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RESEARCH PAPER

Age-Related Differences in Savoring Across Adulthood: The Role of Emotional Goals and Future Time Perspective

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Abstract
Healthy aging is related to increased happiness along with attention and memory biases for positive information, which has led some researchers to suggest that older adults may be better at savoring (i.e., emotion regulation strategies that up-regulate or maintain positive affect). Paradoxically, preliminary empirical findings suggest that savoring is maintained across adulthood or may even decrease with age, but this research has relied solely on the use of self-reported questionnaires. The current study further investigated savoring in adulthood ($N = 119$; age range = 18–83 years) using self-reported questionnaires and an experimental savoring task where participants were instructed to up-regulate positive affect about a previous positive event. Emotional goals and motivations that might underlie age differences in savoring (hedonic motivation, ideal affect, and future time perspective) were also examined. Overall, results suggest that older adults savor less than adults of younger ages. Older adults reported lower trait savoring using self-reported measures. Similarly, young adults and middle-aged adults randomly assigned to the experimental savoring task experienced more positive affect than those assigned to a neutral control task, but older adults did not experience these same emotional benefits. Relations between age and savoring were mediated by an age-related decrease in hedonic motivation and the desire to experience high arousal positive affect. Together, these findings offer new evidence that older adults may savor less than young adults and middle-aged adults, which may be partially due to age-related differences in emotional goals.

Keywords Positive emotion · Emotion regulation · Ideal affect · Hedonic motivation · Future time perspective · Aging

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1 Introduction

Healthy aging has been associated with increased emotional well-being (Diener et al. 1999), despite declines in some physical and cognitive abilities (Craik and Salthouse 2008; Heyn et al. 2008). With age, many people tend to experience more emotional stability (Carstensen et al. 2011), increased happiness (Mather and Ponzio 2016), and less depression (Kessler et al. 2005). Some researchers have suggested that these age-related improvements in emotional health may be due to a better ability to down-regulate negative emotions (Blanchard-Fields 2007; Urry and Gross 2010), as aging has been associated with an increased focus on positive information compared to negative information (Phillips et al. 2008; Mather 2012). Researchers have also hypothesized that older adults may have a superior ability to regulate positive emotions through increasing or prolonging positive emotional experiences (Bryant et al. 2011; Carstensen et al. 2003; Ramsey and Gentzler 2014), regulatory strategies frequently referred to as savoring (Bryant and Veroff 2007). Savoring includes attending to, appreciating, and enhancing positive experiences through either volitional attempts or more automatic processes that occur in response to positive events (Bryant and Veroff 2007; Gentzler et al. 2016). For example, intentionally reminiscing or reflecting on past positive events has been shown to promote positive feelings (Bryant 2003). Importantly, prior research has demonstrated that savoring is a robust protective factor for indices of emotional well-being and depression (e.g., Bryant 2003; Gentzler et al. 2016; McMakin et al. 2011).

Building on established relations between age and increased emotional well-being, and hypotheses that older adults may experience more frequent and efficacious savoring, several recent empirical studies have investigated the relationship between age and savoring. While these studies were limited in that they primarily relied on self-reported questionnaires, all have failed to find evidence that older adults savor more than younger adults. In fact, these preliminary studies have suggested that older adults may actually savor less than younger and middle-aged adults (Geiger et al. 2017; Ramsey and Gentzler 2014; Smith and Bryant 2016). To further investigate this paradox, the current study expanded on these emerging findings to examine how savoring varies with age using both cross-sectional and experimental methods in a sample of young, middle-aged, and older adults. We also extended these findings by examining motivational factors that may explain age-related differences in adults' savoring.

1.1 Age and Positive Emotion

According to Carstensen's socioemotional selectivity theory, older adults are more likely to view their time left in life as limited when compared to other age groups (Charles and Carstensen 2010), which has been hypothesized to result in pursuing more emotionally salient goals in order to maximize positive emotions and experiences (e.g., Carstensen et al. 1999, 2003). Both cross-sectionally and longitudinally, research has shown that older adults experience greater emotional well-being and stability compared to younger ages, even when accounting for other factors such as personality, physical health, and other demographic characteristics (Carstensen et al. 2011). In particular, increasing age is associated with emotion processing biases towards positive information. Multiple studies have found that older adults, when compared to younger adults, attend more to positive stimuli (Isaacowitz et al. 2006a, b; Mather and Carstensen 2003)

and recognize and remember positive images more than negative ones (Carstensen and Mikels 2005; Charles et al. 2003; Mather 2012; Mikels et al. 2005). Likewise, when asked to refocus attention, such as away from something negative and towards a positive memory, older adults performed better than younger adults (Phillips et al. 2008). This age-related positive bias has reliably been found across contexts and laboratories (Scheibe and Carstensen 2010) and has been referred to as the positivity effect (Carstensen and Mikels 2005).

Many researchers have discussed the positivity effect as a process that allows older adults to better regulate emotion, thereby resulting in increased emotional well-being. Supporting this proposition, studies examining the link between aging and the regulation of negative emotions have generally found improvements with age (Kessler and Staudiner 2009; Lawton et al. 1992). Notably, however, this research has largely neglected the role of age in relation to savoring, or emotion regulation strategies focused on the up-regulation and maintenance of positive emotions (Bryant et al. 2011). Research on the positivity effect has examined the attention and memory of older adults towards positive stimuli, but not engagement in emotion regulation strategies directly (Isaacowitz and Blanchard-Fields 2012); thus, it is unclear if these biases towards positive information can be generalized to emotion regulation strategies that would increase or maintain positive affect.

Despite robust findings on age-related biases toward positive information and hypothesized increases in the ability to regulate emotions (Isaacowitz and Blanchard-Fields 2012), preliminary empirical evidence has paradoxically suggested that older adults may not savor more than younger ages, and may actually savor less. For example, age has been found to relate negatively to self-reported savoring ability (Ramsey and Gentzler 2014; Smith and Bryant 2016), and a 2 1/2 year longitudinal study of older adults (ages 60–93) found declines in savoring with time (Geiger et al. 2017). Further, research has found that older adults are less motivated to enhance or up-regulate their positive affect when compared to younger adults (Riediger et al. 2009). Therefore, although research on aging and positive biases suggests that older adults should be better at savoring, empirical evidence directly investigating this relation has suggested that they may actually savor less.

Nonetheless, these preliminary findings have relied on self-reported assessments of savoring, and it is unclear if older adults report less savoring because they are not effectively maintaining or up-regulating their positive affect, or if they report engaging in less savoring because they are regulating their positive affect more efficiently and/or effectively (paralleling research that suggests better or more efficient regulation of negative emotions with age; Kessler and Staudiner 2009; Lawton et al. 1992). To our knowledge, no study has examined age-related differences in savoring effectiveness using an experimental design. This study investigated age-related differences in savoring using both self-reported questionnaires and an experimental savoring task. To further explore age differences in savoring, the current study also examined emotional motivation as a mediating mechanism of any age-related decreases in savoring.

1.2 Age and Emotional Motivation

Although people generally pursue happiness, there are differences in the motivations people have to experience positive feelings (Wood et al. 2003), and people often differ in the type and intensity of emotion they want to feel (Tamir 2009). Factors related to the motivation to experience and pursue positive emotions could explain age differences in savoring.

1.2.1 Pursuit of Hedonia and Eudaimonia

Well-being consists of hedonia (i.e., feelings of pleasure and feeling good) and eudaimonia (i.e., living up to one's potential and according to beliefs; Ryan and Deci 2001). Research has suggested that people vary in the extent to which they are motivated to pursue these different types of well-being, and this motivation can influence how daily activities are approached (e.g., with attempts to feel good versus attempts to live a full life; Huta and Ryan 2010). In particular, greater hedonic motivation may influence attempts to up-regulate positive emotions by savoring (Ortner et al. 2018). The strength of people's motivation to pursue these types of well-being changes across adulthood. McMahan and Estes (2012) found that younger adults considered hedonia or pleasure to be more central to well-being than did older adults. Similarly, research by Riediger et al. (2009) suggested that when people already feel good, age is positively correlated with a desire to maintain positive affect but negatively with desire to enhance positive affect. In other words, older adults may not be as motivated to increase their positive affect as often as younger adults. Therefore, based on these findings that suggest hedonia is valued differently across adulthood, and that older adults strive less to increase hedonic feelings, the current study explored hedonic motivation in relation to savoring. We expected that older adults would report less hedonic motivation given their lower priority or motivation to enhance positive emotion or pleasure (McMahan and Estes 2012; Riediger et al. 2009) and that this could explain the expected decreased likelihood to savor for older adults compared to younger adults.

1.2.2 Ideal Affect

The strength and vulnerability integration model has suggested that older adults are at a disadvantage for experiencing high-arousal mood states due to decreased physiological flexibility (Charles 2010), and thus may not want to experience highly arousing emotions. Indeed, a growing body of research has further supported age-related declines in preferences for high-arousal positive affect (e.g., excitement, elation) compared to low-arousal positive affect (e.g., calm, relaxed) (Scheibe et al. 2013). For example, it has been shown that older adults, but not younger adults, are more likely to view highly arousing stimuli as unpleasant, and low-arousing stimuli as more pleasant (Keil and Freund 2009), and both younger and older adults believe that high arousal positive affective states are more characteristic of younger adults but not older adults (Montepare and Dobish 2014). Across several studies, Mogilner et al. (2011) found that middle-aged and older adults consider happiness to be more about low-arousal feelings that may stem from feeling contentment and acceptance with one's current situation, whereas younger adults consider happiness as being more about high-arousal emotional experiences. Overall, these findings suggest that older adults, relative to younger adults, show a preference for lower arousal positive states over higher arousal states. As a result, older adults' diminished desire for high-arousal positive affect could contribute to a decreased tendency to up-regulate positive emotional experiences.

1.2.3 Future Time Perspective

Older adults are more likely to view their time left in life as limited when compared to other age groups (Charles and Carstensen 2010). A limited future time perspective (or feeling

like there is less time left in life) has been hypothesized to trigger motivations and goals to maximize positive experiences and limit possible negative experiences (e.g., Carstensen et al. 1999, 2003). For example, a limited future time perspective motivates individuals to pursue more emotionally-meaningful social interactions (Fung and Carstensen 2006). Researchers have theorized that this limited future time perspective, and in particular how it is motivating to enhance positive experiences, can encourage greater savoring in order to fulfill these emotional goals (Bryant et al. 2011). While future time perspective primarily concerns attitudes and cognitions about time left in the future, this can influence how individuals think about and savor positive events. For example, feeling like there is little time left in life might encourage reminiscing on past good times to maximize positive affect. Indeed, research has suggested that a limited future time perspective is associated with greater sentimental feelings about the past (Juhl et al. 2010; Routledge et al. 2008).

Nonetheless, other preliminary studies have suggested that a more limited future time perspective may be related to poorer positive emotional experiences. Despite age-related increases in emotional well-being, a limited future time perspective has been related to worse emotional well-being (Grühn et al. 2016), and to less self-reported savoring abilities (Ramsey and Gentzler 2014). Potentially, feeling like there is less time left in life may prompt older adults to feel like there is not enough time to enjoy all that life has to offer, or it might increase poignancy. For example, thinking about being somewhere for the last time or thinking about endings has been associated with experiencing greater mixed emotions, even during positive events (Ersner-Hershfield et al. 2008). Based on these previous studies, we examined if age differences in savoring could be explained by a more limited future time perspective.

1.3 Current Study

We explored age differences and motivational factors underlying savoring in a sample of young, middle-aged, and older adults. As discussed, based on theory, it has been suggested that older adults should be better able to savor, but emerging contradictory evidence instead suggests that older adults may savor less than young or middle-aged adults. First, we sought to build on preliminary findings that age is paradoxically unrelated or negatively related to savoring, and we expected to replicate and expand this research by using multiple methods (surveys and an experimental task).

To investigate self-reported savoring, we used a measure of perceived savoring ability that has been used in previous studies on savoring in adulthood (Geiger et al. 2017; Ramsey and Gentzler 2014), as well as a questionnaire to assess engagement in specific types of savoring strategies, including intentional savoring (i.e., more purposeful savoring strategies used to meet affective goals) and natural savoring (i.e., responses that likely naturally unfold from an emotional experience). We also controlled for typical positive affect to account for age differences in emotional experience (i.e., younger adults may savor more because they experience less daily positive affect and thus, try to increase their positive emotional experiences). To assess savoring ability more objectively, we examined age in relation to affect after a directed regulation task in which participants were randomly assigned to up-regulate their positive affect. In line with other emerging evidence, it was expected that age would be negatively related to self-reported savoring and that older adults would be less able to up-regulate their positive affect during the savoring task when compared to middle-aged and young adults.

Finally, we also examined possible mediators for age-related declines in savoring. In particular, we expected that older adults would experience less hedonic motivation, would desire high arousal positive affect less, and would experience a more limited future time perspective. In turn, we expected that these motivational factors would predict less savoring. To test for the specificity of our proposed mediators, we also included related constructs in our models, including eudaimonic motivation and desire for low arousal positive affect.

2 Method

A total of 119 adults participated (62.2% female; $M_{\text{age}}=44.20$ years, $SD_{age}=19.86$, age range = 18–83 years). Approximately one third of participants were classified as young adults ($n=38$; 60.5% female; $M_{\text{age}}=20.92$, $SD_{\text{age}}=2.16$, age range 18–29), middle-aged adults ($n=38$; 57.9% female; $M_{\text{age}}=42.87$, $SD_{\text{age}}=10.29$, age range 30–59), and older adults ($n=43$; 67.4% female; $M_{\text{age}}=65.95$, $SD_{\text{age}}=5.88$, age range 60–83). Participants primarily identified as white/Caucasian (87.4%). The remaining participants identified as black/African American (6.7%), Asian (4.2%), or other (1.7%). An additional 3.4% identified as Hispanic/Latino. Participants' level of education was as follows: 28.6% completed graduate school, 6.7% had completed some graduate school or were currently enrolled in graduate-level courses, 24.3% graduated from college, 33.9% completed some college or were currently completing a college degree, and 5.2% completed high school.

2.1 Procedure

All study procedures were approved by the university Institutional Review Board. Participants were recruited for a study on individual differences in savoring from suburban communities in the Mid-Atlantic region of the United States through flyers, advertising at community events, and through university alumni email lists. Participants were selectively recruited to target young (18–29 years), middle-aged (30–59 years), and older adults (60+ years). The only exclusionary criterion was an inability to comprehend or complete study procedures. No exclusions were made based on gender, mental history or cognitive ability, socioeconomic status, or marital status. Participants completed self-report questionnaires and within 1 week completed an in-person lab assessment that included a directed savoring task. At this in-person lab assessment, participants first recalled a past positive event that still made them feel happy and described this positive event in detail to the experimenter. After recalling this positive event, participants were randomly assigned to savor this event by re-experiencing and internally reflecting on their recalled positive event, or to complete a neutral control task. To prevent experimenter biases, the experimenter was masked to participant condition and left the room so that the participant completed the task in private.

2.2 Questionnaires

2.2.1 Demographics

Participants reported on their age, gender, and education. Education was coded on a 6-point scale from 1 (*completed some high school*) through 6 (*finished graduate school*).

Participants also were asked about their financial security by responding to the question, "How difficult is it to pay your bills each month?" from 1 (*a great deal*) to 7 (*not at all*).

2.2.2 Savoring: Savoring Beliefs Inventory

Participants reported on their perceived savoring ability using the Savoring Beliefs Inventory (SBI; Bryant 2003), which includes 24 items to assess ability to maximize and maintain positive affect related to past, ongoing, and future positive experiences. Items (e.g., "I know how to make the most of a good time") were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses for each item were averaged to create a total score, with higher scores indicating more effective savoring ($\alpha = .84$).

2.2.3 Savoring: Positive Events and Responses Survey

Participants reported on specific types of savoring strategies that they would engage in after experiencing positive events using an adapted, brief version of the Positive Events and Responses Survey (PEARS; Gentzler et al. 2016). Participants reported on their likelihood of engaging in 8 different savoring strategies for major life events on a 5-point scale from 1 (*not at all likely*) to 5 (*very likely*). The PEARS has two savoring-related subscales. Intentional Savoring (4 items; $\alpha = .65$; item-total correlations ranged from .31 to .57) represented deliberate responses typically to meet subordinate affective goals (e.g., promoting self-worth, to remember the event to support future reminiscing). This scale included items assessing the following savoring strategies: going out to celebrate, rewarding themselves with a gift, reflecting on how good of a person they are, and saving something to remember the event. The intentional savoring subscale also included an additional 5th item about sharing the positive event with many others at once (e.g., on a social networking site like Facebook), but due to the number of participants that indicated that they did not use a social networking site (20.8%), this item was not retained in analyses. Natural Savoring (4 items; $\alpha = .59$; item-total correlations ranged from .38 to .58) captured responses that may naturally stem from experiencing positive emotion after a positive event. This natural savoring subscale included items assessing the following strategies: expressing positive affect, being physically affectionate with someone else, reflecting on how good they feel, or sharing the event with others. Items on each subscale were averaged, with higher scores indicating a greater likelihood of engaging in those strategies in response to major life events.

2.2.4 Hedonic and Eudaimonic Motives for Activities

Participants reported on their motivation underlying their activities using the 9-item Hedonic and Eudaimonic Motives for Activities Scale (HEMA; Huta and Ryan 2010). On a 7-point scale from 1 (*not at all*) to 7 (*very much*) participants indicated the degree to which they typically approach activities with hedonic motivation (5 items; $\alpha = .83$; e.g., "Seeking enjoyment") or eudaimonic motivation (4 items; $\alpha = .79$; e.g., "Seeking to pursue excellence or a personal ideal"). Items were averaged across each subscale, with higher scores indicating greater motivation.

2.2.5 Affect Valuation Index

Participants reported on how much they would ideally like to feel specific emotions using the 30-item Affect Valuation Index (AVI; Tsai et al. 2006) on a scale from 1 (*never*) to 5 (*all the time*). We calculated subscales to determine how much participants wanted to feel high arousal positive affect (ideal high arousal positive affect) and how much they wanted to feel low arousal positive affect (ideal low arousal positive affect). The high arousal subscale included the items *enthusiastic*, *excited*, and *elated*, whereas the low arousal subscale included the items *relaxed*, *calm*, and *peaceful*. Items were averaged to create an overall score of ideal high arousal positive affect ($\alpha = .63$) and ideal low arousal positive affect ($\alpha = .71$). Higher values indicated that participants wanted to feel those affective states more often.

2.2.6 Future Time Perspective

Participants responded to 10 items assessing their views of the future using the Future Time Perspective scale (Carstensen and Lang 1996). Items assessed how much participants focused on opportunities (e.g., "There is plenty of time left in my life to make new plans.") and on limitations (e.g., "I have a sense that time is running out.") on a 7-point scale from 1 (*very untrue*) to 7 (*very true*). The items assessing a focus on limitations were reverse coded, and mean scores were calculated, with higher values indicating a more expansive, or less limited, future time perspective ($\alpha = .89$).

2.2.7 Typical Positive Affect

Participants reported on their typical positive affect using reports of their actual affect on the AVI (Tsai et al. 2006). Specifically, participants reported on how much they experienced positive emotions (*enthusiastic*, *excited*, *elated*, *relaxed*, *calm*, *peaceful)* during the course of a typical week on a scale from 1 (*never*) to 5 (*all the time*). Items were averaged to create an overall typical positive affect score ($\alpha = .85$), with higher values indicating greater typical positive affect.

2.3 Directed Savoring Task

Participants were asked to cognitively reflect on their positive event in ways that would increase their positive affect based on savoring exercises in previous intervention studies (Bryant and Veroff 2007; McMakin et al. 2011). Participants were given 2 min to complete the task to limit excess time that may result in mind wandering and increase the percentage of time spent on-task. More information about pilot testing and the full savoring task instructions are reported in Palmer and Gentzler (2018). Based on other research using positive reflection tasks (e.g., Thoman 2011), participants assigned to the neutral control task were asked to cognitively reflect on their daily morning routine. Participants reported on their positive affect at that moment, both before and after the task using the 10-item positive affect subscale from the Positive and Negative Affect Schedule (PANAS; Watson et al. 1988). The total for each subscale was calculated by taking the mean of the items. Cronbach's alphas for the positive affect scale at each time point was .90 and .93, respectively.

After completion of the savoring task, participants completed several questions regarding the positive event that they chose. First, participants reported on how happy the event made them feel when it first happened on a scale from 1 (*not at all*) to 9 (*extremely happy*), and approximately how long ago the event occurred (in years). Participants also reported on how hard they tried during either the savoring or the control task from 0 (indicating no effort) to 100 (indicating they tried their hardest). The positive events were also coded by an undergraduate research assistant masked to participant condition. A secondary coder (the first author) coded 25% of the events for reliability ($\kappa = .91$). When the focus of the event was about an interaction with another individual, an aspect of a social relationship, or directly due to another's actions, events were coded as interpersonal ($n = 68$). Events not focused on other people were coded as non-interpersonal ($n = 49$). Three participants' events were not coded (one participant elected to not be recorded, and two participants' recordings were inaudible).

2.4 Analytic Strategy

Preliminary analyses compared those who were randomly assigned to the directed savoring task versus the neutral control task on all variables of interest, including post-task positive affect as a manipulation check. We also explored relations between affect after the savoring task, other variables of interest, and various event-related variables (effort during the savoring task, time since the positive event occurred, initial happiness surrounding the event, and if it was an interpersonal or non-interpersonal event). Preliminary correlations among main study variables and demographic characteristics were also explored.

Next, the relationship between age and savoring was examined using a series of hierarchical regression analyses with each self-reported savoring variable (perceived savoring ability on the SBI, intentional savoring on the PEARS, and natural savoring on the PEARS) as the dependent variables and age as the predictor. Typical positive affect was included as a covariate. To assess age in relation to savoring in the experimental task, moderation analyses were examined with positive affect after the experimental task as the dependent variable, task assignment (savoring or neutral control) as an independent variable, and age as a moderator. Baseline (pre-task) positive affect was included as a covariate.

Finally, explanatory mechanisms between age and savoring were investigated simultaneously via multiple mediation models. The mediators examined included hedonic motivation, ideal high arousal positive affect, and future time perspective. Eudaimonic motivation and ideal low arousal positive affect were also included as mediators to test for the specificity of effects, and typical positive affect was included as a covariate. All moderation and mediation analyses were examined using the PROCESS macro in SPSS (Hayes 2013) with 95% bias-corrected confidence intervals using 5000 bootstrapped samples and heteroscedasticity consistent standard errors. Education, financial security, and gender were included as covariates in all primary analyses. A priori power analyses indicated that a sample size range of 55–98 would be sufficient to detect medium effects with 80% power and $\alpha = .05$ in all primary analyses (Faul et al. 2007).

3 Results

3.1 Preliminary Results

Independent samples *t* tests and Chi square analyses indicated that participants assigned to the savoring or control group did not differ on any variables of interest or demographic characteristics. An ANCOVA indicated that when controlling for baseline (pre-task) positive affect, participants assigned to the directed savoring task reported significantly higher positive affect ($M = 6.52$, $SE = .12$) than those assigned to the control task ($M = 5.68$, $SE = .12$), $F(1, 115) = 23.80$, $p < .001$, partial $\eta^2 = .17$. This group difference remained even when controlling for demographic characteristics (education, financial security, and gender). Effort during the task, time since the positive event happened, happiness when the positive event first happened, and whether or not participants chose an interpersonal or non-interpersonal event were all unrelated to affect after the task. Effort, happiness when the positive event first happened, and event type (interpersonal or non-interpersonal) were also all unrelated to participant age. However, age was positively related to duration since the event occurred ($r = .32$, $p < .001$), which indicated that older adults selected events that had a greater gap of time between their study participation and when the event first occurred.

Bivariate correlations and descriptive statistics for all variables of interest are presented in Table 1. Zero-order correlations suggested several demographic characteristics were related to the variables of interest. Higher education was related to lower hedonic motivation, a less expansive future time perspective, and greater post-task positive affect after the savoring task. More financial security was related to greater self-reported savoring ability (on the SBI), greater ideal low arousal positive affect, greater positive affect after the control task, and higher education. Men reported more positive affect both before and after the savoring task. Age was related to less intentional savoring, hedonic motivation, ideal high arousal positive affect, a less expansive future time perspective, and greater positive affect before the task. Age was also positively related to education and income.

3.2 Age and Savoring

A series of hierarchical regression models were conducted with age predicting each self-reported savoring indicator (perceived savoring ability on the SBI, intentional savoring on the PEARS, and natural savoring on the PEARS), while controlling for education, financial security, gender, and typical positive affect. When predicting both intentional savoring and natural savoring, results indicated that age was a significant predictor. Specifically, older age was associated with less intentional savoring and less natural savoring. Age was not significantly associated with reports of perceived savoring ability on the SBI. Results from these regression models are displayed in Table 2.

Moderation analyses using PROCESS (Hayes 2013) examined the relationship between age and positive affect after the savoring task, controlling for demographic characteristics (gender, education, and financial security) and baseline (pre-task) positive affect. Based on preliminary descriptive analyses suggesting that middle-aged adults experienced lower positive affect ($M = 5.28$, $SD = 1.74$) after the control task compared to both young adults ($M = 5.87$, $SD = 1.32$) and older adults ($M = 6.17$, $SD = 1.55$), we included age as a categorical moderator to account for this non-linearity using sequential dummy coded age variables

Table 1 Descriptive statistics and bivariate correlations among variables of interest

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age																
2. Gender	−.04															
3. Education	.58***	.03														
4. Financial Security	.24**	.08	.27**													
5. SBI	.11	−.08	.04	.19*												
6. PEARS intentional	−.23**	−.10	−.04	−.02	.42***											
7. PEARS natural	−.12	−.16	−.01	.12	.47***	.63***										
8. Hedonic motives	−.40***	.02	−.28**	.02	.27**	.36***	.29***									
9. Eudaimonic motives	.08	−.12	.13	−.13	.48***	.30***	.21*	.30***								
10. Ideal HAP	−.23**	.12	−.10	.04	.37***	.39***	.44***	.24**	.15							
11. Ideal LAP	.03	−.03	.03	.20*	.15	.06	.14	.25**	.06	.20*						
12. FTP	−.53***	−.02	−.20*	.01	.18	.22*	.25**	.27**	.27**	.37***	.03					
13. Baseline (pre-task) PA	.19*	.20*	.10	.03	.40*	.18	.32***	.16	.19*	.21*	.07	.07				

Table 1 (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
14. Post-task PA (savoring)	.22	.23	.30*	.002	.21	.21	.22	.06	.22	.30*	.07	.12	.80***			
15. Post-task PA (control)	.17	.24	.04	.38**	.51***	.11	.17	.33**	.28*	.24.	.17	−.08	.82***	–		
16. Typical PA	.09	.09	−.02	−.13	.41***	.17	.31***	.18	.31***	.27**	.18*	.27**	.47***	.34**	.42**	
M (SD)	–	–	–	5.02 (1.89)	5.57 (.87)	3.21 (.77)	4.19 (.72)	5.13 (1.09)	5.74 (.98)	3.66 (.71)	4.23 (.65)	4.94 (1.21)	5.68 (1.38)	6.43 (1.53)	5.80 (1.57)	2.91 (.70)
Range	–	–	–	1–7	3–7	1.6–4.6	2.25–5	2–7	3–7	2.33–5	2–5	2–7	1.40–9	1.30–9	2.30–8.30	1.33–6

Gender is coded as 1 = female, 2 = male

SBI Savoring Beliefs Inventory, *PEARS* Positive Events and Responses Survey, *HAP* high arousal positive affect, *LAP* low arousal positive affect, *FTP* future time perspective, *PA* positive affect

***$p \leq .001$; **$p \leq .01$; *$p < .05$

Table 2 Age predicting savoring controlling for demographic covariates

	Savoring (SBI)			Intentional savoring (PEARS)			Natural savoring (PEARS)		
	b	SE	95% CI	b	SE	95% CI	b	SE	95% CI
Age	.002	.01	−.01, .01	−.01***	.004	−.02, −.01	−.01**	.004	−.02, −.001
Education	−.01	.07	−.15, .13	.09	.06	−.04, .22	.07	.06	−.04, .19
Financial security	−.06	.04	−.15, .02	−.001	.04	−.08, .07	−.002	.03	−.07, .07
Gender	−.21	.16	−.51, .10	−.18	.14	−.46, .11	−.26	.13	−.51, −.005
Typical PA	.51***	.11	.30, .73	.25**	.10	.05, .45	.39***	.09	.21, .56
R^2	.21***			.13**			.18***		

Unstandardized betas and standard errors are presented. Gender is coded as 1 = female, 2 = male

SBI Savoring Beliefs Inventory, *PEARS* Positive Events and Responses Survey, *PA* positive affect

***$p \leq .001$; **$p \leq .01$; *$p < .05$

Table 3 Age predicting post-task positive affect after random assignment to the savoring or control task

	Post-task PA		
	b	SE	95% CI
Condition	.82***	.24	.36, 1.30
Education	.08	.08	−.08, .25
Financial security	−.14**	.05	−.24, −.05
Gender	.18	.19	−.19, .55
Pre-task PA	.89***	.08	.74, 1.04
YA vs. MA, OA (D1)	−.52	.31	−1.14, .10
YA, MA vs. OA (D2)	.58*	.29	.003, 1.16
Interaction: D1 × condition	.49	.43	−.37, 1.35
Interaction: D2 × condition	−.91*	.43	−1.77, −.05
R^2	.71***		

Unstandardized betas and standard errors are presented. Condition = participant random assignment, coded as 1 = control task, 2 = savoring task. Gender is coded as 1 = female, 2 = male. These findings remain unchanged when controlling for the length of time since the savored positive event occurred

PA positive affect, *YA* young adults, *MA* middle-aged adults, *OA* older adults, *D1* dummy code 1, *D2* dummy code 2

***$p < .001$; **$p \leq .01$; *$p < .05$

(young vs. middle-aged and older adults; young and middle-aged adults vs. older adults). Results suggested that the overall model was significant (see Table 3). Main effects of participant condition and age were qualified by a significant interaction between age (young and middle-aged adults vs. older adults) and participant condition. Simple slope analyses indicated that participants randomly assigned to the savoring task experienced greater positive affect (controlling for pre-task positive affect) compared to those in the control task for young adults (effect = .82, SE = .24, $p < .001$, 95% CI [.36, 1.30]) and middle-aged adults (effect = 1.32, SE = .36, $p < .001$, 95% CI [.60, 2.03]), but not for older adults (effect = .41,

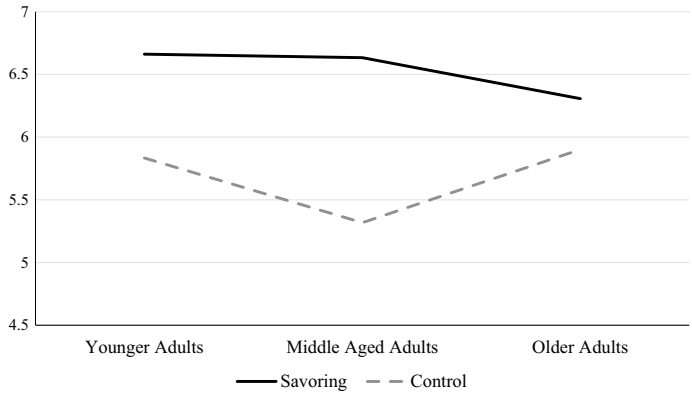

Fig. 1 Positive affect after random assignment to the control and savoring task. *Note* Model controlled for baseline (pre-task) positive affect, gender, education, and financial difficulty

SE = .25, p = .11, 95% CI [− .09, .90]). To further account for age-related differences in the length of time since the savored positive event occurred, we also ran an additional model controlling for the duration since the event. The significance and direction of these results remained unchanged. See Fig. 1.

3.3 Mediation Models

Multiple mediation models were examined to explore explanatory factors for the relationship between age and savoring using PROCESS (Hayes 2013) with the following variables as mediators: hedonic motivation, ideal high arousal positive affect, and future time perspective. To test specificity of our proposed mediators, we also included eudaimonic motivation and ideal low arousal positive affect as mediators. Education, financial security, and gender were included as covariates in all models, along with typical positive affect.

First, we examined a multiple mediation model with intentional savoring as the dependent variable (see Fig. 2). The overall model was significant, R^2 = .32, F(10, 101) = 9.26, p < .001. Results suggested that the direct effect from age to intentional savoring was significant, and that age was negatively related to hedonic motivation, ideal high arousal positive affect, and future time perspective. Hedonic motivation and ideal high arousal positive affect were both positively related to intentional savoring. Once accounting for the mediators, age was no longer associated with intentional savoring. Results suggested that the indirect effect was significant for hedonic motivation (effect = − .004, SE = .002, 95% CI [− .009, − .001]) and for ideal high arousal positive affect (effect = − .003, SE = .002, 95% CI [− .007, − .001]). In other words, older age was related to less intentional savoring, which was partially mediated by decreased hedonic motivation and lower ideal high arousal positive affect.

Next, we examined a model with natural savoring as the dependent variable (see Fig. 3). The overall model was significant, R^2 = .32, F(10, 101) = 3.90, p < .001. The direct effect between age and natural savoring was significant and negative, and age was negatively related to hedonic motivation, ideal high arousal positive affect, and future time perspective. Ideal high arousal positive affect was significantly positively related and hedonic motivation was marginally positively related to natural savoring (p = .09). Results suggested a

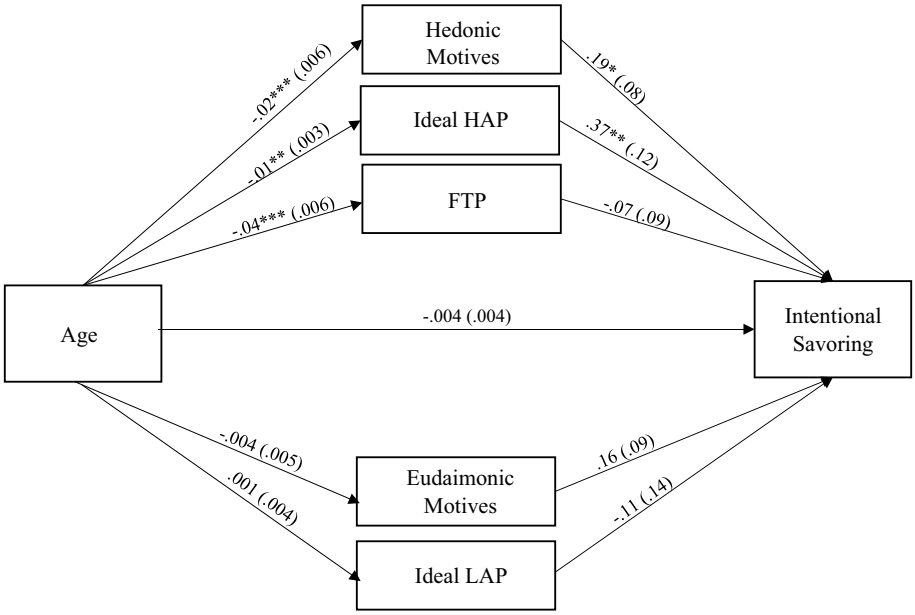

Fig. 2 Indirect effects between age and intentional savoring. *Notes* Unstandardized betas are presented, and standard errors are reported in parentheses. Statistical significance is presented as: ***$p \leq .001$; **$p \leq .01$; *$p < .05$. Model controlled for education, financial security, gender, and typical positive affect. *HAP* high arousal positive affect, *LAP* low arousal positive affect, *FTP* future time perspective

significant indirect effect of ideal high arousal positive affect (effect = − .003, SE = .002, 95% CI [− .007, − .001]) and hedonic motivation (effect = − .003, SE = .002, 95% CI [− .01, − .001]). More specifically, older age was related to less hedonic motivation and ideal high arousal positive affect, which in turn was related to less natural savoring.

Next, we examined a model with perceived savoring ability (using the SBI) as the dependent variable (see Fig. 4). The overall model was significant, $R^2 = .42$, $F(10, 101) = 6.92$, $p < .001$. Age was negatively related to hedonic motivation, ideal high arousal positive affect, and future time perspective. Eudaimonic motivation and ideal high arousal positive affect were positively related to savoring ability. Results suggested a significant indirect effect of ideal high arousal positive affect (effect = − .004, SE = .002, 95% CI [− .009, − .001]), suggesting that older age was related to lower desire for high arousal positive affective states, which in turn was related to less perceived savoring ability. We also examined similar multiple mediation models for the experimental task, but no significant indirect effects emerged.

4 Discussion

Socioemotional selectivity theory suggests that an increased age-related focus on positive information may facilitate better emotion regulation and emotional well-being (Carstensen et al. 2011; Isaacowitz and Blanchard-Fields 2012; Mather 2012; Mather and Ponzio 2016). However, the accumulation of the current findings and other emerging research

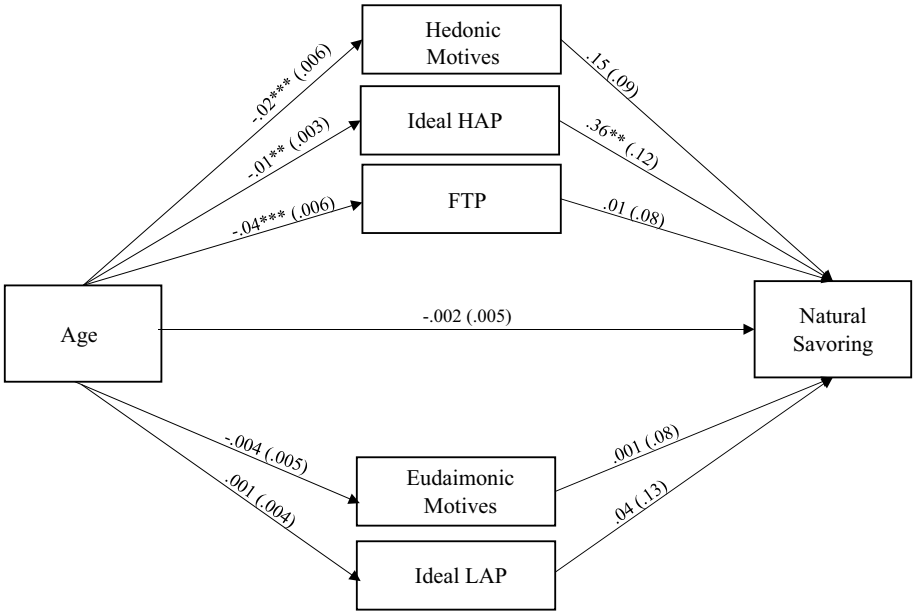

Fig. 3 Indirect effects between age and natural savoring. *Notes* Unstandardized betas are presented, and standard errors are reported in parentheses. Statistical significance is presented as: ***$p \leq .001$; **$p \leq .01$; *$p < .05$. Model controlled for education, financial security, gender, and typical positive affect. *HAP* high arousal positive affect, *LAP* low arousal positive affect, *FTP* future time perspective

suggests that older adults' may paradoxically savor positive experiences less than young or middle-aged adults. The current study advances recent research suggesting older adults may be less likely to up-regulate their positive emotion (Geiger et al. 2017; Ramsey and Gentzler 2014; Riediger et al. 2009; Smith and Bryant 2016) by investigating multiple types of savoring using questionnaires and an experimental directed regulation task. In particular, findings suggest that when compared to young or middle-aged adults, older adults are less likely savor their positive events and do not gain the same emotional benefits when they engage in savoring. The current study also provides support for potential motivational mechanisms that vary with age and may contribute to differences in regulatory tendencies. Overall, results suggest that age is related to less desire and motivation to experience positive emotion, particularly high arousal positive experiences. In turn, these age-related declines may contribute to less savoring in older adults.

4.1 Age Differences in Savoring

Overall, participants randomly assigned to savor a positive memory experience increased positive affect relative to their baseline compared to those randomly assigned to a neutral reflection task. However, results suggest that these effects are only for young adults and middle-aged adults, whereas older adults do not experience significantly more positive affect after savoring. Older adults also report less overall engagement in both intentional savoring and natural savoring strategies (Gentzler et al. 2016). Despite prior research suggesting that older adults experience enhanced emotional well-being (Carstensen et al.

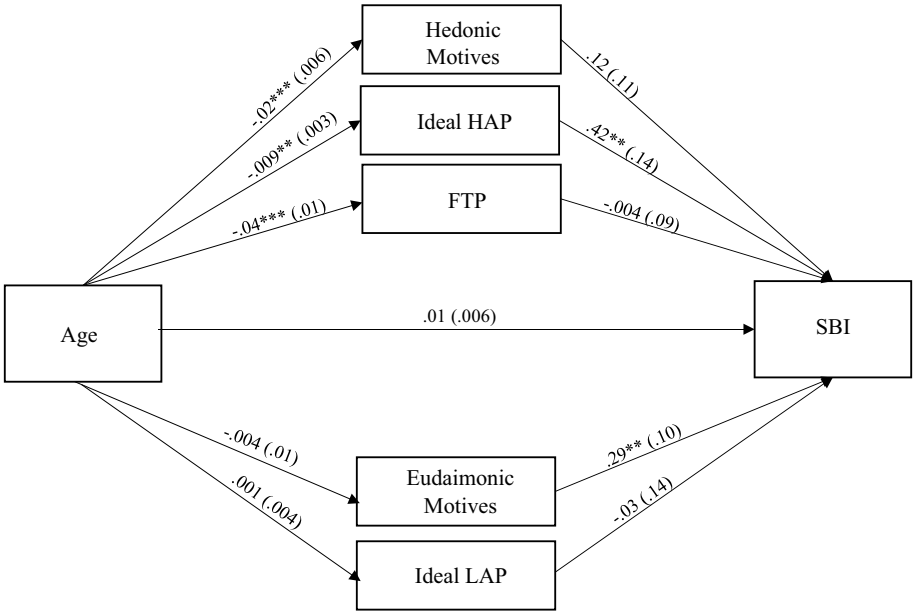

Fig. 4 Indirect effects between age and perceived savoring capacity. *Notes* Unstandardized betas are presented, and standard errors are reported in parentheses. Statistical significance is presented as: ***$p \leq .001$; **$p \leq .01$; *$p < .05$. Model controlled for education, financial security, gender, and typical positive affect. *HAP* high arousal positive affect, *LAP* low arousal positive affect, *FTP* future time perspective, *SBI* Savoring Beliefs Inventory

2011) and tend to focus on the positive (Mather 2012), these findings suggest that older adults do not necessarily savor more. Instead, findings with both survey and experimental methods in this study show that the tendency and ability to engage in savoring strategies that up-regulate positive affect are either maintained or may actually decrease with age. Thus, age-related increases in emotional stability and happiness (Carstensen et al. 2011; Mather and Ponzio 2016) may be a result of processes other than savoring.

4.2 Mediators of Age Associations with Savoring

Our investigation into possible mediators helps us to understand how changing motivations across adulthood may account for decreased savoring. In particular, this study provides evidence that older adults are less likely to report motivation to seek out hedonic experiences and to desire experiences of high arousal positive emotion (i.e., excitement, enthusiasm, elation), which is consistent with prior research on age and affect valuation theory (Scheibe et al. 2013). Further, these age-related differences in emotional goals partially accounts for less savoring by older adults. These findings suggest that older adults may be less likely to up-regulate their positive emotion because their need and desire to experience positive emotion, particularly high arousal positive emotion, is lower. The results are also consistent with the strength and vulnerability integration model, which proposes that age-related decreases in physiological flexibility may reduce the desire to experience intense moods (Charles 2010). Moreover, research suggests that older adults do experience declines in high arousal feelings more broadly (Pinquart 2001). Thus, our findings add to this literature

by providing evidence that lower levels of savoring in older adults may contribute to these declines in intense positive affect.

Previous research suggests that older adults are most likely to meet their positive emotion goals compared to young adults (Scheibe et al. 2013) and place a lower priority on enhancing positive emotion (McMahan and Estes 2012; Riediger et al. 2009). Thus, while decreased savoring and desire for positive affect might be viewed as a negative, this could be consistent with the selection, optimization, and compensation theory (Baltes and Baltes 1990) and Urry and Gross' (2010) proposal that older adults may compensate for a loss of resources by selecting and optimizing regulation strategies that best meet their desired affective goals (i.e., by preferentially engaging in strategies that are more efficient or efficacious). Additionally, prioritizing positivity in daily life is associated with greater positive emotions and less depressive symptoms (Catalino et al. 2014). However, excessively valuing positive feelings may actually be associated with poorer well-being when emotional goals are not adequately met, perhaps due to unrealistic expectations or disappointment when happiness goals are not in line with actual feelings (e.g., Ford and Mauss 2014; Mauss et al. 2011). Indeed, research suggests that valuing happiness in excess is associated with increased tendencies to try and savor using a multitude of different strategies, even ones that are seemingly ineffective (Gentzler et al. 2016). It is possible that over time and with experience, older adults develop a more nuanced understanding of happiness or more realistic expectations regarding positive experiences, and thus may engage in less volitional savoring in attempts to fulfill unmet emotional goals.

The current study also replicates a large body of research suggesting that older adults experience a more limited future time perspective (e.g., Allemand et al. 2012; Kotter-Grühn and Smith 2011; Lang and Carstensen 2002). However, contrary to expectations, a limited future time perspective did not predict greater savoring despite evidence that it profoundly impacts the decisions people make in regards to their happiness (Carstensen 2006; Mogilner et al. 2012) and to pursue emotionally satisfying goals (Carstensen et al. 1999). Specifically, socioemotional selectivity theory and terror management theory both suggest that when one's own mortality is salient, a focus on positive experiences may be greater (Fung and Carstensen 2006) and may result in greater nostalgic reflection on the past (Juhl et al. 2010; Routledge et al. 2008). Nonetheless, other studies also suggest that a more limited future time perspective is related to a lower perceived savoring ability (Ramsey and Gentzler 2014), and poorer profiles of emotional well-being (Grühn et al. 2016). Taken together, these findings support recent explanations of these counterintuitive findings suggesting that future time perspective may explain motivation for social interactions more so than emotion regulation (Grühn et al. 2016). More research is needed to understand why a limited future time perspective does not facilitate savoring behaviors or to delineate conditions under which future time perspective may actually impair savoring (e.g., increased poignancy).

While this study proposes that motivational factors may drive the relationship between age and savoring, a competing explanation may be that various neurocognitive changes may underlie savoring declines. Although there is relatively little age-related structural and functional decline in emotional brain regions such as the amygdala and the ventromedial prefrontal cortex (Mather 2016), other age-related neurocognitive changes may impact the processing of positive experiences and subsequent savoring ability. For example, behavioral studies on the positivity effect find that older adults engage more prefrontal resources to redirect emotional attention and memory (e.g., Mather 2016). Other research suggests that the age-related positivity bias does not appear when attention is divided (Knight et al. 2007; Mather and Knight 2005), suggesting that changing attentional capacities may

inhibit savoring ability. Everyday situations often involve competing attentional demands, which may hinder older adults' ability to focus on positive information in ways that would increase their positive affect. However, more research on the neurocognitive mechanisms underlying savoring specifically in adulthood is needed given that most research to date on neurological factors that may impact emotion regulation in older adults have focused on negative emotions.

4.3 Limitations

Although this study fills an important gap in the literature on aging and positive affect, these findings should be interpreted in light of several limitations. While our hypotheses were based on theory and prior research, the results from the current study are cross-sectional and therefore any conclusions regarding developmental change or directionality are tentative. Our community sample was also primarily white and had a relatively high socioeconomic status. Although little is known about the effects of race or education on savoring, there is some evidence that wealthier adults are less able to savor their positive events (Quoidbach et al. 2010). However, the only association between demographic variables and savoring/positive affect were positive correlations with financial security and education. Both of these characteristics were covariates in main analyses, indicating these demographic characteristics were likely not influencing our findings. Finally, although the item-total correlations were within acceptable ranges (Nunnally and Bernstein 1994), the Cronbach's alphas for the shortened PEARS subscales were lower than ideal. Future research should examine the relation between age and different types of savoring using the full PEARS scale.

4.4 Conceptual Framework and Significance

The current findings hold conceptual significance for theories of emotional functioning and aging. While older adults may experience higher rates of happiness and emotional stability overall (e.g., Carstensen et al. 2011; Mather and Ponzio 2016), findings from the current study in conjunction with other preliminary research suggest that older adults do not desire to change or increase their positive affect (e.g., Scheibe et al. 2013) and may savor less (e.g., Geiger et al. 2017; Ramsey and Gentzler 2014; Smith and Bryant 2016). Possible reasons for these observed age-related decreases in savoring based on prior theory and literature are discussed below.

First, it is possible that older adults simply do not want to increase their positive affect, which is largely supported by the current findings suggesting an overall lower desire to experience high arousal positive affect in particular. Due to reduced physiological flexibility with age, intense positive affective experiences that elicit physiological arousal can be undesirable due to disrupted homeostasis (Charles 2010). As a result, older adults may not seek out ways to increase these high-intensity experiences as often as younger individuals. Second, the savoring strategies that work for older adults may not be the same strategies that work for adults of younger ages, possibly due to differential emotional responses to similar strategies based on age or to changing neurobiological capacities that could inhibit savoring ability. For example, for younger adults, saving and later reflecting on a picture of a positive memory may evoke positive emotional responses, whereas for an older adult the same action could result in increased poignancy. Finally, older adults may pursue other avenues to emotional well-being instead of savoring. Socioemotional selectivity theory

posits that with older age, motivation to seek out more meaningful social interactions with close others increases (Lang and Carstensen 2002). Therefore, it is possible that if older adults are seeking out more positive experiences (e.g., Livingstone and Isaacowitz 2015), they may have less of a need to up-regulate their positive affect in the moment. Thus, the experiences of increased emotional stability in older age may be due to increased positive experiences achieved through antecedent emotion regulation (i.e., situation selection; Gross 1998) more so than regulation after a positive experience, which is what the current study assessed. While the current study provides support for emotional motivation as a possible mechanism for age-related differences in savoring across adulthood, these other possible explanations should also be addressed in future research.

Regardless of the underlying reason for age-related differences in savoring, understanding how to maximize adaptive emotional experiences in older adults is an important direction for future studies. While many older adults experience increased emotional stability and happiness with age, a percentage also experience increased emotional difficulties including depression (Kessler et al. 2005). The current study is a critical step towards identifying and understanding age-related trends in savoring, ultimately providing enhanced understanding of the factors that contribute to experiences of positive emotion in older adults along with promoting mental health across adulthood.

5 Conclusions

It has been noted that more research is needed to investigate emotion regulation across adulthood (Isaacowitz and Blanchard-Fields 2012), particularly the regulation of positive emotion (Bryant et al. 2011). To date very little research has examined the relationship between aging and savoring, despite established relations between savoring and greater well-being, increased happiness, and decreased depression (Bryant and Veroff 2007). The current research provides support for age-related differences in savoring across adulthood using both self-reported and experimental methods, and replicates preliminary findings suggesting that older adults paradoxically savor less than young and middle-aged adults. Further, it extends research by experimentally manipulating savoring to show that older adults do not experience boosts in positive affect after savoring, particularly in comparison to younger and middle aged adults. The study also offers new evidence that older adults may also experience lower motivation to seek out hedonic experiences, specifically high arousal hedonic experiences (e.g., excitement, enthusiasm), which can contribute to declines in savoring. Thus, the current findings highlight age-related differences in positive emotion goals and motivation, and enhances knowledge regarding the factors that contribute to emotional well-being across adulthood.

Compliance with Ethical Standards

Conflict of interest The authors declare no conflict of interest.

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