets. However, it is not clear whether cognition relates to older adults favoring inaction over action when these regrets first originate or whether age-related decrements in fluid cognitive abilities relate to how well participants are able to recall regrettable choices years later. Second, decrements in numeracy and speed were linked to age-related increments in the passive management of regrets, including a lack of regret regulation strategies, a lower likelihood to attempt to improve one's affective response to regret, and reduced willingness to invest (cognitive) resources into the decision process. But since we did not observe age-related differences in the reliance on avoidant coping, we cannot say with certainty whether those decision makers who do rely on decision

avoidance do so for cognitive reasons. In order to address this possibility, future studies would need to draw on bigger samples, as the Chapter 4 sample was not sufficient to detect age-related differences in this regard. Overall, though, cognition did seem to contribute to (age-related differences in) decisions that are being avoided because *not acting is preferred to acting*.

To summarize across chapters, cognition appeared to play a role in decision avoidance in two out of the three decision avoidance phenomena under examination: *avoiding choice for the time being* and *avoiding choice because not acting is preferred to acting*. Out of these two, cognition was only linked to age-related differences in decision avoidance (and the regulation of regrets) in the context of *avoiding choice because not acting is preferred to acting*. Hence, based on the measures tested in the present studies, cognition seems to play a limited part in contributing to older adults' decision avoidance.

However, it is important to point out that our assessment of cognitive factors is subject to several limitations. First, Chapters 2, 3, and 4 only incorporated some potential cognitive covariates, omitting other cognitive measures. Second, our choice of measures differed across studies, with some covariates – such as cognitive reflection ability or processing speed – being only tested in the context of one of the three decision avoidance phenomena. As such, we cannot rule out that these measures might have related to (age-related differences in) decision avoidance in the context of studies they were not included in. Third, and most importantly, Chapters 2 and 3 relied on internet-based surveys, whereas Chapter 4 represented a laboratory-based study. Therefore, Chapter 4 includes more objective tests of cognitive abilities that were conducted under controlled laboratory conditions, whereas Chapters 2 and 3 relied on self-report data as well as cognitive

assessments that could have been compromised (e.g., by seeking help or using a calculator while performing the numeracy test).

### **5.2.3 Affect**

Affect was measured across Chapters 2, 3, and 4, albeit at varying time points in the decision process.

**5.2.3.1 Baseline or Pre-decisional Affect.** All four studies reported in Chapters 2, 3, and 4 assessed participants' baseline valence and arousal (i.e., activation) levels. In Chapter 2, older age was associated with reporting calmer baseline affect but neither valence nor arousal related to participants' susceptibility to default effects. In Chapter 3, older age was associated with reporting lower levels of baseline arousal in Study 1 but not Study 2. Lower levels of arousal were linked to lower levels of decision avoidance, even after partialing out age, but arousal could not be linked to older adults' decision avoidance preferences. In Chapter 4, baseline affect was not linked to age and therefore not entered into follow-up analyses. To conclude, baseline affect is not a consistent correlate of either age or decision avoidance, and did not aid our understanding of why older adults avoid some types of decisions more.

**5.2.3.2 Peri-decisional Affect.** Chapter 3 indexed peri-decisional affect by assessing perceived stress and anticipated regret during the decision process (i.e., prior to making or avoiding choices). Peri-decisional affect was not linked to age or decision avoidance in Studies 1 and 2.

**5.2.3.3 Post-decisional Affect.** How participants felt immediately after choosing (or avoiding choice) was assessed in both Chapters 2 and 3. By contrast, Chapter 4

explored decision makers' long-term affective response to regrettable choices and omissions months or years after the regret had first originated.

In Chapter 2, post-decisional affect was measured by examining changes in valence between pre- and post-decisional stages of the decision process. Neither age nor avoidance (i.e., susceptibility to default effects) were linked to post-decisional shifts in valence or arousal. In Chapter 3, post-decisional affect was captured by a composite score that combined assessments of valence, arousal, satisfaction, and regret. Across both Studies 1 and 2, we found that for most scenarios, older adults and sometimes middle-aged adults felt better after avoiding rather than making decisions. Younger adults did not tend to reap affective benefits from foregoing choice but also did not report worse affect after choosing, as had been observed by Chen and colleagues (2011) and Pethel and Chen (2013). Finally, in Chapter 4, older age was associated with experiencing fewer regrets, less intense regrets, and less intense “hot” emotions linked to regrets, although we observed no age-related differences with respect to the experience of “wistful” or “despairing” regret-related emotions. As noted previously, with age, reported regrets also focused more on omissions than active decisions participants had made. Thus, both Chapters 3 and 4 suggest that older adults feel less bad after foregoing active decisions and that with either time or age, affective responses to regrettable inactions or actions become less bothersome.

**5.2.3.4 Affect Regulation.** As described above, Chapter 3 suggested that behavioral decision avoidance can serve an emotion regulation purpose for middle-aged and older decision makers. Nevertheless, Chapter 4 failed to detect age-related differences in the self-reported reliance on emotion regulation strategies such as

denying/transferring responsibility for choice, delaying/avoiding choice, and seeking help from others. Specifically, older age was associated with being less actively invested in down-regulating regret, as evidenced by (1) a lack of regulation strategies, (2) decreased reliance on affect-based strategies or psychological repair work, and (3) decreased reliance on decision-engaged strategies or behavioral repair work. However, since Chapter 4 drew on cross-sectional rather than longitudinal data, we do not know whether these age-related patterns were already present at the time the regret originated or developed later.

**5.2.3.5 Summary of Findings concerning Affect.** In sum, age-related differences in decision avoidance could not be linked to either pre- or peri-decisional affect. Instead, older age was associated with better post-decisional affect when *avoiding choice for the time being* and with reporting less bothersome responses to experiencing a severe regret in the previous months or years (which may possibly be specific to older adults *avoiding choice because not acting is preferred to acting*). However, we acknowledge that we did not rely on the same affective measures, or the same measurement time points, across Chapters 2, 3, and 4. Therefore, differences in findings between studies may reflect differences in how affect was indexed.

### **5.3 The Role of Covariate Measures**

Across Chapters 2, 3, and 4, this dissertation also explored the contributions of various covariate measures that could not be categorized as falling under the umbrella terms of “context,” “cognition,” or “affect.”

### **5.3.1. Demographic Background**

Chapters 2, 3, and 4 all assessed information about participants' demographic background, specifically their gender, race/ethnicity, educational attainment, and household income. Older adults were more likely to identify as Non-Hispanic White (Chapters 2 and 3), described themselves as better educated (Chapter 3 Study 2), and drew on a higher income (Chapter 4), but these associations were inconsistent across studies.

In the context of *avoiding choice to maintain current circumstances* (i.e., default effects), Chapter 2 found that Non-Hispanic White participants were more susceptible to passively relying on default options than participants of other races/ethnicities were. However, since older age was not associated with default effects, racial/ethnic background did not further our understanding of age-related differences in decision avoidance.

In Chapter 4, older adults' higher income was linked to the relationship between older age and the report of recent omission-based regrets (i.e., of actions or decisions that were avoided *because not acting is preferred to acting*). This may suggest that considering older adults own more financial assets but have limited future opportunities to make use of them, this age group may regret foregoing experiences or purchases they would have had the means to obtain.

### **5.3.2 Physical and Emotional Health**

Chapters 2 and 3 relied on brief self-rated assessments of participants' physical and emotional health. By contrast, Chapter 4 used a more comprehensive measure of physical and emotional health. Older age was associated with reporting lower levels of

physical health (Chapters 2 and 4) and higher levels of emotional health (Chapters 2, 3, and 4).

In Chapter 2, health was not associated with susceptibility to default effects/*avoiding choices to maintain current circumstances*. In Chapter 3, health was not associated with age-related differences in *avoiding choices for the time being*. In Chapter 4, emotional health was associated with various age-related differences in the experience of recent regrets, suggesting that a less severe response to regrets or a lack of regrets reflects higher levels of emotional well-being. In addition, emotional health was connected to age-related increments in reporting more long-term omission-based regrets/*avoiding choice because not acting is preferred to acting*. In turn, and as referenced when discussing Socioemotional Selectivity Theory above (Carstensen et al., 1999), age-related decrements in physical health were connected to age-related decrements in reporting fewer recent interpersonal regrets. As the relationship between older age and a decreased number of recent interpersonal regrets was also associated with the tendency to report a more limited future time perspective with age, late-life health issues may motivate decision makers to mend or maintain close personal relationships “before it is too late.”

To sum up, health seems relevant to the experience and management of regrets, including those originating from omissions, but not as much to avoiding or delaying choices in the first place.

### **5.3.3 Goal Orientation**

Both Chapter 2 and Chapter 3 assessed decision makers’ motivation to pursue growth goals (versus maintenance goals aimed at preserving the status quo) and the

motivation to pursue information- or knowledge-based goals (versus affect-based goals that focus on emotional experience). Older age was associated with a lower likelihood of pursuing growth goals (Chapters 2 and 3) and information- or knowledge-based goals (Chapter 2). In addition, Chapter 3 Study 2 documented that older age was associated with a decreased motivation to optimize decision making (i.e., reporting lower levels of maximization tendencies).

In Chapter 2, goal orientation was not associated with susceptibility to default effects/*avoiding choices to maintain current circumstances*. In Chapter 3, the pursuit of growth goals as well as higher maximization tendencies were associated with lower decision avoidance tendencies/*avoiding choices for the time being*. Nevertheless, neither covariate was associated with age-related increments in the preference for avoiding choices. Hence, age-related differences in goal orientation did not advance our understanding of why older adults avoid choices more.

#### **5.3.4. Personality**

Big Five personality traits – that is, neuroticism, extraversion, openness, agreeableness, and conscientiousness – were measured across all studies in Chapters 2, 3, and 4 (although note that openness was omitted from Chapter 2 analyses). In line with lifespan trends (Cavanaugh & Blanchard-Fields, 2015), we found that older age was associated with reporting lower levels of neuroticism (Chapter 2 and Chapter 3 Study 2), higher levels of agreeableness (Chapter 2 and Chapter 3, Study 2), and higher levels of conscientiousness (Chapters 2 and 3). The Chapter 4 sample did not show age-related differences in personality traits.

In Chapter 2, personality traits were not associated with susceptibility to default effects/*avoiding choices to maintain current circumstances*. In Chapter 3, Study 2, decision avoidance *for the time being* was linked to lower levels of neuroticism and higher levels of conscientiousness; in either study, personality traits were not linked to older adults' heightened avoidance tendencies. Therefore, personality traits, too, do not seem to meaningfully contribute to age-related differences in avoidance.

### ***5.3.5 Other Correlates of Decision Avoidance***

Chapter 2 examined a variety of covariates that are known or suspected to discourage active decision making in the context of default choice options (e.g., Dinner et al., 2011; Jachimowicz et al., 2019): perceived endorsement of the choice option by others, perceived endowment (how much a feature is perceived as “belonging” to the presented choice option),<sup>8</sup> perceived ease (how much easier it is to accept than reject the default), experience with the choice domain, and perceived importance of making a sound decision.

We observed no age-related differences in perceived endorsement or the perceived importance of the decision. Counter to expectations, older age was associated with a lower likelihood to perceive the default options as “belonging” to the rentals participants were reviewing and to perceive staying with the default as easier. In spite of age-related increments in life experience, older age was associated with voicing less experience with renting accommodations. Consistent with the prior literature, decision makers who perceived higher levels of endorsement or ease exhibited stronger default

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<sup>8</sup> Note that endowment is typically captured as the perception that the decision maker “owns” the default choice option, which was not feasible in the context of the Chapter 2 default task design.

effects, whereas decision makers who perceived making a sound choice as more important exhibited weaker default effects. But regardless of these associations, there was no link between older age and susceptibility to default effects.

#### **5.4 Summary of Findings concerning Covariates**

To sum up, across all aforementioned possible contributors to age-related differences in decision avoidance, only few meaningful associations were identified: With respect to decision domains, it seems that age-related differences in decision making and avoidance are most visible in interpersonal contexts (Chapter 4) and that the effect of avoidance on middle-aged and older decision makers' post-decisional affect emerges in consumer contexts before it does in health contexts (Chapter 3). With respect to cognition, there was no evidence that older age was associated with avoiding choices in an effort to preserve cognitive resources or because choosing was subjectively experienced as too challenging. However, age-related differences in cognitive capacities did relate to age-related differences in the experience and management of regrets that can follow making or avoiding choices (Chapter 4). Finally, we observed no evidence that pre- or peri-decisional affective experience predisposes older adults to avoiding choices. However, we did document age-related differences in post-decisional affective experience immediately after (Chapter 3) as well as months or years after experiencing a regrettable (lack of) decision (Chapter 4). We can therefore presume that context, cognition, and affect only play a minor role in older adults' heightened decision avoidance tendencies.

At the same time, it is crucial to acknowledge that different avoidance phenomena (i.e., delaying versus rejecting choice) are likely associated with distinct underlying

mechanisms (e.g., Berens & Funke, 2020). Similarly, different correlates and covariates may play a role when distinguishing between decision and action avoidance (ibid.) or between different decision avoidance motives. For instance, it seems plausible that the desire to *avoid choice for the time being* may be associated with other subjective motives than the desire to *maintain current circumstances* or to avoid acting by *not acting*. Therefore, a lack of consistently relevant covariates may point to the possibility that age-related differences in different avoidance phenomena are connected to different underlying reasons rather than cohesive, related ones.

## **5.5 Future Research Directions**

Because age-related differences in avoidance tendencies could not be readily linked to the various covariates considered in this dissertation, it is necessary to propose other possible explanations for why active decision making may be less attractive to older decision makers. For instance, age-related changes in decision avoidance could be specific to older cohorts rather than older age groups or could be the byproduct of other effects, such as age-related changes in information avoidance.

### **5.5.1 Cohort Effects**

A key drawback of the studies presented in Chapters 2 through 4 is that each of them relies on cross-sectional rather than longitudinal data. As a result, this dissertation is not able to rule out that age-related changes in decision avoidance may reflect cohort rather than age effects. Put differently, it is possible that those decision makers who are now considered “older adults” are less prepared to make choices than current generations who have yet to age into the “older adult” demographic: Current older adults grew up in a time when experts such as physicians made decisions for rather than in collaboration with

them. By contrast, younger generations may have more experience with contributing to or leading the decision process (Mather, 2006). Following suit, many older adults still prefer or are subjected to a more paternalistic or less patient-driven approach to medical decision making (e.g., Bynum et al., 2014; Gaster et al., 2021; Wrede-Sach et al., 2013) than is the case for younger patients. As a result, older adults may have not had the same opportunities to gain decision-relevant experience, expertise, or skills than younger adults have today.

To better understand how decision avoidance unfolds across the lifespan and to disentangle age from cohort effects, future research would benefit from drawing on longitudinal data or even age-period-cohort analyses. In addition, future research ought to examine covariates not prioritized in the present dissertation, such as decision-relevant experience or knowledge (e.g., Löckenhoff & Carstensen, 2007; Nolte et al., 2022), perceived decision-making self-efficacy (ibid.), or subjective decision-making skill (Bruine de Bruin et al., 2012; also see Strough et al., 2002).

### ***5.5.2 The Role of Information Avoidance***

Older age is not only associated with higher levels of decision avoidance but also with the tendency to underuse (for a meta-analysis, see Mata & Nunes, 2010) and actively avoid (Deng et al., 2022; Gigerenzer & Garcia-Retamero, 2017; Hertwig et al., 2021; Nolte et al., 2021) decision-relevant information. As a result, it is possible that older adults' information avoidance begets this demographic's decision avoidance (see Woolley & Risen, 2018), or vice versa.

In contexts in which making a decision would require considering a high amount of information or potentially aversive information, decision avoidance can be the

byproduct of avoiding engagement with unwanted information: Because no information is being obtained, no choice can be made. Alternatively, information avoidance can be the byproduct of wanting to avoid a choice (e.g., Sweeny et al., 2010), as there is no need to acquire decision-relevant information if the choice will be foregone. Such an association between decision and information avoidance may be especially likely in contexts with multiple choice options: Not only may an increasing number of choice options induce more decision conflict (thus increasing the likelihood of decision avoidance; Peterson & Cheng, 2020), but a larger number of options may also mean a higher amount of available information.

Conversely, both decision and information avoidance may occur because there is *too little* information: Decision makers may postpone making choices in order to gather more information or look for additional options (Anderson, 2003). Similarly, decision makers may postpone receiving information because they expect necessary or complementary pieces of information to become available at a later time (Golman et al., 2017).

Because age-related differences in decision avoidance and information avoidance are typically studied separately, future research should examine whether the two phenomena may be related or may be associated with the same covariate measures. This possibility, of course, is most relevant to decision contexts in which delaying choice is possible and in which (more) information about choice options is available. In the context of the present dissertation, this would pertain to *avoiding choice for the time being* but perhaps less so to the other discussed decision avoidance phenomena.

## 5.6 Concluding Remarks

Bypassing, delaying, or outsourcing decisions can mean missing out on timely medical treatments, failing to reap the benefits of financial investments, and chancing a decision option that is not well-aligned with one's own choice preferences. Because older adults are more likely to avoid making active decisions, this dissertation narrowed down *when* and *why* age-related differences in decision avoidance manifest. Since only few variables were linked to older adults' decision avoidance or their emotional response to having avoided choice, this dissertation helps to rule out several mechanisms that might plausibly be expected to drive (older adults') avoidance tendencies. In doing so, the present research can help to (re-)direct intervention efforts aimed at helping decision makers stay bolder as they grow older.

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