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Original Research Report

Age Differences in Emotion Regulation Choice: Older Adults Use Distraction Less Than Younger Adults in High-Intensity Positive Contexts

Bruna Martins,[1] Gal Sheppes,[2] James J. Gross,[3] and Mara Mather[1,4]

[1]Department of Psychology, University of Southern California, Los Angeles. [2]The School of Psychological Sciences/Child Clinical, Tel Aviv University, Tel Aviv, Israel. [3]Department of Psychology, Stanford University, CA. [4]Davis School of Gerontology, University of Southern California, Los Angeles.

Correspondence should be addressed to Bruna Martins, MA, Department of Psychology, University of Southern California, 3715 McClintock Avenue, Los Angeles, CA 90089. E-mail: bruna.martins@usc.edu.

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Abstract

Objectives: Previous research demonstrates that younger and older adults prefer distraction over engagement (reappraisal) when regulating high-intensity negative emotion. Older adults also demonstrate a greater bias for positive over negative information in attention and memory compared with younger adults. In this study, we investigated whether emotion regulation choice preferences may differ as a function of stimulus valence with age.
Method: The effect of stimulus intensity on negative and positive emotion regulation strategy preferences was investigated in younger and older men. Participants indicated whether they favored distraction or reappraisal to attenuate emotional reactions to negative and positive images that varied in intensity.
Results: Men in both age-groups preferred distraction over reappraisal when regulating high-intensity emotion. As no age-related strategic differences were found in negative emotion regulation preferences, older men chose to distract less from high-intensity positive images than did younger men.
Discussion: Older men demonstrated greater engagement with highly positive emotional contexts than did younger men. Thus, age differences in emotion regulation goals when faced with intense emotional stimuli depend on the valence of the emotional stimuli.

Keywords: Aging—Emotion regulation—Intensity—Valence

Introduction

Compared with younger adults, older adults show a positivity effect in which they favor positive over negative stimuli in attention and memory (for a meta-analysis of Age-by-Valence interactions, see Reed, Chan, & Mikels, 2014). Socioemotional selectivity theory provides one explanation for this effect in its supposition that, with age, people focus more on emotion regulation goals that can be realized in the short term, such as optimizing in-the-moment affect (Carstensen, Mikels, & Mather, 2006; Mather & Carstensen, 2005). Short-term emotion regulation goals may promote strategies that enhance present-moment positive feelings and/or decrease negative feelings in order to optimize affective states (Tamir & Gross, 2011).

Consistent with socioemotional selectivity theory's predictions, previous research with stationary eye-tracking methods have found that older adults look more at positive and less at negative stimuli than do younger adults (Isaacowitz, Toner, & Neupert, 2009; Li, Fung, & Isaacowitz, 2010). Furthermore, positive gaze preferences predict better mood, at least for older adults with intact attentional resources. However, recent studies with mobile eye-tracking methods (which allow for selection of emotional contexts) fail to show gaze differences with age (Isaacowitz, Livingstone, Harris & Marcotte, 2015). Age-related changes in the choice and use of emotion regulation strategies may facilitate reaching in-the-moment hedonic goals. Such age-related changes in strategy preferences might help explain mechanisms for improved affective outcomes in later life, such as lower incidence of depression and anxiety (Fiske, Wetherell, & Gatz, 2009; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010). However, age-related changes in emotion regulation strategy preferences remain largely underexplored.

Emotion regulation is a flexible process involving a range of strategies that have their primary impact at different points in an emotional reaction and vary in terms of their outcomes (Gross, 1998, 2013). Emotional coping can be divided into two separate classes: engagement/approach coping that focuses on the stressor and related emotions and disengagement/avoidance aims to escape the threat and related feelings (Roth & Cohen, 1986). Two strategies that embody these engagement and avoidance coping styles are *reappraisal* and *distraction*, respectively. *Cognitive reappraisal* relies on engagement with and reinterpretation of the meaning attributed to an emotional stimulus (Gross, 1998). In contrast, *distraction* involves redirecting attentional focus away from emotional stimuli toward something unrelated (Van Dillen & Koole, 2007).

This study focused on *choice* of emotion regulation strategies, and previous studies have primarily investigated the *efficacy* of distraction and reappraisal in decreasing negative emotional reactions, so we briefly review these efficacy findings here. Distraction has been shown to lead to in-the-moment attenuation of emotional reactions, whereas reappraisal takes effect after an emotional reaction is underway (Shafir, Schwartz, Blechert, & Sheppes, 2015; Sheppes & Gross, 2011, 2012). Older adults report smaller change scores in experienced emotion during the use of reappraisal compared with younger adults, suggesting that reappraisal may not be as effective for older adults in negative emotional contexts (Opitz, Rauch, Terry, & Urry, 2012; Tucker, Feuerstein, Mende-Siedlecki, Ochsner, & Stern, 2012; Winecoff, Labar, Madden, Cabeza, & Huettel, 2011). In contrast, distraction is equally effective for younger and older adults during regulation of negative emotion (Tucker et al., 2012). To our knowledge, only one report directly contrasted efficacy across instructed distraction and reappraisal in an older adult sample (Smoski, Labar, & Steffens, 2014). There was no younger adult comparison group, but older adults reported greater mood improvements from distraction (thinking about loved ones rather than negative thoughts) than from reappraisal of the negative thoughts themselves. Another study did not include an explicit distraction condition but found that strategic detachment (taking a distanced perspective during negative films) attenuated physiological reactions more than cognitive reappraisal for older adults compared with younger adults (Shiota & Levenson, 2009). Insofar as detachment strategies require less stimulus engagement than reappraisal, older adults may profit more from stimulus disengagement. The literature thus suggests that older adults benefit more from utilizing disengagement strategies, such as distraction, than reappraisal when regulating negative affect.

When asked to select their preferred strategy, young participants choose to distract rather than reappraise high-intensity negative emotional contexts and show the opposite preference in low-intensity negative emotional situations (Sheppes, Scheibe, Suri, & Gross, 2011; Sheppes et al., 2014). Two different accounts can explain this preference to distract from highly negative situations. Participants may optimize the avoidance of intense affect (goal: minimize intensity) or avoid intense negative affect states (goal: minimize negativity). Thus, the mechanism driving choice is unclear. In contrast, regulation of positive emotion can differentiate between these two mechanisms, since the end goal could be to either decrease high-intensity positive emotion (goal: minimize intensity) or sustain high-intensity positive emotions (goal: minimize negativity). Sheppes and colleagues (2014) distinguished between these two possibilities by tracking whether highly intense positive emotions would promote stimulus engagement and greater preference for reappraisal (see Bradley, Codispoti, Sabatinelli & Lang, 2001) or stimulus disengagement from highly positive stimuli in younger adults. They found that when asked to attenuate high-intensity positive emotions, younger adults demonstrated a preference to distract from high-intensity positive contexts (Hay, Sheppes, Gross, & Gruber 2015; Sheppes et al., 2014, study 4). Thus, younger adults seem to choose emotion regulation strategies that minimize intense emotion, regardless of valence.

To our knowledge, only one previous study has investigated emotion regulation choice in older adults. This study found that younger and older adults favored distracting away from intensely negative emotional images, and reappraising low-intensity images, whereas older adults favored distraction even more than younger adults did (Scheibe, Sheppes, & Staudinger, 2015). Thus, the older adults seem to prefer disengaging from some negative emotional contexts even more than younger adults do. Whether this relationship between emotion regulation and intensity holds for positive contexts among older adults, however, remains unknown.

The Current Study

In the present study, we assessed older and younger men's emotion regulation strategy choice preferences when confronted with negative versus positive stimuli. Our positive stimuli included sexual scenes that men tend to find more desirable than did women (Leitenberg and Henning, 1995). Thus, we restricted the study to male participants only to minimize the differences in attractiveness of high arousal positive erotica images. We tracked age differences in strategy preferences between reappraisal and distraction for low- and high-intensity images in positive and negative emotional contexts. Based on the predictions of socioemotional selectivity theory regarding the maximization of present-moment affect, we predicted that compared with younger men, older men would demonstrate a lower preference for stimulus disengagement (distraction) during the down-regulation of positive emotion. Given the previous findings (Scheibe et al., 2015), we also predicted that older men would distract more from negative emotional contexts than younger men.

In addition, as our erotic stimuli consisted of heterosexual images of couples, we recruited only self-identified heterosexual men. In order to minimize the age differences in induced emotion, we also selected images that were rated similarly in terms of arousal and valence by both younger and older men during an in-house norming task. Due to an inability to match arousal levels between high-intensity positive and high-intensity negative image sets (positive images were less arousing), we equated arousal across the low-intensity negative and high arousal positive image lists in order to compare the valence effects in our secondary analyses.

Method

Participants

Forty college-aged men from the University of Southern California (USC; 17–23 years, $M_{age} = 19.82 \pm 1.18$) and 40 older adult men recruited from the community through the USC Healthy Minds volunteer database (57–86 years, $M_{age} = 71.24 \pm 5.84$) participated in the study. The study was approved by the USC Institutional Review Board, and all participants gave written informed consent and were paid for their participation. Participants were screened for any neurological and psychiatric illness. Older men were screened for cognitive impairment with a minimum cutoff score of 30 on the Telephone Interview for Cognitive Status (Brandt, Spencer, & Folstein, 1988). Five older and four younger participants' data were excluded due to issues learning task directions based on postquestionnaire responses. Four younger and three older participants' data were not saved due to computer malfunction. No significant demographic differences in age nor education were found between the sample collected and the sample utilized in the final analyses excluding these participants (see Supplementary Table 1, for sample characteristics).

Procedure and Measures

At the start of the session, participants completed a consent form, demographics form, and self-rated their baseline affect using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) scale. Participants performed an autobiographical memory task, and a brief battery of individual difference measures that are not relevant to this study, and are thus not reported here. Next, participants completed two runs of the emotion regulation choice task, one consisting of positive images and the other of negative images. Participants rated momentary affect before each task run using the PANAS scale. Participants trained on a practice version of the task at the start of each run. At the end of the session, participants completed a posttask questionnaire, in which they described what they did during each emotion regulation strategy, as a manipulation check of strategy encoding.

Task stimuli

Forty-eight images were selected with the aim of minimizing age differences in both valence and arousal ratings. A separate sample of 40 men (23 younger and 17 older adults) normed 51 positive and 59 negative images from the International Affective Picture System (Lang, Bradley, & Cuthbert, 1997) and 32 online free-source images in terms of arousal and valence. No significant age differences were found for image arousal ratings, $t(94) = 0.21$, $p = .83$, nor for valence ratings, $t(94) = 0.55$, $p = .58$.

In this experiment, as in previous emotion regulation choice studies (Scheibe et al., 2015; Sheppes et al., 2011, 2014), we experimentally manipulated emotional *intensity* that implicates both valence and arousal dimensions of emotion. High-intensity lists were rated higher in arousal than low-intensity lists. In addition, the high-intensity positive list had higher valence ratings, whereas the high-intensity negative list had lower valence ratings than the low-intensity list (see Supplementary Table 2, for arousal and valence descriptive and statistical comparisons across lists). Twenty-four age-matched positive images and 24 negative images were included in the final study. Positive images included 12 high-intensity positive images, (i.e., erotic scenes between heterosexual couples and high-action sports) and 12 low-intensity positive images (i.e., couples holding hands and low-impact sports).[1] Negative images included 12 high-intensity negative images primarily depicting scenes of sadness and fear (i.e., airplane wreck with wounded victims or child running from gunman) and 12 low-intensity negative images (i.e., drug overdose or crying child in hospital).[2] On average, negative images were more arousing than positive

1 The codes of the positive IAPS images are as follows: LOW INTENSITY POSITIVE: 2501, 4606, 4623, 4641, 8032, 8120, 8162, 8311, 8330, 8461, 8540, and a open-source image of a boy with an inner tube on a lake. HIGH INTENSITY POSITIVE: IAPS 4652, 4659, 4670, 4800, 8130, 8186, 8300, and five open-source images of couples in erotic scenes. Open-source images are available on request.

2 The codes of the negative IAPS images are as follows: LOW INTENSITY NEGATIVE: 1275, 2710, 3300, 6200, 9001, 9182, 9404, 9417, 9421, 9480, 9561, 9913. HIGH INTENSITY NEGATIVE: 1525, 3301, 6212, 6313, 6415, 9050, 9301, 9400, 9570, 9600, 9810, 9921.

images, and thus low- and high-intensity lists could not be matched for intensity across valence. In order to allow for secondary analyses of valence, we also matched arousal across the high positive and low negative image lists, $t(22) = 1.38$, $p = .18$, $d = 3.2$. The valence ratings for the high positive list ($M = 7.38 \pm 0.13$) were significantly higher than the low negative list, $M = 3.18 \pm 0.16$; $t(22) = 20.73$, $p < .001$, $d = 6.0$.

Emotion regulation strategy choice task

Participants performed an adapted version of an emotion regulation strategy choice paradigm previously reported in the literature (Scheibe et al., 2015; see Figure 1). The task involved two runs—one with positive images and one with negative images (order counterbalanced). We blocked rather than randomized valence in the trials to minimize the influence of shifting between tasks on choice behavior, because task-shifting difficulties increase with age (Kray & Lindenberger, 2000). During the task, participants viewed emotional images and were instructed to either think about a single mental distraction image that was emotionally neutral and unrelated to the image (distraction) or think about the picture's meaning in a way that reduced its emotional impact (reappraisal). Participants selected and utilized the same mental distraction image throughout the experiment. During the task instructions, they were given examples of distraction images, such as imagining walking through a familiar neighborhood street or making coffee in the morning but were not limited to these prompts. For negative images, participants reappraised the images shown by focusing on how the situation or outcome might not be as negative as it first seemed. An example of negative reappraisal provided during training was reinterpreting an image of a crying child by focusing on how the child's sadness would be short-lived. For positive images, participants reappraised the positive images shown in a manner that would make the image seem more neutral and less positive. Participants were given the example of how an image of an individual who just finished first in a race could be reappraised by focusing how the excitement of the victory would be short-lived.

At the start of the task, participants performed four trials of emotion regulation training. Corrective feedback was provided to participants to ensure that they understood the distraction and reappraisal strategies. Following training, participants performed nine emotion regulation choice practice trials. The training and practice images were not seen again throughout the experiment.

Participants completed two task runs, each 24 trials in length. On each task trial, participants initially viewed an emotional image on the screen (1.2 s). They then chose whether they preferred to utilize the Distract or Rethink strategy to decrease their emotional reaction to the image. They were then shown a reminder cue ("RETHINK" or "DISTRACT") cueing them to prepare to utilize the chosen strategy. Finally, they were shown the image again for an extended duration, and they employed the chosen strategy throughout the 10-s image duration. Two optional rest breaks were provided after 8 and 16 trials had been completed.

Results

Primary Analyses

Emotion regulation choice results: Positive emotion

We used a binary logistic regression to explore the effects of Age (Younger Men, Older Men), Intensity (Low Intensity, High Intensity), Age × Intensity, as well as covariates of counterbalance order and trial number, on the likelihood that participants choose to distract (rather than to reappraise) on each trial of the positive emotion regulation task run. The logistic regression model was statistically significant, $\chi^2(5) = 141.33$, $p < .001$, and correctly classified 65.1% of cases. Results revealed that high-intensity stimuli were 4.27 times more likely to promote distraction choice than low-intensity stimuli ($B = 1.45$, $p < .001$). In addition, a significant

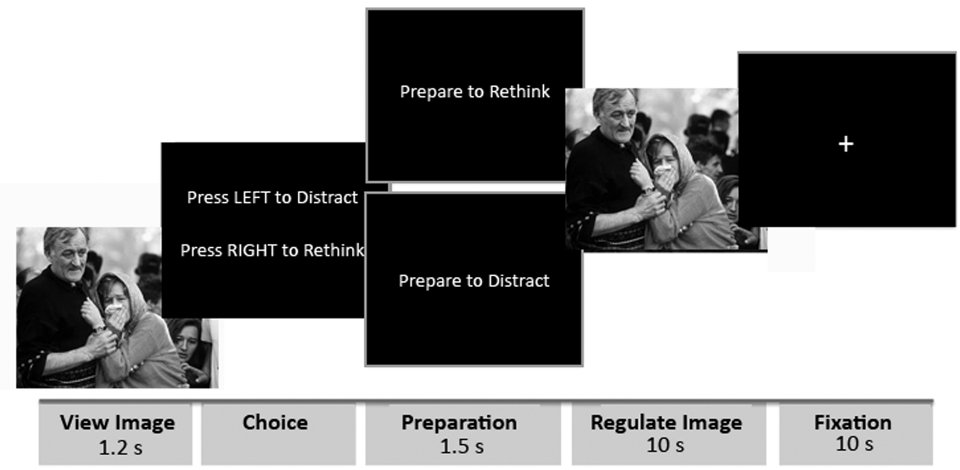

Figure 1. Trial timeline for emotion regulation task. Task time line depicts the negative emotion regulation task run. Note that the positive task run had an identical time line but utilized positive images. Participants indicated by button press (self-paced) whether they preferred to distract (left button) or rethink (right button) the image to in order to feel more neutral.

Age × Intensity interaction was found ($B = -0.62$, $p = .004$), in which older men distracted less from high-intensity positive images compared with low-intensity stimuli than did younger men. No other predictors significantly contributed to choice preference (see Table 1, for summary).

In order to clarify the nature of the Age × Intensity interaction and compare our findings with previous studies that utilized analysis of variance (ANOVA) frameworks, we also conducted a 2×2 repeated-measures ANOVA of Intensity × Age for the positive emotion regulation task run, with the percentage of all trials for which distraction was chosen as the dependent variable. Note that the percentage of trials for which reappraisal was chosen is 1 (proportion of trials in which distraction was chosen) as participants performed a binary choice on each trial. Our results extended previous findings in younger adults and revealed a significant main effect of Intensity, in which participants showed a preference to distract more from high positive intensity than low positive intensity images, $F(1, 62) = 67.10$, $p < .001$, partial $\eta^2 = 0.52$. These main effects were qualified by a significant interaction of Intensity and Age, $F(1, 62) = 5.69$, $p = .02$, partial $\eta^2 = 0.08$, reflecting no significant age-related difference in distraction preferences for low-intensity images, $M_{young} = 0.30 \pm 0.04$; $M_{older} = 0.28 \pm 0.03$; $t(62) = 0.42$, $p = .68$, $d = 0.57$, in contrast with a significant age difference for high-intensity images in which younger adults distracted from high-intensity images more frequently ($M_{young} = 0.65 \pm 0.04$) than older adults, $M_{older} = 0.47 \pm 0.04$; $t(62) = 3.17$, $p = .002$, $d = 4.5$ (see Figure 2).

Emotion regulation choice results: Negative emotion

We next ran a binary logistic regression of Age, Intensity, Age × Intensity, and covariates of counterbalance order and trial number to predict the likelihood that participants choose to distract (rather than to reappraise) on each trial of the negative emotion regulation task run. The logistic regression model was statistically significant, $\chi^2(5) = 51.59$, $p < .001$, and correctly classified 60% of cases. High-intensity stimuli were found to be 2.21 times more likely to promote distraction choice than low-intensity stimuli. No other effects significantly contributed to choice preference (see Table 2).

A 2×2 repeated-measures ANOVA of Intensity × Age was also conducted for the negative emotion regulation task run. Replicating previous accounts (Scheibe et al., 2015; Sheppes et al., 2011, 2014), we found a significant main effect of Intensity, in which participants preferred to distract more from high negative intensity than low negative intensity images, $F(1, 62) = 58.88$, $p < .001$, partial $\eta^2 = 0.49$. In previous work, older adults chose to distract from all negative contexts (both low intensity and high intensity) more than younger adults (Scheibe et al., 2015), but we did not find a main effect of Age, $F(1, 62) = 0.91$, $p = .34$, partial $\eta^2 = 0.01$. However, our data did replicate the previous finding, demonstrating no significant interaction of Intensity and Age (Scheibe et al., 2015), $F(1, 62) = 0.99$, $p = .32$, partial $\eta^2 = 0.02$.

Table 1. Positive Emotion Regulation—Logistic Regression Results

							95% CI for Exp (*B*)	
	B	*SE*	Wald	*df*	*p* Value	Exp (*B*)	Lower	Upper
Age	−0.11	0.16	0.51	1	.48	0.89	0.65	1.22
Intensity	1.45	0.15	88.47	1	<.001	4.27	3.16	5.78
Age × Intensity	−0.62	0.22	8.21	1	.004	0.54	0.35	0.82
Trial number	−0.001	0.008	0.03	1	.86	1.00	0.98	1.01
Counterbalance order	0.01	0.01	0.66	1	.42	1.01	0.99	1.03
Constant	−0.91	0.18	26.24	1	<.001	0.40		

Note: Reference groups are given in parentheses: Age (Younger Men), Intensity (Low Intensity).

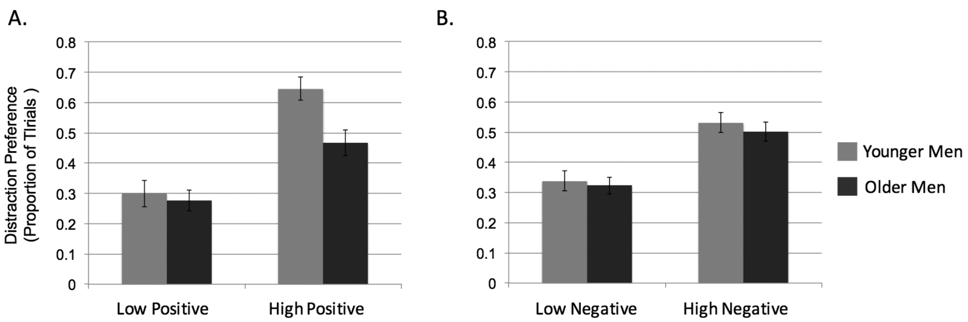

Figure 2. Emotion regulation choice preferences across age, intensity, and valence. Mean proportion of trials for each age-group in which distraction was chosen over reappraisal with standard error bars. (A) Positive run of the emotion regulation strategy choice task. (B) Negative run of the emotion regulation strategy choice task.

Table 2. Negative Emotion Regulation—Logistic Regression Results

	B	*SE*	Wald	*df*	*p* Value	Exp (*B*)	95% CI for Exp (*B*)	
							Lower	Upper
Age	−0.07	0.15	0.20	1	0.66	0.93	0.69	1.26
Intensity	0.79	0.15	28.42	1	< 0.001	2.21	1.65	2.96
Age × Intensity	−0.17	0.21	0.68	1	0.41	0.84	0.56	1.27
Trial number	0.008	0.008	1.21	1	0.27	1.01	0.99	1.02
Counterbalance order	−0.01	0.01	1.17	1	0.28	0.99	0.97	1.01
Constant	−0.67	0.17	15.01	1	< 0.001	0.51		

Note: Reference groups are given in parentheses: Age (Younger Men), Intensity (Low Intensity).

Secondary Analyses

Regulation choice preferences across age and valence

In order to track whether valence played a role in emotion regulation choice with age, we conducted a secondary analysis contrasting choice preferences for arousal-matched negative intensity and high-intensity positive image lists. We ran a binary logistic regression of Age, Valence, Age × Valence, and covariates of counterbalance order and trial number to predict the likelihood that participants choose to distract (rather than to reappraise) on each task trial. The logistic regression model was statistically significant, $\chi^2(5) = 105.82$, $p < .001$, and correctly classified 63% of cases. Positive high-intensity stimuli were found to be 3.57 times more likely to promote distraction choice than negative low-intensity stimuli. A significant Age × Intensity interaction was found ($B = -0.67$, $p = .002$), in which older men distracted less from high-intensity positive images compared with low-intensity negative stimuli than did younger men. No other predictors significantly contributed to choice preference (see Supplementary Table 3, for summary).

We also conducted a 2×2 repeated-measures ANOVA of Valence × Age. It revealed a significant main effect of Valence, in which participants preferred to distract more from positive images than negative images, $F(1, 62) = 47.12$, $p < .001$, partial $\eta^2 = 0.43$. In addition, there was a significant main effect of Age, in which older adults chose to distract less frequently than younger adults, $F(1, 62)= 6.32$, $p = .02$, partial $\eta^2 = 0.09$. This main effect of Age was qualified by a significant interaction of Valence and Age, $F(1, 62)= 6.25$, $p = .02$, partial $\eta^2 = 0.09$. The interaction occurred due to greater preference for distraction for younger than older adults for positive images ($M_{young} = 0.65 \pm 0.04$; $M_{older} = 0.47 \pm 0.04$), $t(62) = 3.17$, $p = .002$, $d = 4.5$, rather than age-related differences in strategy choice for negative images, ($M_{young} = 0.34 \pm 0.03$; $M_{older} = 0.32 \pm 0.03$), $t(62) = 0.35$, $p = .73$, $d = 0.09$ (see Figure 2).

Baseline affect

We ran two 2×2 univariate ANOVAs of Age (Older Adults, Younger Adults) × Counterbalance Order (Positive First, Negative First): one with the baseline Positive Affect PANAS scores and the other with baseline Negative Affect PANAS scores as dependent measures. Baseline Positive Affect results indicated a significant main effect of Age, $F(1,60) = 8.28$, $p < .006$, partial $\eta^2 = 0.12$, in which older adults rated Positive Affect ($M = 31.59 \pm 1.17$) as more positive than younger adults ($M = 26.84 \pm 1.17$), $t(62) = 2.90$, $p = 0.005$, $d = 4.1$. No main effect of Order, nor interaction of Age × Order was found, $F < 1$. Baseline Negative Affect results indicated a significant main effect of Age, $F(1, 60) = 11.80$, $p = 0.001$, partial $\eta^2 = 0.16$, in which older adults rated Negative Affect ($M = 11.42 \pm 0.79$) as less negative than younger adults ($M = 15.25 \pm 0.79$), $t(62) = 3.49$, $p = .001$, $d = 4.9$. No main effect of Order, nor interaction of Age × Order was found, $F < 1$.

Regulation session affect

We conducted repeated-measures analyses of covariance with between factors of Age (Older Adults, Younger Adults) and Order (Positive First, Negative First), within factor of Time (pre-Run 1, pre-Run 2), and Baseline PANAS as a covariate, for Positive Affect and Negative Affect scores separately. Positive Affect results indicated no main effects of Age, $F(1, 59) = 2.73$, $p = 0.10$, Time, or Order, $F < 1$. The only significant interaction was of Time × Order, $F(1, 59) = 4.93$, $p = .03$, with all other interactions not reaching significance, $F < 1$. Negative Affect results indicated no main effects of Age, Time, or Order, $F < 1$. The only significant interaction was of Time × Order, $F(1, 59) = 18.75$, $p < .001$, with all other interactions not reaching significance, $F < 1$. Thus, there were no significant age differences in the effects of the manipulations on mood. Age differences in affect ratings are outlined in Supplementary Table 1.

Discussion

Minimizing emotional intensity and minimizing negative affect are two differing goals that can guide experiences one chooses to engage with or avoid. Younger adults have been previously shown to prefer emotion regulation strategies that minimize exposure to intense emotion in both high-intensity positive and negative contexts (Sheppes et al., 2014). For older adults, emotion regulation strategy preferences have only been studied in negative contexts (Scheibe et al., 2015)—a context in which goals of minimizing intense emotion and minimizing negative affect lead to the same outcome, namely, the avoidance of high-intensity negative contexts. In this study, we investigated whether emotion regulation strategy choice in negative and positive emotional contexts would differ across age.

As predicted, we found that across negative and positive emotion regulation contexts, men generally demonstrated a bias to distract more from high-intensity images compared with low-intensity images. This replicates previous findings with negative and positive emotion regulation in younger adults (Sheppes et al., 2011, 2014) and previously reported preference to distract from highly intense negative images in older adults (Scheibe et al., 2015). In addition, we extend these findings, demonstrating that older men also minimize engagement with intense positive emotional stimuli, given the main effect of intensity but no demonstrated interaction with age.

However, supporting our hypotheses, we also found that older men showed a weaker preference to distract from high-intensity positive stimuli than younger men. Distraction strategically drives attention away from stimuli in order to attenuate emotion and so involves disengagement, whereas reappraisal involves engagement with emotional stimuli in order to allow for reinterpretation of the emotional meaning of the stimulus as less emotional (Sheppes & Gross, 2012). Thus, older men in our study were as motivated as younger adults to disengage from negative emotion, but they chose to remain more engaged with highly positive stimuli than younger men. This finding accords with socioemotional selectivity theory, which states that older adults may aim to boost positive feelings and decrease exposure to negative emotion as their perceived life span length becomes increasingly shorter (Carstensen et al., 2006; Mather & Carstensen, 2005). For instance, older adults choose to redirect their visual attention toward positive materials when induced into a negative mood, whereas younger adults tend to focus on negative stimuli and demonstrate mood-congruent gaze (Isaacowitz, Toner et al., 2009). Isaacowtiz and colleagues suggest that older adults may engage with these positive materials in order to improve the in-the-moment affect.

Given older adults' motivation to maintain positive emotion in later life, engagement with positive images may become more automatic with age and more difficult to disengage from. Older adults structurally show loss of gray matter in lateral prefrontal brain regions crucial to inhibitory processing (Mather, 2016; Phillips & Della Sala, 1998) and behaviorally demonstrate difficulties with perseverative responding (Kramer, Hahn, & Gopher, 1999; Ridderinkhof, Span, & van der Molen, 2002). Inhibition of automatic processes rely on these inhibitory systems that decline with age. Selection, Optimization, and Compensation with Emotion Regulation (SOC-ER) theory proposes a number of factors that may influence and constrain the use and selection of emotion regulation strategies (Opitz, Gross, & Urry, 2012). These include the cognitive resources available and ease of utilizing particular strategies. Younger and older adults recruit different prefrontal brain networks during reappraisal use, which has been suggested to reflect compensation for age-related decline in a subset of prefrontal regions (Allard & Kensinger, 2014). In addition, in this study, we found that older adults' choice patterns supported greater optimization of positive affect in the present moment. Limited availability of working memory resources in later life may help explain why distraction was favored less by older than younger adults in highly positive emotional contexts. However, it is important to note that this study did not explicitly track difficulty of emotion regulation strategy use, and substantiating these mechanisms remains an important consideration for future research.

In terms of age differences in negative emotion regulation choice, we hypothesized that older men would minimize exposure to negative emotion more than younger men via the use of distraction processes, given previous research supporting greater distraction preference for negative emotion regulation in older relative to younger adults (Scheibe et al., 2015). However, in our study, younger and older adults chose to use distraction at about the same rate during negative emotion regulation, for both low- and high-intensity emotional contexts. This discrepancy in findings could be partially attributable to larger differences in arousal responses to the stimuli between younger and older adults in the previous study, which equated image lists on the basis of similar valence ratings, whereas we age matched our lists to minimize age differences in both valence and arousal. Given the established relationship between disengagement preferences and higher intensity stimuli (Sheppes et al., 2011, 2014), differences in perceived arousal could have led to age differences in motivation to distract away from images. Our results extend previous findings and suggest that when negative images are arousal matched across age-groups, younger and older men do not significantly differ in their distraction preferences.

Limitations and Future Directions

The study has limitations that necessitate future investigation and research. As in previous studies examining regulation choice (Scheibe et al., 2015; Sheppes et al. , 2011, 2014), emotion and effort ratings were not collected before and after each trial. Older adults may have less effectively downregulated high-intensity images than younger adults, and so we cannot make claims about the efficacy of the strategies investigated. In terms of effort, reappraisal may require a higher working memory load than distraction (Ochsner, Silvers, & Buhle, 2012; Opitz, Gross, et al., 2012). Given decreased working memory resources in older adults (Salthouse, 1990), if strategy difficulty concerns were driving choice, one would expect older men to choose a simpler strategy (distraction) over a more demanding one (reappraisal) when they are cognitively taxed (i.e., in high-intensity emotional contexts). Thus, we would expect older people to choose to distract more than younger adults in intense emotional contexts (aka, reappraise less). Our findings do not support this effort account. Future studies should explicitly consider these influences of self-reported efficacy and difficulty with age.

Another important limitation is that we could not equate positive and negative lists for arousal, given the lower arousal associated with positive images. However, arousal was matched across low-intensity negative and high-intensity positive lists. Contrary to our expectations, both age-groups tended to distract more from positive than negative images encountered. It is possible that image content may largely be driving this effect, as many of the images depicted in the positive stimulus set depicted sexual scenes and most low-intensity negative stimuli depicted scenes of sadness. Given our small stimulus set, we lack the power to determine to what degree image content may have affected choice preferences. Future research should investigate the role of image content in arousal and regulatory context to help disentangle image content effects in emotion regulation choice.

In addition, younger and older men may have differing attitudes regarding pornography/erotica that influence choice preferences. A 2013 Gallup Values and Beliefs poll found that 49% of 18- to 34-year olds, 28% of adults aged 35–54, and 19% of adults aged 55 and older found pornography to be morally acceptable. Thus, approval of engagement with erotica decreases with age (Wilk & Saad, 2013). However, contrary to what would be predicted from these age differences in attitudes, in our study, older men chose to distract from erotica less than younger men and instead used more reappraisal for these high-intensity stimuli.

Finally, this study investigated choice preferences in a sample of younger and older male participants in order to minimize differences in induced emotion for erotic stimuli, and therefore cannot make claims regarding emotion regulation preferences in women, or gender differences in regulation strategy choice. Women have been reported to activate prefrontal structures less than men during reappraisal of negative images (McRae, Ochsner, Mauss, Gabrieli, & Gross, 2008; Domes et al., 2010; Mak, Hu, Zhang, Xiao, & Lee, 2009), and these sex differences may impact choice behavior in an important manner. In addition, fluctuations in estrogen and progesterone across the menstrual cycle influence women's responses to arousing stimuli (Sakaki & Mather, 2012). Future studies should explore sex-related differences in emotion regulation strategy preferences and whether our age-related findings extend to a female sample.

In conclusion, we found no age differences in regulation preferences in negative contexts, whereas older males favored distraction less than younger males in positive contexts. Thus, both younger and older adults frequently opt for distraction strategies that minimize intense emotional experiences, and older men remain more engaged with highly positive contexts than younger men. This suggests that valence may play an important role in emotion regulation strategy choice across the life span.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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