



Contents lists available at ScienceDirect

Journal of Behavior Therapy and Experimental Psychiatry

journal homepage: www.elsevier.com/locate/jbtep



Older adults' attentional deployment: Differential gaze patterns for different negative mood states



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ARTICLE INFO

Article history:

Received 11 February 2016
Received in revised form
9 November 2016
Accepted 22 November 2016
Available online 24 November 2016

Keywords:

Older adults
Attentional bias
Emotion regulation
Eye tracking
Negative mood

ABSTRACT

Background and objectives: Older adults are characterized by an attentional preference for positive over negative information. Since this positivity effect is considered to be an emotion regulation strategy, it should be more pronounced when emotion regulation is needed. In contrast to previous studies that focused on the effects of sad mood on attention, we used a stressor to activate emotion regulation and evaluate the effects of different types of mood state changes. Moreover, we evaluated mood effects on attentional processes using a paradigm that allows disentangling between different attentional engagement and disengagement processes.

Methods: Sixty older adults were randomly assigned to receive a stressor or a control task. Before and after this manipulation, mood state levels (happy, sad, nervous, calm) were assessed. Next, attentional processing of happy, sad, and angry faces was investigated using an eye-tracking paradigm in which participants had to either engage their attention towards or disengage their attention away from emotional stimuli.

Results: Changes in different mood state levels were associated with different attentional disengagement strategies. As expected, older adults who increased in sad mood level showed a larger positivity effect as evidenced by a longer time to disengage attention from happy faces. However, older adults who received the tension induction and who decreased in calm mood level were characterized by longer times to disengage attention from sad faces.

Limitations: The stressor was only partially effective as it led to changes in calm mood, but not in nervous mood.

Conclusions: These results suggest that older adults may deploy a positivity effect in attention (i.e., longer times to disengage from positive information) in order to regulate sad mood, but that this effect may be hampered during the confrontation with stressors.

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1. Introduction

Although aging is associated with declines in several areas of functioning, not all functions deteriorate. Current research points towards age-related improvements in emotion regulation (e.g. Urry & Gross, 2010). Emotion regulation is the ability to influence the experience and/or expression of emotions, and it is a key factor determining emotional wellbeing (Gross, 1998). Therefore, age-related improvements in emotion regulation abilities may help to understand unexpected results on wellbeing in older adults. In

contrast to what might be expected as a result of the increasing amount of loss experiences in late life, studies have reported decreased negative affect and even increased positive affect in older adults (Carstensen et al., 2011; Charles, Reynolds, & Gatz, 2001). These relatively high levels of emotional wellbeing are thought to result from an improved ability to regulate emotions with aging.

One of the most prominent theories on aging, the socio-emotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999), proposes that older adults allocate more resources towards emotion regulation to achieve and maintain high levels of emotional wellbeing. One possible way to achieve this is by selectively attending to positive over negative information in the environment (see Sanchez & Vazquez, 2014). This pattern of attentional deployment has been conceptualized as a key strategy of emotion

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regulation (Gross, 1998). Importantly, this pattern of attentional deployment, conceptualized as the 'positivity effect' (Carstensen & Mikels, 2005), is predicted to increase with age, acting as a mechanism of emotion regulation to maintain emotional wellbeing in older adults.

To investigate this age-related positivity effect, several studies have focused on age-related differences in attentional processing of emotional stimuli. Previous studies have shown that, in contrast to younger adults, older adults are characterized by larger attentional preferences for positive than negative stimuli (Reed, Chan, & Mikels, 2014; Scheibe & Carstensen, 2010). However, other studies have failed to replicate this positivity effect in older adults' emotional attention (Murphy & Isaacowitz, 2008; Steinmetz, Muscatell, & Kensinger, 2010). In an attempt to clarify mixed findings, it has been suggested that the positivity effect in older adults would be more pronounced under certain conditions (e.g. Reed et al., 2014; Urry & Gross, 2010). Given that the positivity effect in attention is thought to reflect an emotion regulation strategy, it has been proposed that it should become more pronounced under conditions where emotion regulation is needed, such as during increased negative mood (Isaacowitz & Blanchard-Fields, 2012).

Recent research has started focusing on the interplay between mood and attentional deployment in older adults. Demeyer and De Raedt (2013) found that inter-individual differences in negative emotions in older adults were related to attentional biases measured by an exogenous cueing task. Older adults who reported higher levels of anxiety showed the largest positivity effect, as evidenced by faster attentional avoidance of negative stimuli. Isaacowitz, Toner, Goren, and Wilson (2008) induced a negative mood state in a sample of older adults before assessing attention patterns to different emotional stimuli with eye tracking. Older adults at high levels of negative mood spent more time looking towards positive stimuli and less time looking towards negative stimuli. Therefore, these gaze patterns may serve as an emotion regulation mechanism (Isaacowitz et al., 2008). In line with this idea, Isaacowitz and Choi (2012) demonstrated a link between older adults' attentional patterns and subsequent recovery from negative mood states. When confronted with a negative film clip, older adults who looked less at the negative content were faster in regulating the induced negative mood state. Thus, an increased negative mood may serve as a signal that more effort is needed to reach an optimal level of emotional wellbeing. As a result, older adults would deploy a positivity effect in emotional attention (i.e., selectively attending to positive over negative information) in order to regulate negative mood states.

Although initial evidence points towards the positivity effect as an emotion regulation strategy, further research is required. First, previous studies investigating this effect have focused on emotional attention after inducing sad mood, whereas the presence of a positivity effect in response to other types of negative mood states remains unclear. It has been suggested that older adults are less emotionally reactive to stress as a result of improved emotion regulation strategies (Neupert, Almeida, & Charles, 2007). However, it also has been suggested that once experiencing greater levels of physical arousal older adults have greater difficulties in recovering from arousal increases (Charles, 2010). The Strength and Vulnerability Integration (SAVI) model (Charles, 2010) posits that age-related changes in emotion regulation are not only characterized by enhancement in emotion regulation strategies that help to limit the exposure to negative information, but also by increasing difficulties with modulating high arousal and stress. Thus, not all negative mood states may lead to the successful use of attentional strategies in emotion regulation. However, to the best of our knowledge, no studies have investigated the influence of mood

states that are linked to the reactivity to stressors (i.e., increased nervousness, reduced calmness), as opposite to sad mood state, on older adults' attentional deployment. Second, studies analyzing the interplay between mood states and attentional deployment have mainly focused on attention during naturalistic free viewing, finding evidence for prolonged attentional processing of positive compared to negative information (e.g. Isaacowitz et al., 2008). However, attention research stresses the importance of differentiating between interrelated components of attention (Posner & Cohen, 1984), such as attentional engagement (i.e., directing attention towards stimuli) and attentional disengagement (i.e., shifting attention away from stimuli). It has been indicated that these distinct attentional processes can play a role during the regulation of emotions (e.g., Sanchez, Vazquez, Gomez & Joormann, 2013; Sanchez, Vazquez, Marker, LeMoult & Joormann, 2013). For instance, depressed individuals, known for difficulties with emotion regulation, do not differ from control groups in directing attention to negative information, but they do exhibit difficulties in disengaging once this negative information has captured their attention (for an overview, see De Raedt & Koster, 2010). Since the tasks used in previous studies (e.g. Isaacowitz et al., 2008) do not allow disentangling these two components involved in overt attentional processing, it remains unclear whether the prolonged attentional processing of positive compared to negative information found in these studies results from a faster engagement to positive information, slower disengagement from positive stimuli, and/or faster disengagement from negative stimuli. Therefore, studies using tasks that allow disentangling these two differential attentional components are needed. Third, several types of negative stimuli (e.g. angry and sad faces) have been used to investigate preferences for positive over negative stimuli. Although former studies have shown that the positivity effect reflects an attention bias away from sad faces (e.g. Demeyer & De Raedt, 2013; Mather & Carstensen, 2003), there are also several studies in which a bias away from angry faces was found (e.g. Isaacowitz, Wadlinger, Goren, & Wilson, 2006; Mather & Carstensen, 2003). These findings highlight the importance of including different types of negative stimuli in order to investigate whether attentional engagement and disengagement processes differ in response to different types of stimuli.

The aim of the current study was to clarify these questions by investigating the conditions (i.e., different mood states: happy, sad, nervous, calm; different emotional information: happy, angry, sad) that determine the occurrence of the positivity effect in older adults and the specific processes underlying such attentional deployment pattern (i.e., faster engagement towards positive information, slower disengagement from positive information, and/or faster disengagement from negative information). In contrast to previously found associations between sad/happy mood states and attentional deployment, we aimed to extend the knowledge on the influence of mood on the positivity effect by clarifying the influence of mood states linked to the reactivity towards stressors in older adults' attentional deployment. Therefore, this study represents a first pilot study using a stressor (i.e., an unsolvable task) to investigate the potential role of mood state changes associated to the reactivity towards stressors (i.e., an increase in nervousness, decrease in calmness), as opposite to sad mood state changes, in older adult's emotional attention processes. A group of older adults receiving this stressor and a control group (who did not have to complete the unsolvable task) performed an attention task based on eye-tracking, the engagement-disengagement task (Sanchez, Vazquez, Marker et al., 2013), to obtain direct measures of attentional engagement towards and attentional disengagement from emotional faces.

We expected that, compared to the control condition, the

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