

The Positivity Effect in Old Age:

Is it Real?

Christie Chung

Although many studies have documented that older adults remember positive better than negative information, others have not found this positivity effect in their studies, thus raising the question of whether the positivity effect is a reliable cognitive phenomenon. In the present study, I examined the possibility of the positivity effect as a cohort effect. The positivity effect could be a cohort effect because older adults have been through more unfortunate events than most young adults; therefore, their positive attitude now may subsequently enhance their memory for positive information. My results, however, did not support this hypothesis. Participants who rated life as better now than before did not show better recall for positive information than those who rated life as the same or worse than before. This finding suggests that positive memory bias in old age is not a cohort effect. Moreover, older adults who have fewer depressive symptoms, tend to remember emotional information better than those who show more depressive symptoms. This important finding suggests that the positivity bias in memory may not be a universal cognitive change in old age. Factors such as older adults' mood traits should be taken into account while evaluating their emotional memory performance.

Key words: cognitive ageing , emotional memory, positivity effect, cohort effect

A growing literature documents evidence that we experience fewer negative emotions as we age. For example, when tested on an incidental picture memory task, older adults remembered fewer pictures overall, but the age difference was greater for negative pictures than for positive and neutral pictures.¹ Researchers have found a similar positivity bias in other paradigms, such as reviewing past choices² and autobiographical information.^{3, 4, 5} Carstensen and colleagues suggested that this age-related difference in memory for emotionally valenced information is related to older adults' greater motivation than young adults to regulate emotional states.⁶ According to the socioemotional selectivity theory, when one's lifetime is perceived to be limited,

emotionally meaningful thoughts, for example viewing the past as positive, are emphasized more than thoughts directed toward gaining new information.

Yet, the positivity effect in old age may be caused by factors other than ones posited by the socioemotional selectivity theory. The positivity effect may be a cohort effect because older adults who are living in this era have been through many unfortunate events in their lives, for example, the Great Depression, World Wars I and II, and the Korean Campaign. In addition, due to technological advances, life is much more comfortable today than it was 50 years ago. As a result, the decreased emphasis on negative memory may not be an age-related cognitive phenomenon but may instead be related to the individual's year of birth, i.e., cohort. Further, older adults who in general hold positive views on life may remember more positive information on a memory test, thus, exhibiting a positivity effect. Similarly, older adults who are going through positive changes in life may also hold more positive attitudes toward life than ones who are sick and alone. Consequently, the decrease in negative memories observed in some studies of emotional memory may be related to environmental factors instead of age-related cognitive changes.

Another possible explanation for the positivity effect is that older adults who volunteer for laboratory studies are in general healthy individuals living independently. As a result, this self-selected volunteer sample may have a more positive attitude toward life than healthy older adults who are unable or unwilling to participate in laboratory studies due to family commitments, decreased mobility, or other obligations.

The present study explored the possibility of the positivity effect being a cohort effect with an emotional picture memory task. I correlated participants' performance on the emotional picture memory task with answers from a carefully designed questionnaire. Participants were asked to rate their lives now compared to lives in their young adulthood (20 to 30 years old). If the cohort effect hypothesis were true, participants who rated life now as better than life before should have a more positive attitude towards life than those who rated life as the same or worse than before. I expected this group to show a stronger instance of a positivity bias in memory.

I was also interested in the effect of depressive symptoms on healthy older adults' emotional memory performance. Therefore, the Beck Depression Inventory (BDI) was used to assess mood trait in clinically non-depressed older adults alongside the examination of their emotional memory ability. I hypothesized that participants with fewer depressive symptoms, i.e., lower BDI scores, would show a more prominent positivity bias in memory.

Method

Participants. Participants were 49 older adults recruited from the Claremont and East Bay communities in Southern and Northern California, USA. Participants' ages ranged from 57 to 87, with a mean of 74.65. Participants were paid \$10/hr for participation. English was the participant's first language or had been learned before age 7. Participants with a history of neurological/psychiatric disorders, diabetes, stroke, or vision difficulties were excluded. All participants were equated on health condition (health questionnaire), education level (≥ 12 years), mental/dementia status (Mini Mental State Examination, MMSE ≥ 27 – non-demented); and depression (BDI ≤ 10 – non-depressed). They completed a personality questionnaire (NEO-Five Factor Inventory)⁷ and a frequency of forgetting questionnaire (Rasch Modeled Memory Self-efficacy Scale)⁸ for sample characterization purposes.

Materials. The stimuli were 30 pictures (10 positive, 10 neutral, 10 negative), plus 2 fillers at the beginning and end of each encoding list. These pictures were obtained on the internet and were rated for valence and arousal by younger adults and older adults in a separate cognitive neuroscience experiment conducted at Massachusetts Institute of Technology, Cambridge, USA (MIT). Only pictures that were representative of each valence were used in the present study. Charles and her colleagues¹ suggested that pictures that include human faces are ones that would most likely evoke the positivity effect. I examined this claim by using pictures that did not include human beings or animals. Two counterbalanced encoding lists were created with pictures of objects and scenes.

The Ageing Questionnaire I designed was administered at the end of each session. In order to assess participants' attitudes towards ageing, they were instructed to write five words or phrases on a blank piece of paper that came to mind when they thought of ageing and then answer the view of life questions that followed.

Procedure. Participants viewed a list of positive, negative, and neutral pictures presented individually for 4 sec/picture on the computer screen. They were told to view the pictures as if they were watching television and were not informed of the memory test that would follow. After viewing the pictures, a 5-minute filler task was administered. Then, participants recalled aloud pictures that they could remember using brief verbal descriptions. After this picture task, participants completed the BDI, personality, frequency of forgetting, and Ageing questionnaires.

Results

An alpha of .05 was used for all analyses. Figure 1 shows the pattern of recall by valence for older adults divided into two sub-groups: young-old adults were 55 to 69 years old ($n = 9$) and old-old adults were 70 to 87 years old ($n = 40$). A 2 (age) X 3 (valence) Analysis of Variance (ANOVA) revealed a significant main effect of valence, $F(2, 94) = 7.85, p < .01, \eta^2 = .14$, but no significant main effect of age, $F(1, 47) = .002, p = .97, \eta^2 < .001$, or age x valence interaction, $F(2, 94) = .37, p = .69, \eta^2 = .01$. However, upon closer inspection, old-old adults appeared to have recalled more positive and fewer negative pictures than young-old adults. This trend is consistent with our hypothesis that the positivity effect should increase as age advances chronologically.

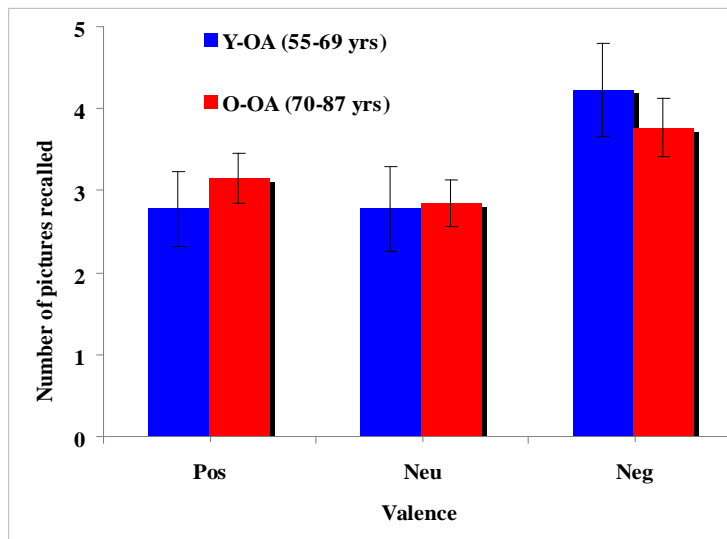


Figure 1. Picture recall performance by valence in young-old (Y-OA) and old-old adults (O-OA) (means \pm standard errors).

I then examined the difference between participants who thought life was better now ($n = 34$) compared to those who rated life as the same or worse than before ($n = 14$). One participant failed to answer this question, i.e., $N = 48$.

As shown in Figure 2, a 2 (view of life) X 3 (valence) ANOVA revealed a significant main effect of valence, $F(2, 91) = 6.92, p < .01, \eta^2 = .13$, but no significant main effect of view of life, $F(1, 46) = .40, p = .53, \eta^2 = .01$, or view X valence interaction, $F(2, 88) = 1.02, p = .36, \eta^2 = .02$. Thus, I concluded that the positivity effect in old age might not be simply due to a cohort effect.

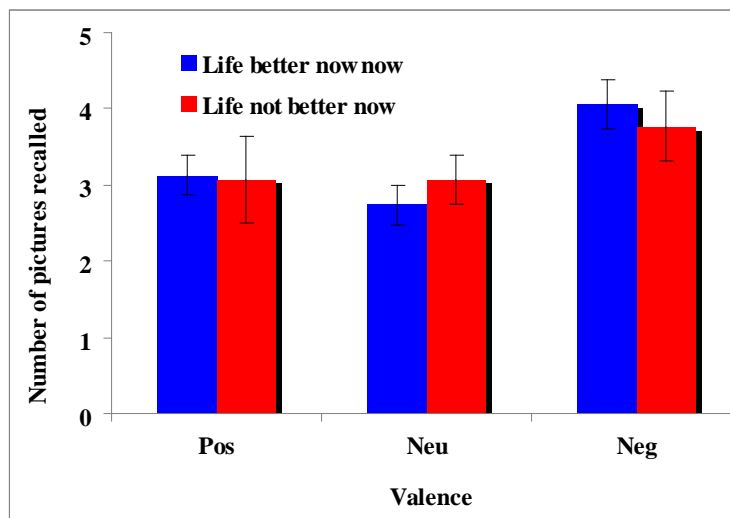


Figure 2. Picture recall performance by valence in older adults who rated life as better now or not (means \pm standard errors).

I next examined the contribution of depressive symptoms to emotional memory performance. Although all participants were classified as clinically non-depressed according to the Beck Depression Inventory (BDI), I further categorized the participants into a low depressive symptoms group (BDI scores 0 to 5; $n = 34$) and high depressive symptoms group (BDI score 6 to 10; $n = 15$). I hypothesized that participants with fewer depressive symptoms, i.e., lower BDI scores, would show a more prominent positivity bias in memory. As shown in Figure 3, the two groups of older adults had different patterns of emotional memory performance.

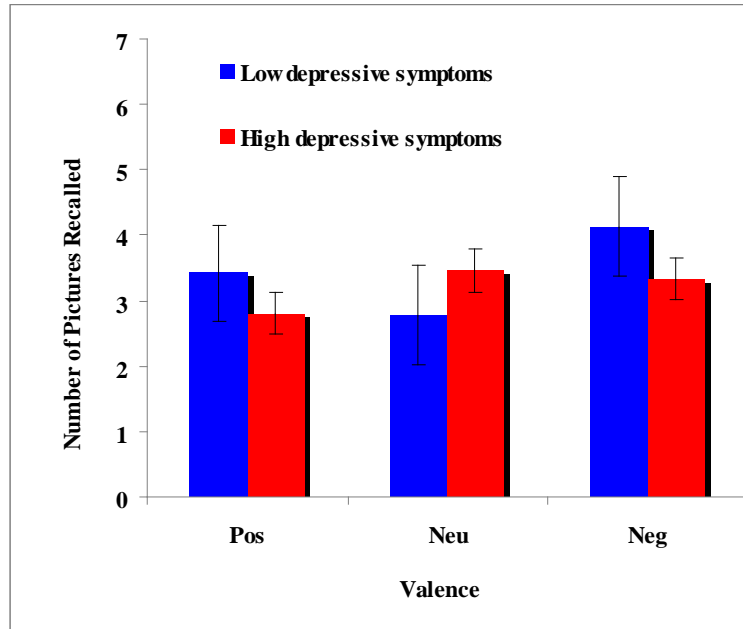


Figure 3. Picture recall performance by valence in older adults who showed low and high depressive symptoms (means \pm standard errors).

A 2 (depressive symptoms) \times 3 (valence) ANOVA revealed a significant main effect of valence, $F(2, 94) = 8.15$, $p < .01$, $\eta^2 = .15$, and a marginally significant interaction between depressive symptoms and valence, $F(2, 94) = 1.97$, $p = .10$, $\eta^2 = .04$. Although post-hoc t-tests did not reveal any statistically significant differences in recall patterns between the two groups (possibly due to small sample size), it is obvious that older adults with high depressive symptoms had a recall pattern that differed from those with low depressive symptoms. Older adults with high depressive symptoms did not have better recall for emotional pictures, or an emotional enhancement effect, as shown by older adults with low depressive symptoms.

Discussion

According to the socioemotional selectivity theory, older adults tend to focus on emotionally salient and positive instances due to age-related motivational and cognitive changes.⁶ In due course, older adults are also more likely to remember positive than negative and neutral information than young adults. The purpose of this study was to examine the possibility of the positivity bias in older adults' memory as a cohort effect instead of a cognitive-related change in older adulthood. My results clearly demonstrates the trend of a positivity bias as age increased, however, the cohort effect explanation was not a sufficient answer for the observed emotional memory difference in our participants. Mood trait, on the other hand, was a factor that significantly contributed to differences in older adults' emotional memory.

In general, we found an emotional enhancement effect consistent with the rest of the cognitive literature, in which participants remembered more emotional (positive and negative) information than neutral information.⁹ Figure 1 clearly illustrates the trend of a positivity bias in memory as participants' age increased – old-old adults (70 to 87 years old) remembered more positive and fewer negative pictures than young-old adults (57 to 69 years old). This result coincides with many others in the cognitive ageing literature, yet, the basis of this finding is not completely clear.

The reasoning behind the examination of the positivity effect as a cohort effect is two-fold. First, older adults may have been through many more unfortunate events than young adults, therefore, their points of view towards life are bound to be slightly different from that of the young adults. I hypothesized that older adults may have a more positive view on life because those who live in the U.S. now are more likely to experience life that is more stable and of higher quality than when they were younger, especially if they have been through wars and other political campaigns. Young adults have not been through as many life events overall, let alone unfortunate ones. Thus, their view of life maybe less positive than older adults' merely due to a lack of reference points in history. In fact, many studies have found a negativity bias in young adults' memory.¹⁰ Second, our views of our own cognition, namely metacognition, as well as personal attitudes have also been found to directly impact cognitive performance.¹¹ These findings further strengthen my claim that young and older adults' view of life may affect their memory performance.

With a carefully designed questionnaire, I was able to categorize my older participants into two separate groups – 1) rated life as better than in their

20's or 30's, and 2) life is the same or worse than in their 20's or 30's. I hypothesized that the group who rated life as better now would also exhibit a stronger positivity bias in memory. To my surprise, the results did not support my hypothesis. As shown in Figure 2, older adults who viewed life as better now had similar emotional memory recall patterns as those who viewed life as the same or worse than before. Thus, I concluded that the positivity effect in old age is more than merely a cohort effect.

Apart from cohort factors, I was also interested in the role that mood trait may play in older adult's emotional memory. In one of my previous studies, depression significantly decreased the instance of emotional enhancement in young women.¹⁰ Therefore, I also examined the contribution of depressive symptoms on older adults' picture recall performance in the present study. I further categorized my non-depressed older adults into a low depressive symptoms group (BDI 0-5) and a high depressive symptoms (BDI 6-10) group. My results clearly illustrate that only participants with few depressive symptoms exhibited an emotional enhancement effect. That is, participants with more depressive symptoms recalled positive, neutral, and negative pictures at similar rates. This finding supported my hypothesis and is also consistent with my previous finding on women and depression.¹⁰

One way to explain the above finding is that perhaps older adults with fewer depressive symptoms were able to appropriately allocate their limited cognitive resources to information that were emotionally salient and meaningful. Older adults with more depressive symptoms, however, were not able to complete this task as adequately. They ended up remembering more information that was not necessarily emotionally important. Another possible explanation is that older adults with more depressive symptoms interpreted the neutral items as negative. Thus, their better memory for these neutral items may merely be a reflection of their heightened awareness of negative information in general. Only further studies would allow us to fully examine the underlying mechanism of this interesting finding. Nevertheless, this serendipitous finding proclaims the utmost importance in considering healthy older adults' mood traits while examining their cognitive functioning.

As the population grows older, it has never been more pressing for us to understand age-related changes in cognition and motivation. The present study shed light on the understanding of the positivity effect in old age, which is a well-documented yet poorly understood phenomenon in the cognitive ageing literature. I found that the positivity effect is not a cohort effect, but depressive symptoms appear to be an important factor that influences the way older adults

remember emotional information. Future research would allow us to tease apart the possible contributing factors to this fascinating change in older adults' memory

Notes

- 1 S Charles, M Mather, & L Carstensen, 'Aging and Emotional Memory: The Forgettable Nature of Negative Images for Older Adults'. *Journal of Experimental Psychology: General*, vol.132, 2003, 310-324.
- 2 M Mather & M Johnson, M, 'Aging and Emotional Memory: The Forgettable Nature of NEG Images for Older Adults'. *Psychology and Aging*, vol. 15, 2000, pp. 596-606.
- 3 D Field, 'Retrospective Reports by Healthy Intelligent Elderly People of Personal Events of their Adult Lives'. *International Journal of Behavioral Development*, vol. 4, 1981, pp. 77-97.
- 4 Q Kennedy, M Mather & L Carstensen, 'The Role of Motivation in the Age Related Positivity Effect in Autobiographical Memory'. *Psychological Science*, vol. 15, 2004, pp. 208-214.
- 5 W Wagenaar, & J GroeneIg, 'The Memory of Concentration Camp Survivors'. *Applied Cognitive Psychology*, vol. 4, 1990, pp. 77-87.
- 6 L Carstensen, 'Motivation for Social Contact Across the Life Span: A Theory of Socioemotional Selectivity'. J. E. Jacobs (ed.), *Nebraska Symposium on Motivation*. University of Nebraska Press, Linclon, 1993. pp. 209-254.
- 7 P Costa & R McCrae, Neo Five Factor Inventory (NEO-FFI). Psychological Assessment Resources, Inc. 2003.
- 8 E Zelinski & M Gilewski, 'A 10-item Rasch Modeled Memory Self-efficacy Scale'. *Aging and Mental Health*, vol. 8, 2004, pp. 293-306.
- 9 E Kensinger, B Brierly, N Medford, J Growdon, & S Corkin, 'Effects of

Normal Aging and Alzheimer's Disease on Emotional Memory'. *Emotion*, vol. 2, 2002, pp. 118-134.

10 C Chung, F Sharifi, E Mahinda, S Wong, & J Johnson, (2009). Negativity bias in young women's memory. *Manuscript in preparation*.

11 B Levy & E Langer, 'Aging Free from Negative Stereotypes: Successful Memory in China and Among the American Deaf'. *Journal of Personality and Social Psychology*, vol. 66, 1994, pp. 989-997.

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Christie Chung is an Assistant Professor in the Psychology Department at Mills College in Oakland, California, USA. Email: cchung@mills.edu.