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Mood Regulation in Real-Time: Age Differences in the Role of Looking

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Abstract

Mechanisms have been proposed to underlie differences between younger and older adults in real-time mood regulation, but these mechanisms have not yet been shown to predict mood outcomes. One such mechanism is age-related positivity effects in attention and memory. In this paper, I take one form of this possible mechanism – positive looking patterns – and consider whether 1) older adults prefer positive looking, and 2) positive looking helps older adults regulate their mood in real-time. Evidence is more consistent for the former than the latter. A similar exercise is needed for other possible forms (positive memory) and other possible mechanisms that may explain age differences in real-time mood regulation.

Keywords

aging; emotion; mood regulation; attention; eye tracking

Older adults report more positive affective experience (Carstensen et al., 2011), are more likely to rapidly regulate out of negative mood states (Larcom & Isaacowitz, 2009), and are overrepresented in clusters of positive mood change (Stanley & Isaacowitz, 2011) compared to younger adults. Given well-known age-related declines in cognitive functioning (Park & Reueter-Lorenz, 2009) and physical health (Bortz, 2005) that might be expected to lead to worse moods with age, how can older adults' positive mood regulation be explained?

Several theories have provided possible proximal mechanisms that could underlie these findings: for example, older adults may have more experience managing their moods (Blanchard-Fields, 2007). The most prominent explanation emerged from socioemotional selectivity theory, which explained older adults' socioemotional adaptation as a function of their time perspective and prioritization of emotionally meaningful and/or hedonic goals (SST: Carstensen, Isaacowitz & Charles, 1999).

Recently, Carstensen and colleagues asserted that older adults display “positivity effects” in their attention and memory, focusing more on positive and less on negative material, as a way to achieve their goal of feeling good (Carstensen & Mikels, 2005). This provided several components of a plausible mechanism for older adults' real-time mood regulation. While SST originally focused on selectivity in avoiding elicitors, the addition of positivity effects implicated management of response to potentially negative stimuli: paying less attention to, or remembering fewer negative aspects of a stimulus could plausibly minimize the impact that stimulus has on the mood of the older individual. This perspective can be seen in two theoretical papers regarding SST and positivity effects:

“This ‘emotionally gratifying’ focus would bias attention and memory in favor of material that optimizes emotion regulation (i.e., positive material) even if there are costs to focusing only on such material.” (Carstensen & Mikels, 2005, p. 118)

“Reasoning from socioemotional selectivity theory, the positivity effect reflects motivated cognition operating in the service of emotion regulation.” (Scheibe & Carstensen, 2010, p. 137)

There are no age differences in detection of negative stimuli (Mather & Knight, 2006); once detected, potential response to them can be regulated, and positivity effects can play a regulatory role (Urry & Gross, 2010). Importantly, positivity is an antecedent-focused regulatory strategy, operating on the source of the response (Gross, 1998). This could happen before any mood response has occurred, or dynamically while a mood response is happening, to minimize it. Either way, the outcome is how the person feels when faced with the potentially negative stimuli.

With Fredda Blanchard-Fields, I recently proposed a framework for empirically testing whether age differences in some cognitive process, such as age-related positivity effects in attention and memory, actually serve to help older adults regulate their affective state (Isaacowitz & Blanchard-Fields, 2012). This framework is shown in the top panel of Figure 1, and *critically distinguishes* between (Question 1) whether there are age differences in preferences for some cognitive process related to emotional stimuli, and (Question 2) whether that process bears any functional relationship to mood regulatory outcomes. In that paper, we argue that despite numerous studies showing age differences in preferences (Q1), and the conceptual appeal that such preferences have a mood-regulatory function, surprisingly few studies had actually even tested whether age differences in cognitive processing have anything at all to do with mood regulation (Q2). We assert that it is premature to conclude that age-related positivity effects, when observed, necessarily relate to mood regulation.

My interest has been in one type of age difference: those involving visual attention to emotional stimuli, measured by eye tracking. In numerous studies, we have investigated whether older and younger individuals look differently at emotional material. To mirror work on positivity effects more generally, I refer to “positive looking” as any pattern of eye fixation that is directed *away from more negative and/or toward more positive* material. The framework described above specifies two *distinct* questions about aging and positive looking: First, do older adults prefer positive looking compared to younger adults (Q1)? And second, does positive looking help older adults to regulate their moods over time (Q2)?

The middle panel of Figure 1 shows hypothetical answers to these questions for older adults building from socioemotional selectivity theory: older adults show preferences toward positive information (e.g., more positive looking: Q1), and these preferences (in looking) then predict successful mood regulation (Q2). The next two sections evaluate evidence for whether (Q1) older adults *prefer* positive looking more so than do younger adults and (Q2) positive looking actually predicts better mood regulation outcomes in older adults who display it.

Older Adults Prefer Positive Looking

In several studies, we have found age differences in positive looking, with older adults preferring positive looking more than younger adults (Q1). For example, older and younger adults were asked to “look naturally” while viewing synthetic face pairs varying in emotional expression. Older adults looked more at positive faces and less at some types of negative faces (Isaacowitz et al., 2006a, 2006b). In another study with unpleasant IAPS images, older adults looked less at the most negative parts of the image than did younger adults, even after training them to engage more with negative stimuli (Isaacowitz & Choi, 2011).

These preferences seem strongest when mood regulation is salient: older adults show the most positive looking when in bad moods, though this is when younger adults show the most *negative* looking (Isaacowitz et al., 2008). When subjects were explicitly instructed to regulate their emotions, older adults looked less than young at the most negative parts of the images (Noh, Lohani, & Isaacowitz, 2011).

Across different stimuli, older adults appear to prefer a positive looking approach compared to younger adults: this pattern has been found not only for synthetic faces and IAPS images (Isaacowitz & Choi, 2011; Noh et al., 2011), but also for negatively-valenced health messages (Isaacowitz & Choi, in press), and in studies in other labs (Knight et al., 2007; Nikitin & Freund, 2011). Thus, current evidence provides a positive answer for Q1, as shown on the left side of the bottom panel of Figure 1.

Positive Looking Helps Older Adults with Good Attentional Abilities Regulate Their Moods

Older adults may prefer positive looking (Q1), but does it help them regulate their mood in real-time (Q2)? While emotion regulation is not always hedonically-oriented (Tamir, 2009), arguments that positivity effects such as positive looking function to help older adults pursue emotion regulatory goals and to feel good are not tested or demonstrated by the preference studies described above. Findings that older adults activate positive looking most strongly in negative moods (Isaacowitz et al., 2008) are suggestive but do not provide direct evidence, nor do conceptual proposals that attentional deployment may be a more effective regulatory strategy for older adults (Urry & Gross, 2010). Instead, designs are needed that specifically test a functional link between positive looking and downstream positive mood regulation outcomes, regardless of whether positive looking functions before or once there is already some response to the potential elicitor. In other words, does positive looking lead to positive mood regulatory outcomes for older adults when faced with potentially negative mood disruptions? My lab has conducted several such studies: in each case, positive looking has been found to help some older adults regulate their mood. These effects were moderated by individual differences in attentional abilities, which were of theoretical interest given findings that cognitive abilities moderate positivity effects in a manner consistent with them reflecting top-down processes (though in the context of Q1 rather than Q2: Mather & Knight, 2005).

We have used the Attention Network Test (Fan et al., 2002) to assess individual differences in attentional abilities, defined as performance on behavioral tasks indexing the efficiency of three attentional networks: alerting, orienting, and executive control. In one study, most participants experienced mood decline during a task, but older adults with good attentional abilities on the ANT executive control scale who showed positive looking resisted mood decline. Older adults without good attentional abilities, or who did not display positive looking, showed mood declines (Isaacowitz et al., 2009). In a second study, older adults with good attentional abilities on the ANT alerting scale who activated positive looking as they were presented with extremely negative images showed less mood decline than older adults without that combination of attributes (Noh et al., 2011). While both alerting and executive control have emerged as moderators, the overall pattern has been similar regardless: positive looking helps older adults with good attentional abilities to regulate their moods, thus showing the relevance of attentional abilities to Q2. Put another way, older adults who possess good attentional abilities are able to use attentional deployment in the form of positive looking to successfully regulate how they feel.

In no case has positive looking proven helpful for the mood regulation of younger adults. Rather, in several studies we have found that younger adults feel *better* when they look more

rather than less at negatively-valenced material (Isaacowitz et al., 2009; Noh et al., 2011). Why might this be the case? One possibility is that whereas older adults are trying (and sometimes succeeding) in using attentional deployment as their key regulatory strategy, younger adults take a different path. If younger adults use reappraisal as a regulatory strategy rather than attentional deployment, this could be independent of gaze (Urry, 2010); recent pilot data from my lab suggests that some forms of reappraisal may be associated with elevated looking at negative stimuli. This visual engagement with negative stimuli may help younger adults to craft a reappraisal narrative: one recent study found younger adults looked more at negative stimuli when instructed to reappraise as compared to when they were instructed to suppress their emotional response (Bebko, Franconeri, Ochsner, & Chiao, 2011).

Returning to the framework, it appears that positive looking can lead to positive affective outcomes in older adults, but it depends on good attentional abilities. Sometimes positive affective outcomes mean showing less mood decline in that context. For younger adults positive looking does not lead to positive affect; it may be that more negative looking patterns are associated with feeling better for them via reappraisal. Thus, age differences appear not only for preferences but also for links between preferences and outcomes, though with at least one important moderator: attentional abilities. This nuanced answer for Q2 is shown on the right side of the bottom panel of Figure 1.

Are There Trade-offs Between Affective Outcomes and Other Behavioral Outcomes?

Does older adults' use of positive looking for mood regulation lead to decrements in other areas? If less-attended negative stimuli contain important information, will older adults successfully regulate how they feel at the expense of learning or engaging in other important behavior?

My lab has investigated this using upsetting, informative videos about skin cancer (Isaacowitz & Choi, in press). Younger and older adults had their eyes tracked as they watched the videos and recorded their mood response during and after them. Older adults looked less at the emotional parts of the video, especially when instructed to regulate their emotions. Both age groups showed an equally strong emotional response to the upsetting video - reinforcing that lab stimuli can induce strong reactions - but older adults more rapidly regulated out of their bad moods and stayed in better moods throughout the rest of the session.

On an explicit learning test concerning the videos, younger adults outperformed older adults. But, on a number of skin cancer risk-reducing behaviors suggested in the videos, older adults showed similar or higher levels of positive health behavior than younger adults, indicating some implicit learning from them. For example, older adults were more likely to select a protective suntan lotion as a giveaway and were more likely to remember to complete and return a skin self-exam by mail than their younger counterparts. Thus, it seems from this correlational evidence that older adults may be able to regulate their mood in real-time while also extracting some key information from the less-attended negative stimuli, suggesting an *efficient* looking pattern.

Conceptual Implications and Future Directions

Taking the framework above and applying it to positive looking, there is more robust evidence for age differences in preferences for positive looking (Q1) than evidence that positive looking leads to positive affective outcomes (Q2). Thus, older adults' positive real-

time mood regulation may be accompanied by positive looking, but the two may not always be causally linked. This suggests that SST can tell part of the story about age differences in a process like positive looking patterns – these looking patterns may be age-related positivity effects consistent with the theory – but the idea that positive looking shown by older adults is just a tool for older adults to regulate their emotions may be overly simplistic. Findings that older adults sometimes display positive looking that does not lead to positive affective outcomes (Isaacowitz et al., 2009; Noh et al, 2011) suggests either that it is unsuccessful in serving a mood-regulatory purpose, or is serving some other purposes. Delineating which is true is critical for determining what conceptual models can best explain the proximal and distal causes of older adults' real-time mood regulation.

A key implication is that this exercise needs to happen with other cognitive operations thought to play a role in older adults' real-time mood regulation as well; these other cognitive processes may have been tested for age differences in preferences (Q1) but also need to be tested for explicit links to mood regulation (Q2). For example, numerous studies have found age differences in emotional memory (see Kryla-Lighthall & Mather, 2009 for a review; though cf. Gruhn, Smith, & Baltes, 2005) and often conclude something like “older adults reconstruct the past in such a way as to accentuate the positive, and, as others have suggested, this may reflect efforts at emotional regulation in older adults” (Fernandes, Ross, Wiegand, & Schryer, 2006, p. 304).

However, such studies only speak to preferences (Q1) and not about links to real-time mood regulation (Q2). To date no studies have investigated that link between positive memory and real-time mood regulation, making this a key area of conceptual need: without such studies, it is simply not possible to claim that older adults' real-time mood regulation results from positivity effects in memory. They could also plausibly result from alternative mechanisms suggested as possible causes of changes in emotion-relevant processes with age: for example, particular patterns of age-related neural changes (Caccioppo et al., 2011) or compensatory responses to declining health and abilities (Consedine, 2011). While proponents of SST have argued against these alternate perspectives on the display of positivity effects (Q1: Samanez-Larkin & Carstensen, 2011), there is still an active debate in the literature on Q1 (e.g., Altgassen, Phillips, Henry, Rendell, & Kliegel, 2010), and Q2 remains wide open (see also Urry & Gross, 2010). Only with direct evidence linking cognitive operations to real-time mood regulation can different perspectives actually be contrasted with each other on an empirical level.

What other cognitive operations can be considered in this framework? Different types of emotion regulation strategies may be used at different points in the emotion regulation process (Gross, 1998): for example, attentional deployment is preceded by situation selection/modification, and followed by cognitive change/reappraisal. The efficiency of these strategies may change with age (Urry & Gross, 2010). My lab has started going earlier in the real-time regulation process to investigate positive situation selection: as with any cognitive operation, we will need to determine both whether there is an age preference and separately whether it links to real-time mood regulation. It will also be critical to complement lab studies with longitudinal investigations of within-person changes in mood regulation, given the possibility of cohort differences in exposure to certain negative stimuli (e.g., the TV show *Fear Factor*). Finally, all work to date linking positive looking to mood regulation has been in the context of dampening negative emotional responses; future work should also consider whether positive looking can enhance positive responses as well.

Older adults' real-time mood regulation has a number of conceptually-driven potential underlying mechanisms. Demonstrating that particular proximal mechanisms are not merely plausible but can specifically predict real-time mood change is a more daunting task, but is

ultimately critical; doing so will feed back to the conceptual frameworks. Positive looking can explain some, but not all, of older adults' real-time mood regulation. Other proximal sources, and their conceptual implications, remain to be explored.

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Recommended Readings

- Carstensen LL. The influence of a sense of time on human development. *Science*. 2006; 312:1913–1915. [PubMed: 16809530] This paper provides a brief conceptual and empirical overview of socioemotional selectivity theory.
- Carstensen LL, Mikels JA. At the intersection of emotion and cognition: aging and the positivity effect. *Current Directions in Psychological Science*. 2005; 14:117–121. This paper briefly describes how age-related positivity effects in attention and memory relate to socioemotional selectivity theory.
- Isaacowitz DM, Blanchard-Fields F. Linking process and outcome in the study of emotion and aging. *Perspectives on Psychological Science*. 2012; 7:3–16. [PubMed: 22888369] The conceptual framework used in the current paper is laid out in more detail here.
- Isaacowitz DM, Toner K, Goren D, Wilson HR. Looking while unhappy: Mood congruent gaze in young adults, positive gaze in older adults. *Psychological Science*. 2008; 19:848–853. [PubMed: 18039037]

18947348] This study shows a direct link between negative mood states and age-related positive looking.

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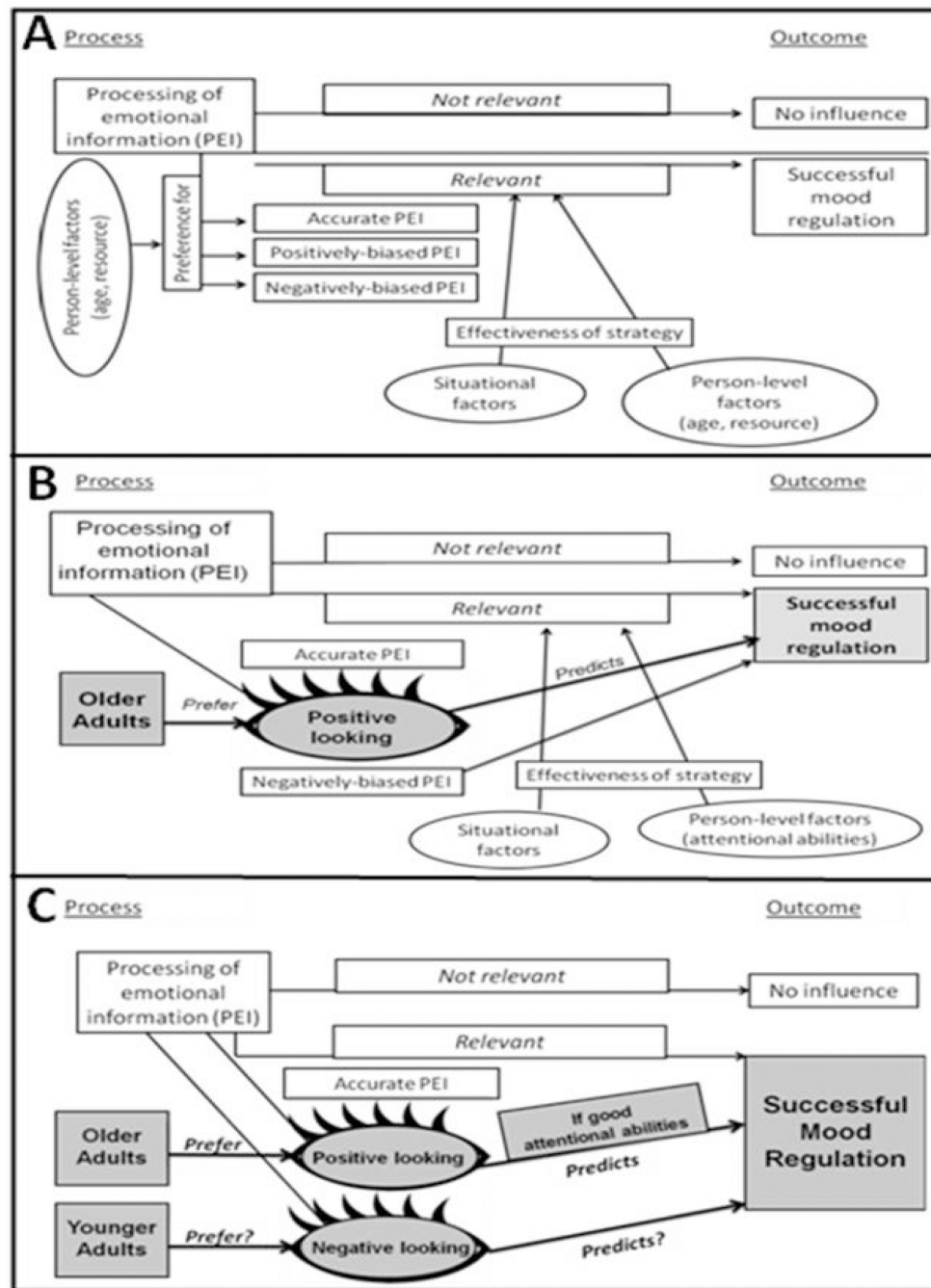


Figure 1.

(A) Proposed framework for linking process and outcome in the study of emotion and aging (from Isaacowitz & Blanchard-Fields, 2012). (B) Hypotheses drawn from socioemotional selectivity linking positivity effects (in this case “positive looking”) to mood regulation. Older adults are hypothesized to prefer positive looking (Q1), and positive looking is hypothesized to lead them to experience successful mood regulation (Q2). (C) Findings from our studies: Older adults prefer positive looking, but it only leads to successful mood regulation for older adults with good attentional abilities. For younger adults, there may be a preference for negative looking, and it may lead to successful mood regulation, but evidence for this is preliminary.