CHAPTER

9

Aging, Emotion, and Decision Making

Joseph A. Mikels, Michael M. Shuster, Sydney T. Thai

Department of Psychology, DePaul University, Chicago, IL, USA

Notable discoveries in the psychology of aging correspond well to recent advances in the decision sciences. In particular, emotions have begun to figure prominently in decision making; and decision theory has begun to place greater emphasis on the dual contributions of both affective and analytic processes to judgments and decisions. Recent characterizations of human aging as involving divergent affective and deliberative trajectories map onto this distinction; in the face of declines in deliberative processes, older individuals show stability and potential gains in processes reliant on experiential and emotional processes. As such, the implications of these age-related divergent trajectories for decision making are vast—yet poorly understood. In particular, emotional processes may play a larger and more significant role in decision making as individuals age into the later parts of the life span. Thus, the interplay of affective and deliberative processes in decision making represents an important domain of inquiry, especially across the adult life span. Following a review of contemporary theory and findings regarding age differences in cognition and emotion, we review theoretical perspectives on the role of emotion in decision making. We then describe how age-related changes in emotion and cognition impact decision making across the adult life span—an approach that has only recently been incorporated into empirical investigations. Finally, we conclude with implications of extant findings and critical future research directions.

http://dx.doi.org/10.1016/B978-0-12-417148-0.00009-1

AGE-RELATED CHANGES IN COGNITION, EMOTION, AND MOTIVATION

To fully understand how emotions impact the decisions of older adults, it is imperative to first consider age-related changes in deliberative processing. Although some aspects of cognitive function remain stable or increase with age, deliberative-processing abilities (e.g., working memory, long-term memory, attention, reasoning) central to decision making generally decline with age (for comprehensive reviews, see Strough, Parker, & Bruine de Bruin, this volume; Zaval, Li, Johnson, & Weber, this volume). However, on tasks that require solving interpersonal problems, older people show greater flexibility than younger people, especially when problems are emotionally charged (Blanchard-Fields, Jahnke, & Camp, 1995). Findings such as these speak to the potential influence of emotion and motivation on cognitive performance. Interest in emotional influences on cognitive performance is all the more pertinent in light of emerging evidence that emotional functioning is well maintained or even improved with age.

Although emotional aging was initially characterized by deterioration (Banham, 1951), it has become increasingly clear that this is not the case. Emotion regulation and emotional experience in old age are as good if not better than they are in younger years. In general, older adults do not differ from younger adults in self-reports of emotional intensity or in emotionally expressive behavior (for a review, see Carstensen, Mikels, & Mather, 2006). However, older adults do report sustained or higher levels of positive affect and lower levels of negative affect relative to the young (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Carstensen et al., 2011; Charles, Reynolds, & Gatz, 2001; Mroczek & Kolarz, 1998). Additionally, there are notable age differences for a few discrete negative emotions; relative to younger adults, older adults experience and display less disgust (Carstensen, Gottman, & Levenson, 1995; Kunzmann, Kupperbusch, & Levenson, 2005), less anger (Gross et al., 1997; Lawton, Kleban, & Dean, 1993), but potentially greater sadness (Alea, Bluck, & Semegon, 2004; Kunzmann & Grühn, 2005). With respect to regulation, older adults relative to younger adults report greater emotional control on self-report measures (Gross et al., 1997; Lawton et al., 1992), but also demonstrate an intact ability to regulate their emotions in laboratory tasks (see, e.g., Kunzmann et al., 2005). Importantly, these patterns coalesce to indicate that the emotion system is generally as functional as it is in younger adults.

Given the divergent trajectories of emotional and deliberative processes in the aging mind, there has been consideration of how preservations in emotional functioning may help assuage the cognitive difficulties that individuals have as they grow older. Findings indicate that there are emotional enhancements in information processing; older adults evidence superior memory for emotional relative to non-emotional information

(e.g., Charles, Mather, & Carstensen, 2003; Fung & Carstensen, 2003) and show a preserved emotional memory enhancement effect (e.g., Kensinger, Brierley, Medford, Growdon, & Corkin, 2002). Importantly, this selective preservation of emotional processing is found even in working memory (Mikels, Larkin, Reuter-Lorenz, & Carstensen, 2005). Specifically, whereas age is negatively associated with working memory performance in virtually all content domains (see, e.g., Verhaeghen, Marcoen, & Goossens, 1993), Mikels et al. (2005) found that working memory for emotional information was selectively unimpaired. Insofar as working memory is the central cognitive system involved in the maintenance and manipulation of information (Baddeley, 1986), age-related changes in working memory have significant implications for decision making because increasingly complex decisions place high demands on processing capacity.

In addition to findings indicating a prioritization of emotional information, a surprising valence difference also has emerged: the positivity effect (for reviews, see Carstensen & Mikels, 2005; Carstensen et al., 2006; Mather & Carstensen, 2005). The positivity effect describes an age-related pattern in which a disproportionate preference for negative information in youth shifts across adulthood toward the positive. This phenomenon has been observed across numerous studies examining different processes from attention and memory to decision making (for reviews, see Reed & Carstensen, 2012; Reed, Chan, & Mikels, 2014). Though the reliability of the effect had been questioned, a recent meta-analysis of over 100 studies on memory and attention revealed a robust positivity effect (Reed et al., 2014). For instance, in studies of visual attention, eye-tracking methodologies have shown that older individuals have an increased preference toward positive stimuli and away from negative stimuli in contrast to their younger counterparts (Isaacowitz, Wadlinger, Goren, & Wilson, 2006). Also, older adults remember a higher proportion of positive emotional material relative to negative emotional material (Charles et al., 2003).

These age-related changes in emotion have been explained by different theoretical perspectives. One explanation is offered by a prominent lifespan theory of motivation, Socioemotional Selectivity Theory (SST; see Carstensen, 2006). The theory holds that younger adults are more likely to pursue information-seeking goals, whereas older adults are more likely to pursue emotionally meaningful goals and engage in emotion regulation. According to the theory, when future time horizons are broad—as is typical in youth—individuals focus on the future and in obtaining and acquiring resources, knowledge, and social connections. In contrast, when future time horizons narrow—as is typical in later life—individuals focus on the present moment and prioritize emotionally meaningful goals. In particular, older adults' regulation strategies are marked by optimization of positive affect and minimization of negative affect (for reviews, see Carstensen & Mikels, 2005; Carstensen et al., 2006; Mather & Carstensen, 2005).

It should be noted that other theoretical perspectives emphasize alternative but complementary mechanisms underlying these effects, such as declines in cognitive resources (Labouvie-Vief, 2003), selective use of preserved emotion regulation strategies (Urry & Gross, 2010), and the balance of emotion regulatory strengths versus physiological vulnerabilities (Charles, 2010), among others.

Given the focus of SST on motivation, predictions can be drawn from the theory regarding the emotional goals of older adults when making decisions. Extrapolating from SST, older adults may focus on emotional aspects of decisions to a greater extent and may be more influenced by positive emotions and less influenced by negative emotions. Alternatively, a recent goal-orientation perspective has been applied to the decision making of older adults (see, e.g., Depping & Freund, 2011; Depping & Freund, 2013). This perspective emphasizes that older adults have an increased motivation to avoid losses, relative to younger adults who are more focused on attaining gains. As many decisions involve consideration of losses and gains, a loss-prevention orientation among older adults would suggest that they respond differently to losses.

In order to aptly extend these age differences in emotion, cognition, and motivation to the decision domain, in the next section we will review broader theoretical perspectives on emotion and decision making. Then in the subsequent section, we will present empirical evidence on age differences in decision making that underscores the importance of considering the role of emotion—especially for the aging decision maker.

THEORETICAL PERSPECTIVES ON THE ROLE OF AFFECT IN JUDGMENT AND DECISION MAKING

As with much of psychology, descriptive decision research and theory have developed through consideration and examination of normative processes among younger adults. Most decision-making research—including most of that reviewed below—has been conducted on younger adults and may not generalize to older adults (see Strough, Karns, & Schlosnagle, 2011). Thus, expanding the scope of such work across the adult life span promises to shed new light on how decision processes may change as a function of age-related changes in emotion and cognition. Importantly, though, decision science has traditionally focused heavily on the cognitive, deliberative aspects of decision making. However, there has been burgeoning theoretical and empirical interest in understanding how emotions impact decision making. Specifically, when considering the role of affect in decision making, emotions can be integral, that is, centrally relevant to decisions, choice options, and/or outcomes, or incidental and unrelated to the choice at hand (see, e.g., Lerner & Keltner, 2001; Tiedens

& Linton, 2001). This distinction is critical to clearly delineating the role of emotion in decision making; *integral affect* can be used as an information-bearing heuristic to make a decision (see, e.g., Schwarz & Clore, 2007), whereas different *incidental affective states* can lead to greater reliance on either systematic or heuristic processing (e.g., Tiedens & Linton, 2001) and can lead to either increases or decreases in risk perception and behavior (e.g., Lerner & Keltner, 2001). We will first review theoretical perspectives that consider affect as an integral part of decision making, and then will consider perspectives that highlight an incidental role for emotions in the decision-making process.

Dual Process Models. The role of affect as an integral source of information in decision making can be aptly considered within the larger context of dual-process models that draw the distinction between two general processing streams: intuitive and deliberative (e.g., Epstein, 1994; Kahneman, 2003; Loewenstein, Weber, Hsee, & Welch, 2001; Reyna, 2004). The intuitive system (also referred to as system 1) is considered to be experiential and is generally characterized as quick, automatic, gist-based, and affective. In contrast, the deliberative system (also referred to as system 2) is considered to be generally slow, controlled, verbatim-based, and analytic in nature. Although the distinction between systems 1 and 2 is a useful heuristic, it is becoming increasingly clear that such an overarching dichotomy is oversimplified and cannot coherently accommodate all proposed distinctions (for a review, see Evans, 2008). The many criticisms of a broad dual-process theory of the mind underscore the inadequacy of an all-encompassing theory, thus requiring greater precision and the differentiation of multiple types of dual processes (Evans & Stanovich, 2013). For instance, whereas some dual process models include affect centrally within the intuitive system (see, e.g., Epstein, 1994), others do not include affect and consider the intuitive system to be entirely cognitive and implicit in nature (see Evans, 2008). As such, this chapter takes into account a dual-process model that includes affect as a central component: cognitive-experiential self-theory (CEST; Epstein, 1994).

Cognitive-Experiential Self-Theory. When individuals are faced with decisions, there are multiple sources of information to consider including "hot" and "cold" cognitions. The former stream of information is emotional in nature, whereas the latter involves "rational" and deliberative processes (see, e.g., Janis & Mann, 1977). According to CEST, behavior and decisions are guided by both affect-laden experiential and rational–analytic parallel systems (see Epstein, 1994). For instance, when purchasing a car, people can deliberate over the specifications that differentiate each model and/or consider their gut feelings. Critical to the current chapter, the experiential system is intuitive in nature and intimately—but not exclusively—associated with affect. In support of these specific dual processes, studies suggest that there may be separable working memory subsystems for

emotional versus non-emotional information (Mikels et al., 2005). As working memory is centrally involved in decision-making processes (e.g., Del Missier et al., 2013), such separable subsystems may differentially support the deliberative and intuitive systems. Moreover, given age-related preservation of working memory processes for emotional versus non-emotional information (Mikels et al., 2005), the decisions of older adults may benefit from reliance on integral affect. Importantly, such benefits would arise when the two systems operate in an interactive and integrated manner; however, conflict can arise when these two sources of information urge the individual to pursue opposing actions.

When individuals are confronted with such conflict and rely on integral feelings that diverge from clear "rational" probabilities, they have been shown to make non-optimal decisions (Denes-Raj & Epstein, 1994). The ratio-bias phenomenon is a perfect example; people will often choose an option with a greater absolute number of desirable options over one with a smaller absolute number but better odds; e.g., 9 out of 100 versus 1 out of 10 (Alonso & Fernandez-Berrocal, 2003; Epstein & Pacini, 2000; Pacini & Epstein, 1999). CEST contends that greater experience with absolute numbers makes the non-optimal option feel better, though abstraction through rational processes would indicate otherwise. Findings regarding the ratio bias phenomenon dovetail with other research showing that reliance on the "intuitive" system can lead to flawed decisions via heuristics and biases (Gilovich, Griffin, & Kahneman, 2002). Insofar as older adults might rely more on affect in decision making, it is possible then that they would show a larger ratio bias and make more non-optimal choices.

The Framing Effect. Further evidence indicates that integral affect may indeed underlie decisions in one of the most robust biases in human decision making: the "framing effect." This effect refers to the observation that people will make different choices depending on how alternatives are described (Kahneman & Tversky, 2000). Specifically, when objectively equivalent options are described positively in terms of gains (e.g., you receive $100; you can either keep $40 or take a gamble with a 40% chance to keep it all), individuals show risk aversion (i.e., they choose to keep the $40); but when options are described negatively in terms of losses (e.g., you receive $100; you can either lose $60 or take a gamble with a 60% chance to lose it all), individuals show risk seeking (i.e., they chose to gamble). With respect to the role of affect in the framing effect, De Martino, Kumaran, Seymour, and Dolan (2006) examined the neural activation of participants completing a monetary gambling task. They found that when participants displayed framing-consistent behavior (i.e., risk seeking in a loss frame and risk avoidance in a gain frame), there was greater neural activity in the amygdala, a brain region associated with affective processes. Additionally, they found that when participants did not display framing, there was increased activity in the prefrontal cortex, a brain region associated with deliberative processes.

Although traditionally the framing effect has been explained as a cognitive phenomenon (see, e.g., Kahneman & Tversky, 2000; Reyna, 2004), these findings suggest that the framing effect is at least partially due to emotional reactions to the gain and loss frames. Behavioral findings provide additional insight into the role of integral affect in the framing effect (Cheung & Mikels, 2011). Participants completed a framing task that included affect probes to assess the extent to which they relied on emotion to make their decisions as well as how positive versus negative they felt about the decisions. Cheung and Mikels (2011) found that when young adults relied on emotion to make their decisions, they were more likely to choose the risky gamble option. Moreover, positive affect was a significant predictor of risk taking in the loss frames. These data delineate a precise role for integral affect—and specifically positive affect—in leading to biased decisions. Given the central role of emotion in the framing effect, it is likely that life-span differences in emotion would result in different patterns of performance between older and younger adults on framing tasks.

Such findings align with the views of some researchers, such as Forgas, Martin, and Clore (2001), who have concluded that reliance on affect generally in judgments and decisions is an "ineffective and dysfunctional strategy" (p. 104) that solely relies on mistaken inferences. However, others have suggested that affective processing and certain heuristics may benefit decision making (Gigerenzer, 2007). For instance, the feelings-as-information approach (Schwarz & Clore, 2007) suggests that when feelings are integral to a decision, they can be beneficial. Moreover, the potential benefits of the intuitive system have more broadly been highlighted (Kahneman, 2003; Slovic, Peters, Finucane, & MacGregor, 2005). For example, individuals who have a high level of skill or expertise within a given domain appear to rely to a greater extent on intuitive processes (see, e.g., Reyna & Lloyd, 2006).

The Affect Heuristic. Slovic and colleagues have developed a theoretical framework, the affect heuristic, that further elaborates the potentially beneficial role of integral affect in decision making, while also considering the role of risk perception. The affect heuristic delineates how decision options are "tagged" with varying amounts of positive and negative affect (see, e.g., Finucane, Alhakami, Slovic, & Johnson, 2000; Peters, Dieckmann, & Weller, 2011; Slovic et al., 2005). Slovic et al. (2002) contend that "using an overall, readily available affective impression can be far easier—more efficient—than weighing the pros and cons or retrieving from memory many relevant examples, especially when the required judgment or decision is complex or mental resources are limited" (p. 400). As a theoretical framework, the affect heuristic has been used to explain findings in judgment and decision making such as the ease or difficulty with which an attribute can be evaluated (e.g., Hsee, 1996), one's sensitivity to framed proportions (e.g., Hsee, 1998), probability estimations (Denes-Raj & Epstein, 1994), and so forth.

Additional findings indicate that under conditions of exceptionally high complexity, decision making greatly benefits from employing emotion-focused versus detail-focused approaches (Mikels, Maglio, Reed, & Kaplowitz, 2011). Thus, given age-related declines in deliberative processes, older adults may indeed benefit from using affect as a heuristic.

Regarding the differential role of positive and negative valence, the affect heuristic proposes links between positive affect and increased benefit perception, and between negative affect and increased risk perception (Slovic et al., 2005). Specifically, integral positive affect associated with an option is related to lower perceived risk and higher perceived benefit, whereas integral negative affect toward an option is related to higher perceived risk and lower perceived benefit. In support of these links, Alhakami and Slovic (1994) found that if affective evaluations for an activity were positive, then individuals judged its risks to be low and its benefits to be high. The opposite pattern was found if individuals had a negative evaluation of the activity. Thus, it is the balance of risk and benefit perception that is directly influenced by affective reactions, and together integral affect and risk judgments guide decisions. As a result of the age-related positivity effect, it is likely that older adults would place greater weight on benefits and less weight on risks.

Risk-As-Feelings Hypothesis. The affect heuristic suggests that emotion plays an informational role that contributes in tandem with cognition in order to facilitate decision making. The risk-as-feelings hypothesis (Loewenstein et al., 2001) differs from this account in terms of its explicit proposal that emotional reactions to risk can differ from the cognitive evaluations of the same risk. For instance, evaluations based on integral affect tend to be more polarized, less effortful, and less sensitive to numerical and probabilistic factors in comparison to deliberative evaluations. As such, cognitive evaluations can suggest one course of action, while emotions can suggest a completely contradictory one. An aim of the risk-as-feelings hypothesis is to predict when and how emotional and cognitive evaluations diverge. Emotional reactions to potential risks are evoked by factors such as how vividly the consequences of a choice can be imagined and the degree of personal experience with outcomes. In contrast, cognitive evaluations of risks depend on objective components of the situation (e.g., probabilities of outcomes).

A dramatic example of the crucial role of integral affect in risky decision making comes from the work of Damasio and colleagues (see, e.g., Damasio, 1994), who have documented that patients with damage to the ventromedial prefrontal cortex make severely flawed and non-optimal decisions in the Iowa Gambling Task (Bechara, Tranel, Damasio, & Damasio, 1996). In an extensive series of observations and studies, it has been demonstrated that the non-optimal decisions of these patients resulted from their inability to use anticipatory feelings and physiological markers to guide decisions despite preserved intellectual and deliberative

abilities. Importantly and consistent with all of the theoretical perspectives, a concrete and specific distinction can be drawn between two dual processes: those that encode affective impressions versus those that encode the details into working memory.

Appraisal-Tendency Framework. Although it is important to consider how integral affect may be involved in decision making, incidental affect has also been shown to play a significant role. Lerner and Keltner's (2000) appraisal-tendency framework articulates how incidental emotions can change the way people appraise unrelated future events. Specifically, future events are appraised in a manner consistent with the appraisals associated with the specific incidental emotion. For instance, with respect to the framing effect, dispositional fear has been shown to be related to risk aversion, whereas dispositional anger was related to risk seeking—especially so in loss frames (Lerner & Keltner, 2001). Using the appraisal-tendency framework, appraisals of uncertainty associated with incidental fear lead to a bias favoring sure options, whereas appraisals of certainty associated with incidental anger lead to a bias favoring riskier gamble options. Further supporting these distinctions, Lerner, Gonzalez, Small, and Fischhoff (2003) found that increases in the experience of incidental fear led people to evaluate negative outcomes (e.g., terrorism risks) as more probable in comparison to individuals induced with incidental anger. In addition to framing, incidental discrete emotions have also been shown to influence another pervasive bias, the endowment effect, in which individuals offer disproportionally higher selling prices and lower buying prices for the same object. Specifically, incidental disgust eliminated the endowment effect, whereas incidental sadness resulted in a reverse endowment effect (Lerner, Small, & Loewenstein, 2004). Given age-related reductions in the experience of disgust and anger, such effects may be less prevalent later in the life span.

Though the appraisal tendency perspective underscores the importance of considering specific discrete emotions, there is also considerable evidence that general positive and negative affect can lead to different patterns of risk-seeking behavior. For instance, multiple studies have demonstrated that individuals induced with incidental positive moods view their probability of obtaining gains more optimistically (e.g., Johnson & Tversky, 1983; Mayer, Gaschke, Braverman, & Evans, 1992). Conversely, induced negative moods have been shown to lead to higher risk estimates for various undesirable events, such as causes of death, compared to induced positive moods (Johnson & Tversky, 1983). Here again, the age-related positivity effect may bias older adults toward positive outcomes with reduced consideration of risk.

When considering the role of affect in decision making, examining only positive and negative valence omits a key dimension of affect: arousal (Mano, 1994). Ariely and Loewenstein (2006) found that incidental arousal

was related to an increase in the willingness to engage in hypothetical risky behaviors. In another study, Mano (1994) demonstrated that individuals in aroused states tended to take more risks as measured by their increased willingness to pay for lottery tickets but lower willingness to pay for insurance. There is also considerable research demonstrating that physiological markers of autonomic arousal (e.g., heart rate and skin conductance response) are elevated when individuals encounter risky decisions (for a review, see Lo & Repin, 2002).

In sum, these multiple perspectives all specify how emotions are importantly involved in decision making. Moreover, from a dual-process perspective, these affective contributions to decision-making stand in stark contrast to deliberative contributions. Given divergent age-related trajectories in deliberative versus affective processes, the role of emotion in decision making likely differs for older versus younger adults. As alluded to above, it is likely that emotional processing may be beneficial or harmful to the decision making of older adults in several ways. We will further elaborate these possibilities below and include pertinent findings, though empirical findings are at present somewhat limited.

DECISION MAKING ACROSS THE ADULT LIFE SPAN

In light of the age-related changes in cognition and emotion, it is perhaps not too surprising that older adults make decisions differently relative to their younger counterparts. Mirroring the focus on the cognitive aspects of decision making in the decision sciences, adult life-span studies too have predominantly focused on cognition. However, adult life-span research has begun to consider how emotions are involved in the decision making of older adults—though much work has yet to be done. We first consider the predominant focus on how aging impacts the cognitive aspects of decision making and then focus on other work in which emotion and emotion-related factors—such as risk, gains, and losses—are more strongly considered.

Age Differences in Deliberative Aspects of Decision Making. Considering the extensive declines in deliberative cognitive abilities, research has focused on how decision making is negatively impacted in later life. For instance, older adults prefer decision rules with lower cognitive processing demands (Johnson, 1990), seek and use less information prior to making decisions (for a review, see Löckenhoff & Carstensen, 2007), and prefer fewer options in numerous decision domains (Reed, Mikels, & Simon, 2008). Such characteristics of older adults' decision-making tendencies suggest that they may have difficulty making complex decisions (see Strough et al., this volume; Zaval et al., this volume).

Age Differences in Affective Aspects of Decision Making. Importantly, emotional processes may buttress the impact of declining deliberative abilities. As such, one possibility is that if older adults rely on their intact emotional abilities, perhaps this could be beneficial to their decision making. With respect to the influence of emotion, though, the distinction between integral and incidental affect is critical. We propose that under most circumstances, older adults will benefit when relying on their integral emotions. In contrast, when older adults are swayed by their incidental affect, their decisions may be negatively or positively impacted. Extant data support this supposition.

Regarding integral affect, one study examined different decision strategies in younger and older adults (Mikels, et al., 2010). In this study, decision strategies that involved holding the details of decisions in working memory and deliberating over the decisions improved the decision quality of younger adults but impaired that of older adults. In stark contrast, when participants were encouraged to hold in mind their integral emotional reactions to decision options and base their decisions on their feelings, the age differences disappeared and older adults made decisions of equally high quality compared to those of younger adults. Under the larger dual-process perspective of deliberative versus experiential/affective processing, other findings are consistent with this affective processing advantage, which indicates that experiential processes benefit the decision making of older adults (e.g., Bruine de Bruin, Parker, & Fischhoff, 2012; Queen & Hess, 2010; Strough, Mehta, McFall, & Schuller, 2008).

In related research, when older adults explicitly evaluate their choice options, they list a greater number of positive versus negative attributes relative to the young, which then leads to increased satisfaction with their ultimate choice (Kim, Healey, Goldstein, Hasher, & Wiprzycka, 2008). Thus, in the instance of attribute evaluation—which draws on integral affect—the age-related positivity effect benefits choice satisfaction. However, it is also important to note that older adults attend to and recall more positive versus negative information than younger adults (Löckenhoff & Carstensen, 2007; Mather, Knight, & McCaffrey, 2005), which could lead older adults to miss critical decision-relevant negative information and ultimately result in non-optimal decision outcomes.

In terms of health messages, the positivity effect has also been shown to further influence older adults, indicating that age differences in integral affect can influence decision making. In particular, many health-related messages use a particular type of framing, known as goal framing. Goal framing emphasizes either receiving a health benefit by performing a particular behavior or avoiding a negative consequence by performing the same behavior. One study examined impressions of, and memory for, positively and negatively framed health care messages that were presented in pamphlets to older and younger adults (Shamaskin, Mikels, & Reed, 2010).

Older adults relative to younger adults rated positive pamphlets as more informative than negative pamphlets and remembered a higher proportion of positive to negative messages. These findings demonstrate the age-related positivity effect in health care messages via the persuasive and lingering effects of positive messages. In a related study, relative to younger adults, older adults looked less at negative material about skin cancer but took more protective measures (Isaacowitz & Choi, 2012). Taken together, these findings suggest that integral positive emotional appeals are most effective for older adults in the health domain, and that the positivity effect may ultimately not be detrimental to older adults' health behaviors. Despite these findings that integral affect and experiential processing generally may be beneficial to the decisions of older adults, there is evidence that incidental affect can be both beneficial and detrimental to decision making in older adults.

Consistent with the benefits of the positivity effect on decision making, one study suggests that incidental positive affect was associated with better decisions for older adults. Carpenter, Peters, Västfjäll, and Isen (2013) found that older adults induced into a positive mood made more optimal decisions resulting in greater monetary earnings on a risky decision-making task. Further examining the role of incidental affect on changes in decision making across the adult life span, preliminary evidence indicates that positive and negative mood inductions differentially influence hypothetical risk seeking between older and younger adults (Chou, Lee, & Ho, 2007). Specifically, older adults were more willing to choose risky resolutions to hypothetical life-dilemmas after watching positive movie clips (relative to watching neutral or negative clips) than were younger adults. This study suggests that older adults may make different decisions relative to the young when under the influence of positive incidental affect.

Other studies suggest that incidental positive affect may be harmful to the decision making of older adults. For instance, von Helversen and Mata (2012) examined age differences in sequential decision making performance. Sequential decision-making tasks require individuals to either accept or reject an option while not allowing them to go back and accept a previously presented option. In order to succeed in such tasks, individuals must search through the optimal number of options first in order to create a threshold for selecting the option with the best value. Compared to younger adults, older adults set a lower threshold for accepting an option and thus performed worse on the task. Furthermore, fluid cognitive abilities (e.g., processing speed) were unrelated to performance, yet incidental positive affect was related to reduced search behavior prior to making a choice. These findings suggest that the higher levels of positive affect reported by older adults can lead them to search through fewer options and thus make poorer decisions. Similarly, a recent study found that incidental positive affect led older versus younger adults to make more

non-optimal decisions on the above-mentioned ratio-bias task, in which intuition guides people toward a choice that feels better versus a choice that actually has a greater probability of winning (Mikels, Cheung, Cone, & Gilovich, 2013). Importantly, this age difference was not explained by age-related declines in deliberative abilities but by the greater incidental positive affect of the older adults.

Overall, it is clear that emotions impact the decision making of individuals across the adult life span. In general, it appears that older adults can harness their intact emotional abilities to benefit their complex decision-making. However, insofar as older adults are swayed by incidental positive affect, in certain instances it could benefit their decisions but in other instances prove problematic.

Aging, Emotion, and Risky Decisions Involving Gains and Losses. Studies examining different patterns of risky decision making between older and younger adults have examined the role of age-related changes in emotional processes to various extents. Using physiological measures of arousal, Denburg, Recknor, Bechara, and Tranel (2006) found that compared to their younger counterparts, older adults had lower galvanic skin responses (GSRs) to potential losses and higher GSRs to potential gains. In additional work, Bauer et al. (2013) found that older relative to younger adults have a hypersensitivity to reward regardless of the rate of loss.

Other research by Samanez-Larkin et al. (2007), however, indicates that whereas older and younger adults report similar subjective positive arousal when anticipating gains, older adults reported relatively lower negative arousal when anticipating losses. Furthermore, the findings from the self-report data mirrored patterns of older and younger adults' brain activity in reward processing areas. In related research on the framing effect, Mikels and Reed (2009) found that whereas both older and young adults displayed similar levels of risk aversion in gain frames, older adults did not display risk seeking in loss frames (cf. Peters et al., 2011, for a discussion of findings with different patterns of results). Although not all of the above studies had measures of performance or optimality, we can predict that the lower impact of potential losses found for older adults may contribute to their relatively poorer decision-making abilities, especially in tasks that require learning (see also, Mata, Josef, Samanez-Larkin, & Hertwig, 2011). For instance, Samanez-Larkin, Kuhnen, Yoo, and Knutson (2010) found that older adults made more risky and suboptimal decisions in an investment task in comparison to younger adults, and that this suboptimal performance was related to higher actual debt and less savings.

Another nuanced examination of the role of emotion in age differences in risky decision making was conducted by Mather et al. (2012). These researchers examined the certainty effect, in which an individual's decision between a sure and risky option depends on whether the decision is in the gain or loss domain. Specifically, people are theorized to be

more risk averse in the domain of gains and are more risk seeking in the domain of losses due to an overweighing of certainty. Across a series of studies, Mather et al. (2012) found that older relative to younger adults had a greater preference for sure options in the domain of gains, while they were less willing to select sure options in the domain of losses. In this work, age was positively correlated with the proportion of positively valenced words used in explanations. Controlling for the positivity of the explanations (as opposed to numeracy or other cognitive measures) as a covariate eliminated the age difference in sure-loss avoidance. These findings indicate that relative to younger adults, older adults' greater focus on positive affect was related to their increased propensity to select options with at least some probability of a positive outcome. This research is consistent with the loss prevention perspective proposed by Depping and Freund (2011, 2013).

An additional account of age differences in risk taking proposes that loss aversion is present across the adult life span, but age differences in responses to gains are related to frontal lobe atrophy (Weller, Levin, & Denburg, 2011). However, other research indicates that older adults' risk taking is predicted by anticipated positive affect associated with a positive outcome, whereas younger adult risk taking is predicted by anticipated negative affect associated with a negative outcome (Chen & Ma, 2009). Thus, some findings suggest that older adults have higher sensitivity toward gains and rewards versus losses, whereas other work suggests greater sensitivity to losses. It will be critical for future research to investigate these patterns as these propensities may negatively impact the risky decisions of older adults, especially in the financial domain.

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

Although the currently emerging patterns for the role of emotion in the decision making of older adults do not suggest a unified perspective, there are clear conclusions that can be extracted from the findings reviewed here. Primarily, it appears vitally important to consider how emotions impact decision making in later life. This premise is evident by amassing research showing that emotions explain age differences in decisions—above and beyond the influence of cognitive factors (Mather et al., 2012; Mikels et al., 2013; von Helversen & Mata, 2012). Specifically, several studies demonstrated that controlling for either incidental or integral emotions eliminated age differences in decision behavior. Such patterns suggest that decision researchers should continue to examine the contributions of incidental states and integral emotions to decision processes across the life span.

Importantly, though, the appraisal tendency framework highlights the important consideration of how different discrete emotions differentially impact decisions. Insofar as older adults experience less disgust and anger but potentially stronger instances of sadness, discrete emotions likely influence their decision making in different ways relative to the young (e.g., less risk seeking). Future research is needed to specify how discrete emotions may differentially influence older adults. Methodologically, researchers should increase their efforts to incorporate indirect measures of emotion in aging and decision research. For instance, facial electromyography has been used to measure the valence of emotional reactions (see, e.g., Larsen, Norris, & Cacioppo, 2003) and could be further incorporated into aging and decision research as a measure of integral feelings during choices. Additionally, it would also be beneficial for more studies to measure the GSRs of older and younger adults given the previously mentioned research on the role of arousal in decision making under risk.

It will also be critical to delineate when emotions are beneficial versus harmful to the decision making of older adults. We have highlighted the important distinction between integral and incidental affect in an attempt to differentiate when emotions may result in positive versus negative decision outcomes. In particular, we propose that in the face of their declining deliberative processes, older adults can benefit from using integral affect to make decisions under most circumstances. In light of CEST and dual-process models, such benefits should be most readily observed when deliberative and affective processes lead to similar as opposed to conflicting choices. In contrast, we maintain that incidental affect may mainly be detrimental to the decisions of older adults. Insofar as incidental affect is not directly relevant to a decision, older adults may often be led astray by their generally greater positivity. Future research directions considering such distinctions should be fruitful and would advance our understanding of when emotions are beneficial versus harmful to decision making across the adult life span.

Unfortunately, the extant literature on aging and risk taking is relatively inconclusive, with the suggestion that sometimes older relative to younger adults do not differ in risk taking, but sometimes they do. Critically, though, age differences in emotion are not always taken into consideration. Also, it appears likely that such age differences are contingent on the differential considerations of gains and losses. Research in this domain suggests that age-related changes in emotion likely underlie the complicated patterns observed in decisions involving risk. Systematically exploring how emotion may differentially influence risk taking with special attention to affective reactions to gains and losses will be informative.

Most importantly, the age differences in decision making reviewed here have critical implications for the health and financial domains.

Although research has begun to examine the role of emotion in such decisions, more research is necessary. For instance, as a result of the positivity effect, are health messages best conveyed with positive emotional tone focusing on gains and benefits? However, does a focus on benefits and gains lead older adults to make less optimal financial decisions?

The decision making of older adults is clearly influenced by emotion, and it is important to consider such influences. Though nascent, research in this domain has large societal implications and represents an exciting area for future research. By integrating the role of emotion in the decisions of older individuals with theoretical and methodological approaches, our understanding of decision making and aging will be more comprehensive, convergent, and balanced. Above all, however, this approach has the potential to enhance the lives of older individuals as they make decisions—which is to suggest that the societal impact and public policy applications are considerable.

Acknowledgments

Preparation of this chapter was supported by the Decision, Risk and Management Sciences program at the National Science Foundation, Research Grant SES-1139554 and National Institute on Aging Grant R01 AG043533-01 to the first author.

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