**Nostalgia and the Positive Valence System**

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Materials and data are located on the [Open Science Framework](https://osf.io/gkt3w). Corresponding author:Nicholas J. Kelley, Center for Research on Self and Identity, School of Psychology, University of Southampton, Southampton, SO17 1BJ, United Kingdom. Email: [n.j.kelley@soton.ac.uk](mailto:n.j.kelley@soton.ac.uk).

**Abstract**

According to the regulatory model of nostalgia, nostalgia activates the positive valence system to countermand negative emotionality. However, no research has systematically examined whether nostalgia influences the diverse manifestations of the positive valence system. We addressed this issue in two preregistered studies (*ΣN* = 543). Participants completed trait nostalgia scales and the Positive Valence System Scale, comprising the following seven constructs: reward valuation, reward expectancy, effort valuation, action selection, reward anticipation, initial reward responsiveness, reward satiation. In both studies, trait nostalgia was positively associated with all positive valence system constructs. When nostalgia was experimentally induced (Study 2), it increased reward valuation, action selection, and initial responsiveness. The results clarify nostalgia’s impact on the positive valence system and the implications of the regulatory model.

*Keywords*: nostalgia, positive valence system, reward valuation, action selection, initial responsiveness

**Nostalgia and the Positive Valence System**

Nostalgia is a sentimental longing for one’s meaningful past (Sedikides et al., 2008). Originally coined by Swiss physician Johannes Hofer in 1688 as a term for homesickness (Hofer, 1688/1934), nostalgia remained synonymous with it for centuries (Sedikides et al., 2004). It was not until the mid-20th century that researchers began to recognize nostalgia as a distinct psychological construct, with systematic research accelerating around the turn of the 21st century (Batcho, 2013; Dodman, 2023).

Typically, nostalgia involves recalling momentous life events, such as birthdays, graduations, or anniversaries, which are often shared with family, friends, or romantic partners (Hepper et al., 2014; Wildschut et al., 2006). Although nostalgia is bittersweet (Leunissen et al., 2021; Turner & Stanley, 2021), it leans more toward the sweet (Leunissen, 2023; van Tilburg, 2023), evoking warmth, tenderness, contentment, and joy, yet also carrying a sense of yearning for the irretrievable past (Batcho, 1995; Hepper et al., 2012; Sedikides & Wildschut, 2016). The emotion is experienced multiple times a week (Hepper et al., 2021; Wildschut et al., 2006), and is observed across cultures (Hepper et al., 2014, 2024; Sedikides & Wildschut, 2022) and throughout life stages (Juhl et al., 2020; Madoglou et al., 2017). Nostalgia also confers psychological benefits, with a growing body of research highlighting its regulatory capacity. In the current research, we focused on this capacity by examining whether the emotion activates the positive valence system.

**The Regulatory Model of Nostalgia**

The regulatory model of nostalgia (Wildschut & Sedikides, 2023a) proposes that nostalgia functions to maintain psychological stability, especially in the face of negative affect or motivational disruption. By “regulatory,” we refer to nostalgia’s role in offsetting distress and promoting approach-oriented functioning. For example, nostalgia can reduce loneliness, elevate mood, increase optimism, and motivate socially engaged or goal-directed behavior (Sedikides et al., 2015; Wildschut & Sedikides, 2023b). This model is organized around two fundamental propositions. The first proposition is that the emotion is triggered by negative or discomforting experiences or states, which are laced with avoidance motivation—“the energization of behavior by or the direction of behavior away from negative stimuli” (Elliot, 2006, p. 112). Indirect support for this proposition comes from studies showing that a range of avoidance-motivated states trigger nostalgia. For example, loneliness is related to elevated avoidance motivation (Gable, 2005; Nikitin & Freund, 2017) and elicits nostalgia (Wildschut et al., 2006; Zhou et al., 2008, 2022). Similarly, social exclusion is associated with avoidance motivation (Molden et al., 2009; Park & Baumeister, 2015) and elicits nostalgia (Seehusen et al., 2013). Likewise, negative mood states covary with avoidance motivation (Elliot & Thrash, 2002) and trigger nostalgia (Barrett et al., 2010; Wildschut et al., 2006). Additionally, heightened avoidance motivation is a key characteristic of existential concerns that evoke nostalgia, such as boredom (van Tilburg et al., 2013), self-discontinuity (Sedikides, Wildschut, Routledge, & Arndt, 2015), disillusionment (Maher et al. 2021, Study 3), and meaninglessness (Routledge et al., 2011). Finally, right lateralized patterns of frontal brain activity are indicative of avoidance motivation (Kelley et al., 2017), and such patterns predict nostalgia (Tullett et al., 2015).

Direct support for the first proposition of the regulatory model comes from experiments by Stephan et al. (2014) demonstrating that avoidance motivation triggers nostalgia. In Study 1, these researchers assessed avoidance motivation using Carver and White’s (1994) Behavioral Inhibition Scale and found a significant correlation with nostalgia. Put otherwise, dispositionally nostalgic participants exhibited higher levels of avoidance motivation. In Study 2, the researchers experimentally manipulated avoidance motivation by asking participants to think about their future and list either five aversive events they are motivated to avoid (avoidance motivation condition) or five ordinary events that might occur (control condition). Inducing avoidance motivation (vs. control) heightened state nostalgia, which, in turn, boosted approach motivation.

The second proposition of the regulatory model states that nostalgia strengthens the activation of the approach-motivational system by enhancing positive affect or pleasure, reward responsivity, goal pursuit, and behavioral tendencies. Support for this proposition comes from an integrative data analysis combining positive and negative affect measures from 41 experiments that manipulated nostalgia (*N* = 4,659). The findings revealed that induced nostalgia increased positive affect but not negative affect (Leunissen et al., 2021). Further support for the proposition comes from multiple experiments. For example, nostalgia

intensifies reward-related brain activity in the ventral striatum (Oba et al., 2015), enhances the approach motivated pursuit of important goals (Sedikides et al., 2018), especially friendship goals (Abeyta et al., 2015), and galvanizes approach-oriented behavior as evidenced by reduced seating distance between oneself and another person (Stephan et al., 2014, Study 4) and helping a person in need (Stephan et al., 2014, Study 5).

**The Current Research**

We were concerned in this article with the relation between nostalgia and the positive valence system, which is multifaceted. In particular, it includes the following constructs: desire for rewards (reward valuation), expectations regarding the likelihood of reward attainment (reward expectancy), willingness to exert effort to obtain rewards (effort valuation), choosing to pursue rewards rather than other possible actions (action selection), anticipation of future rewards (reward anticipation), immediate responses to rewards (initial responsiveness), sustained responses to rewards (reward satiation; Khazanov et al., 2020). Although the literature we reviewed in the preceding paragraph (Abeyta et al., 2015; Leunissen et al., 2021; Oba et al., 2015; Sedikides et al., 2018; Stephan et al., 2014) focused on outcomes related to the positive valence system, it did so in a piecemeal fashion. To more thoroughly delineate nostalgia’s influence on the positive valence system from the perspective of the regulatory model, we conducted both cross-sectional (Studies 1-2) and experimental (Study 2) investigations.

We report how we determined our sample sizes and all data exclusions, manipulations, and measures, and we follow Journal Article Reporting Standards (Kazak, 2018). Participants provided informed digital consent, and procedures were approved by Bond University’s Human Research Ethics Committee. We compensated participants with £1.25 and pro-rated payment to those who terminated early. We analyzed the data using SPSS Version 29. We preregistered hypotheses, analyses, and exclusion criteria for both studies (<https://osf.io/qpgts>; <https://osf.io/mj4sx>). Data and materials are available on the [Open Science Framework](https://osf.io/gkt3w).

**Study 1**

In Study 1, we examined associations between nostalgia and the positive valence system. For convergent validity purposes (Campbell & Fiske, 1959; Wildschut et al., 2023), we implemented a comprehensive assessment of nostalgia using the Southampton Nostalgia Scale (SNS; Sedikides, Wildschut, Routledge, Arndt et al., 2015), the Nostalgia Prototype Scale (NPS; Cheung et al., 2017), and the Personal Inventory of Nostalgic Experiences (PINE; Newman et al., 2020). We also included measures of counterfactual thinking and rumination to capture other modes of autobiographical reflection (Cheung et al., 2018; Jiang et al., 2021; Wildschut et al., 2023). Accordingly, participants completed the Counterfactual Thinking for Negative Events Scale (CTNES; Rye et al., 2008) and the Ruminative Response Scale (RRS; Treynor et al., 2003). Finally, participants completed the Positive Valence Systems Scale (PVSS; Khazanov et al., 2020). We administered all measures in a separate randomized order for each participant. We hypothesized that nostalgia would be associated with greater positive valence system activation in general. However, we remained agnostic regarding whether nostalgia would be more strongly linked to specific constructs of the positive valence system.

**Method**

***Participants***

A-priori power analysis indicated that 193 participants would confer 80% power to detect small-to-moderate effects (*r* = .20) and 258 participants would confer 90% power. We oversampled and recruited 355 U.K. Prolific workers. Five participants exited the study after providing consent. We excluded 35 participants for failing at least one attention check. The final sample comprised 315 participants (159 women, 150 men, and 6 non-binary, transgender, or genderfluid) ranging in age from 18–76 years (*M* = 32.84, *SD* = 11.50).

***Procedure***

**Southampton Nostalgia Scale*.*** The SNS (Sedikides, Wildschut, Routledge, Arndt et al., 2015; Wildschut & Sedikides, 2022) first presents participants with a definition of nostalgia (“a sentimental longing for the past”). Next, they respond to seven questions referring to the personal importance (e.g., “How important is nostalgia for you?”; 1 = *not at all*, 7 = *very much*) and frequency (e.g., “How often do you experience nostalgia?”; 1 = *very rarely*, 7 = *very frequently*) of nostalgic engagement (*M* = 4.88, *SD* = 1.18, α = .91).

**Nostalgia Prototype Scale*.*** The NPS (Cheung et al., 2017) asks participants to indicate how frequently they experience (1 = *I do this very rarely*, 7 = *I do this very often*), and the importance they place upon (1 = *This is not important for me*, 6 = *This is very important for me*), five prototypical features of nostalgia (e.g., “I bring to mind rose-tinted memories,” “I reflect on keepsakes”). Unlike other measures, the NPS does not use the term “nostalgia.” Following Cheung et al. (2017), we aggregated the 10 responses (5 behaviors × 2 ratings; *M* = 4.85, *SD* = 1.19, α = .92).

**Personal Inventory of Nostalgic Experiences*.*** The 4-item PINE (Newman et al., 2020) asks participants how nostalgic they feel in general (e.g., “How nostalgic do you feel?” “To what extent do you feel sentimental for the past?”; 1 = *not at all*, 7 = *very much*; *M* = 4.90, *SD* = 1.28, α = .86).

**Positive Valence System Scale*.*** Participants completed the 45-item version of the PVSS (Khazanov et al., 2020), allowing us to examine associations with an overall positive valence factor, as well as with subscales relating to the reward constructs that comprise the Positive Valence Systems domain. Participants considered how well each item described their experiences in the previous two weeks—or hypothetically, if they had not experienced the pertinent event in the previous two weeks (*1 = extremely untrue of me, 9 = extremely true of me*). We used their response average as a general measure of positive valence systems (α = .93). We also created averages for each subscale, although their internal consistency ranged from acceptable (Reward Valuation α = .66, Reward Expectancy α = .61, Effort Valuation α = .70, Action Selection α = .65, Initial Responsiveness α = .72, Reward Satiation α = .67) to low (Reward Anticipation α = .54).

**Counterfactual Thinking** **for Negative Events Scale*.*** As part of the CTNES (Rye et al., 2008), we asked participants to reflect on a recent event that had a negative impact on them and indicate the frequency with which they experienced 16 counter-factual thoughts (1 = *never*, 5 = *very often*). As in previous studies (Cheung et al., 2018), we averaged responses across the four CTNES subscales (Nonreferent Downward, Other-Referent Upward, Self-Referent Upward, and Nonreferent Upward; α = .84).

**Ruminative Response Scale*.***As part of the RRS (Treynor et al., 2003), participants indicated how frequently they thought or engaged in 10 reflective or ruminative thoughts or behaviors (1 = *almost never*, 4 = *almost always*). We used the sum of responses as an index of rumination (α = .94).

**Attention Checks*.***We embedded three attention check items (i.e., responding to an arithmetic question, selecting a specific scale response, interacting with a fictional country) among the demographic questions, the RRS, and at the conclusion of the study. The PVSS included an additional attention check item.

**Results**

***Data Analysis Plan***

Following our preregistered data analysis plan, we first used bivariate correlations to assess the relations among nostalgia, counterfactual thinking, rumination, and the positive valence system. Next, we conducted multiple regression analyses to assess the associations between nostalgia and the positive valence system, while controlling for rumination and counterfactual thinking. Finally, we conducted canonical correlation analyses to examine multivariate associations between a set of variables comprising the past-thinking measures, and a set of variables comprising the PVSS subscales (Cheung et al., 2018; Sherry & Henson, 2005). Given that the results of the canonical correlation analyses corroborated and overlapped with those of the multiple regression analyses, we report them in Supplemental Materials (see Canonical Correlations in Study 1 and Table S1).

***Bivariate Correlations***

All three nostalgia measures were highly inter-correlated (*r*s > .69, *p*s < .001). Also, all three nostalgia measures were significantly associated with the PVSS composite. The association between PVSS and nostalgia was strongest for the NPS (*r* = .31, *p* < .001), weakest for the PINE (*r* = .17, *p* = .002), and intermediate for the SNS (*r* = .25, *p* < .001). Given the high inter-correlations of the nostalgia measures, we created a nostalgia composite which was also significantly associated with PVSS (*r* = .26, *p* < .001). When examining constructs of the positive valence system separately, the nostalgia composite was significantly associated with every PVSS construct, with the smallest association observed for Reward Expectancy (*r* = .13, *p* = .019) and the largest association observed for Initial Responsiveness (*r* = .29, *p* < .001). This same pattern emerged when examining each nostalgia scale separately. We report all bivariate correlations in Figure 1A

In our preregistration, we stated that we would examine bivariate correlations among rumination, counterfactual thinking, and the PVSS constructs. We report these correlations in Figure 2A. To evaluate the hypothesis that nostalgia would be more strongly and positively associated with individual differences in positive valence systems, compared to other modes of autobiographical reflection, we used Lee and Preacher’s (2013) web-based calculator testing for the difference between two dependent correlations with one variable in common. Although the regulatory model does not explicitly predict that nostalgia should show stronger associations with positive valence systems than other forms of autobiographical reflection, we viewed this as a theoretically motivated extension. Compared to rumination and counterfactual thinking, nostalgia more consistently elicits positively valenced, socially meaningful, and emotionally rich content that is likely to engage reward-related processes. Nostalgia was significantly more strongly related to the PVSS composite (*r* = .29) than rumination (*r* = -.09), *z* = 5.00, *p* < .001. This same pattern emerged for Reward Valuation (*z* = 3.13, *p* = .002), Reward Expectancy (*z* = 3.57, *p* < .001), Effort Valuation (*z* = 3.49, *p* < .001), Reward Anticipation (*z* = 5.07, *p* < .001), Action Selection (*z* = 4.85, *p* < .001), Initial Responsiveness (*z* = 4.96, *p* < .001), and Reward Satiation (*z* = 4.71, *p* < .001). Nostalgia was non-significantly more strongly related to the PVSS composite than counterfactual thinking (*r* = .16), *z* = 1.51, *p* = .132. This same pattern emerged for Reward Valuation (*z* = 1.65, *p* = .100), Reward Expectancy (*z* = 0.30, *p* = .764), Effort Valuation (*z* = 1.06, *p* = .290), Reward Anticipation (*z* = 1.47, *p* = .142), Action Selection (*z* = 1.05, *p* = .293), Initial Responsiveness (*z* = 1.84, *p* = .065), and Reward Satiation (*z* = 1.46, *p* = .145).

***Multiple Regressions***

We preregistered multiple regression analyses predicting PVSS constructs from nostalgia while controlling for other modes of autobiographical reflection. When controlling for rumination and counterfactual thinking, nostalgia was significantly associated with the PVSS composite (*b\** = .25, *p* < .001) as well as Reward Valuation (*b\** = .22, *p* < .001), Reward Expectancy (*b\** = .12, *p* = .035), Effort Valuation (*b\** = .18, *p* = .002), Reward Anticipation (*b\** = .20, *p* < .001), Action Selection (*b\** = .21, *p* < .001), Initial Responsiveness (*b\** = .28, *p* < .001), and Reward Satiation (*b\** = .24, *p* < .001).

**Discussion**

In Study 1 we examined the relation between nostalgia and the positive valence system, using multiple nostalgia measures (SNS, NPS, PINE) alongside assessments of counterfactual thinking and rumination. Results from bivariate correlations showed that the nostalgia measures were strongly inter-correlated and significantly associated with the overall PVSS. Among the PVSS subscales, nostalgia was most strongly associated with Initial Responsiveness and least strongly associated with Reward Expectancy. Comparisons with other modes of autobiographical reflection revealed that nostalgia was significantly more linked to PVSS activation than rumination, but not significantly more than counterfactual thinking. In multiple regression analyses, controlling for rumination and counterfactual thinking, we confirmed that nostalgia remained significantly associated with PVSS activation and its subconstructs, including Reward Valuation, Reward Anticipation, and Effort Valuation. Overall, across different analytical approaches, trait nostalgia was consistently related to higher positive valence system activation, with the strongest association observed for Initial Responsiveness.

**Study 2**

Although Study 1 provided robust correlational evidence that nostalgia is associated with greater activation of the positive valence system, its design does not allow for causal inferences. Establishing causality is essential to determining whether nostalgia directly enhances the positive valence system, as proposed by the regulatory model, or if the observed relations stem from underlying third variables. To address this limitation, in Study 2, we employed an experimental design, manipulating nostalgia and assessing its causal impact on the positive valence system. By inducing nostalgia, we aimed to determine whether the emotion enhances state-level positive valence system activation rather than merely correlating with it. We hypothesized that nostalgic (vs. control) participants would report greater state activation of the positive valence system. Additionally, Study 2 allowed us to replicate and extend the Study 1 findings by testing whether trait nostalgia (assessed through self-report scales) would predict state-level positive valence system activation. If nostalgia regulates and sustains approach motivation, then both experimentally induced nostalgia and dispositional proclivities to nostalgize should be linked to increased activation of the positive valence system. By combining correlational (as in Study 1) and experimental approaches, we provide a more robust test of the regulatory model of nostalgia, clarifying its role in promoting positive affect and goal-directed behavior.

**Method**

***Participants***

Power analysis indicated that 210 participants would confer 95% power to detect moderate effects (*r* = .24 or *d* = .50) observed in Study 1. We recruited 292 U.K. Prolific workers. We excluded 41 participants for failing an attention check (25 participants in the control condition and 16 participants in the nostalgia condition) and 23 additional participants in the control condition who did not follow instructions. As pre-registered, we also excluded participants who wrote about a nostalgic event in the control condition (*n* = 23). The final sample comprised 228 participants (110 women, 117 men, 1 undisclosed), who ranged in age from 18 to 83 years (*M* = 40.18, *SD* = 13.56; *n*nostalgia = 125; *n*control = 103).

***Procedure***

Participants first completed, in a separate random order, the same trait measures as in Study 1, with the exception of the PVSS. Instead of completing the PVSS at the start of the study, participants completed a state-adapted version of this scale at the end of the study. Next, we manipulated nostalgia with the Event Reflection Task (Sedikides, Wildschut, Routledge, Arndt et al., 2015; Wildschut & Sedikides, 2025).

In the *nostalgia condition*, we presented participants with a definition of “nostalgia” and then instructed them to reflect on a nostalgic event, list four keywords, and write a brief narrative about the event. Specifically, instructions read:

According to the Oxford Dictionary, “nostalgia” is defined as a “sentimental longing for the past.” Please think of a nostalgic event in your life. Specifically, try to think of a past event that makes you feel most nostalgic. Bring this nostalgic experience to mind. Immerse yourself in the nostalgic experience. How does it make you feel? Please spend a couple of minutes thinking about how it makes you feel. Using the space provided below, for the next few minutes, we would like you to write about the nostalgic event. Immerse yourself into this nostalgic experience. Describe the experience and how it makes you feel. Please write at least 128 characters.

In the *control condition*, we used the same protocol but for an ordinary event, as follows:

Please bring to mind an ordinary event in your life. Specifically, try to think of a past event that is ordinary. Bring this ordinary experience to mind. Immerse yourself in the ordinary experience. How does it make you feel? Please spend a couple of minutes thinking about how it makes you feel. Using the space provided below, for the next few minutes, we would like you to write about the ordinary event. Immerse yourself into this experience. Describe the experience and how it makes you feel. Please write at least 128 characters.

Next, participants responded to a 3-item manipulation check (e.g., “Thinking about this event leaves me feeling nostalgic”; Hepper et al., 2012; α = .98), followed by the state-adapted version of the PVSS, which asked them to indicate the extent to which each statement described their feelings *“*right now*.”*

**Random Assignment.** Random assignment to conditions was administered by Qualtrics and was successful. Demographic characteristics (age, gender, ethnicity) and trait nostalgia (SNS, NPS, PINE) did not differ significantly between conditions. We report detailed analyses in Supplemental Materials (see Supplemental Analyses Study 2, “Random Assignment”).

**Results**

***Induced Nostalgia***

As intended, participants in the nostalgia condition (*M* = 4.63, *SD* = 1.54) reported feeling more nostalgic than those in the control condition (*M* = 3.11, *SD* = 1.54), *F*(1, 226) = 73.40, *p* < .001, η2 = .245. The keywords generated in the nostalgia (vs. control) condition captured the prototypic character of nostalgia—predominantly positive and centered on family and childhood (Figure 3). We proceeded to examine the effect of nostalgia on state PVSS in a 2 (condition: nostalgia vs. control) × 7 (PVSS construct: Reward Valuation, Reward Expectancy, Effort Valuation, Action Selection, Initial Responsiveness, Reward Satiation, Reward Anticipation) mixed ANOVA. Participants in the nostalgia condition (*M* = 6.81, *SD* = 0.94) tended to score higher on the PVSS than their control condition counterparts (*M* = 6.59, *SD* = 0.91), *F*(1, 226) = 3.04, *p* = .083, η2 = .013.[[1]](#footnote-1) We observed a main effect of PVSS Construct, *F*(6, 1356) = 21.67, *p* < .001, η2 = .087, and a Condition × Construct interaction, *F*(6, 1356) = 2.32, *p* = .031, partial η2 = .007.

Next, we conducted Bonferroni-corrected simple main effects tests. Participants in the nostalgia (relative to the control) condition reported higher Reward Valuation [*F*(1, 226) = 5.54, *p* = .021, η2 = .023], Action Selection, [*F*(1, 226) = 5.14, *p*. = 024, η2 = .022], and Initial Responsiveness, [*F*(1, 226) = 4.03, *p* = .046, η2 = .018], whereas Reward Expectancy, [*F*(1, 226) = 0.32, *p* = .574, η2 = .001], Effort Valuation [*F*(1, 226) = 1.68, *p* = .197, η2 = .007], Reward Satiation, [*F*(1, 226) = 2.59, *p* = .109, η2 = .011], and Reward Anticipation, [*F*(1, 226) = 1.26, *p* = .263, η2 = .006] did not show statistically significant differences (Figure 4). Controlling for trait nostalgia, rumination, and counterfactual thinking did not alter the interpretation of the results (Table 1).

**Controlling for Self-Transcendent Emotional Content.**We wondered whether specific positive emotions influenced the results.[[2]](#footnote-2) In particular, we conducted a content analysis of nostalgic and control narratives using Linguistic Inquiry and Word Count (LIWC-22; Boyd et al., 2022) to apply the Self-Transcendent Emotion Dictionary (STED; Ji & Raney, 2020), which assesses awe, admiration, elevation, gratitude, and hope. Nostalgic narratives (*M* = 1.58, *SD* = 2.35) were higher in awe than control narratives (*M* = 0.58, *SD* = 1.18), *F*(1, 226) = 15.56, *p* < .001, η2 = .064. Also, nostalgic narratives (*M* = 1.82, *SD* = 2.53) were higher in admiration than control narratives (*M* = 0.98, *SD* = 1.60), *F*(1, 226) = 15.56, *p* = .004, η2 = .037. Further, nostalgic narratives (*M* = 0.91, *SD* = 1.50) trended higher in elevation than control narratives (*M* = 0.95, *SD* = 1.73), *F*(1, 226) = 3.61, *p* = .059, η2 = .016. In addition, nostalgic (*M* = 1.17, *SD* = 1.71) and control (*M* = 0.98, *SD* = 1.60) narratives did not differ on gratitude, *F*(1, 226) = 0.96, *p* = .329, η2 = .004. Finally, nostalgic (*M* = 1.19, *SD* = 1.63) and control (*M* = 1.03, *SD* = 1.64) narratives did not differ on hope, *F*(1, 226) = 0.54, *p* = .461, η2 = .002.

We then examined the effect of nostalgia on state PVSS in a 2 (condition: nostalgia vs. control) × 7 (PVSS construct: Reward Valuation, Reward Expectancy, Effort Valuation, Action Selection, Initial Responsiveness, Reward Satiation, Reward Anticipation) mixed ANCOVA, controlling for awe, admiration, and elevation narrative content. Participants in the nostalgia condition (*M* = 6.81, *SD* = 0.94) tended to score higher on the PVSS than controls (*M* = 6.59, *SD* = 0.91), *F*(1, 223) = 3.49, *p* = .063, η2 = .015. We observed a main effect of PVSS construct, *F*(6, 1356) = 12.88, *p* < .001, η2 = .055, and a Condition × PVSS Construct interaction, *F*(6, 1338) = 2.67, *p* = .014, partial η2 = .012. Subsequently, we conducted Bonferroni-corrected simple main effects tests and found that, as before, participants in the nostalgia (vs. control) condition reported higher Reward Valuation [*F* (1,223) = 6.57, *p* = .011, partial η2 = .029], Action Selection [*F* (1,223) = 5.97, *p* = .015, partial η2 = .026], and Initial Responsiveness [*F* (1,223) = 4.38, *p* = .038, partial η2 = .019]. Reward Expectancy [*F* (1,223) = 0.45, *p* = .502, partial η2 = .002], Effort Valuation [*F* (1,223) = 1.53, *p* = .218, partial η2 = .007], Reward Satiation [*F* (1,223) = 2.57, *p* = .111, partial η2 = .011], and Reward Anticipation [*F* (1,223) = 1.87, *p* = .173, partial η2 = .008] did not show significant variation as a function of condition.

***Trait Nostalgia***

All three nostalgia measures were highly inter-correlated (*r*s > .69, *p*s < .001). In addition, all three nostalgia measures were significantly associated with the PVSS composite. The association between PVSS scores and nostalgia was strongest for the NPS (*r* = .31, *p* < .001), weakest for the PINE (*r* = .17, *p* = .002), and intermediate for the SNS (*r* = .25, *p* < .001). Given this high inter-correlation, we created a composite nostalgia measure which was also significantly associated with PVSS scores (*r* = .26, *p* < .001). Further, the nostalgia composite was significantly associated with every PVSS construct, with the smallest association observed for Reward Expectancy (*r* = .13, p = .019) and the largest association for Initial Responsiveness (*r* = .29, p < .001). The same pattern emerged when we examined each nostalgia scale separately. We report all bivariate correlations in Figure 1A.

In our preregistration, we stated that we would examine bivariate correlations among rumination, counterfactual thinking, and the PVSS constructs. We report these correlations in Figure 2B. To evaluate the hypothesis that nostalgia would be more strongly and positively associated with individual differences in positive valence systems, relative to other modes of autobiographical reflection, we used Lee and Preacher’s (2013) web-based calculator testing for the difference between two dependent correlations with one variable in common. Nostalgia was significantly more strongly related to the PVSS composite (*r* = .29) than rumination (*r* = -.09), *z* = 4.64, *p* < .001. The same pattern emerged for Reward Valuation (*z* = 3.75, *p* < .001), Reward Expectancy (*z* = 4.66, *p* < .001), Effort Valuation (*z* = 3.66, *p* < .001), Reward Anticipation (*z* = 4.51, *p* < .001), Action Selection (*z* = 4.89, *p* < .001), Initial Responsiveness (*z* = 3.69, *p* < .001), and Reward Satiation (*z* = 4.52, *p* < .001). Nostalgia was non-significantly more strongly related to the PVSS composite than counterfactual thinking (*r* = .16), *z* = 1.67, *p* = .095. The same pattern emerged for Reward Valuation (*z* = 2.04, *p* = .041), Reward Expectancy (*z* = 1.52, *p* = .128), Effort Valuation (*z* = 1.44, *p* = .151), Reward Anticipation (*z* = 0.99, *p* = .324), Action Selection (*z* = 1.68, *p* = .093), Initial Responsiveness (*z* = 1.44, *p* = .150), and Reward Satiation (*z* = 1.48, *p* = .095).

**Multiple Regressions.** We preregistered multiple regression analyses predicting PVSS constructs from nostalgia while controlling for other modes of autobiographical reflection. When controlling for rumination and counterfactual thinking, nostalgia was significantly associated with the PVSS composite (*b\** = .28, *p* < .001) as well as Reward Valuation (*b\** = .32, *p* < .001), Reward Expectancy (*b\** = .22, *p* < .001), Effort Valuation (*b\** = .19, *p* = .005), Reward Anticipation (*b\** = .25, *p* < .001), Action Selection (*b\** = .26, *p* < .001), Initial Responsiveness (*b\** = .25, *p* < .001), and Reward Satiation (*b\** = .27, *p* < .001).As in Study 1, the results of the canonical correlation analyses corroborated and overlapped with those of the multiple regression analyses. We report these results in Supplemental Materials (see Canonical Correlations in Study 2 and Table S2).

***Exploratory Moderation Analyses: State × Trait Interactions***

We conducted exploratory moderation analyses using Model 1 of Hayes’ (2017) Process Macro to examine whether trait nostalgia, rumination, or counterfactual thinking moderated the effect of induced nostalgia on the PVSS composite or any PVSS constructs.

**PVSS Composite.** With trait nostalgia included in the model as moderator, the PVSS composite was significantly higher in the nostalgia (vs. control) condition, *b* = .25, *SE* = .12, *t* = 2.08, *p* = .039, 95%CI [.01, .48]. The main effect of trait nostalgia was also significant, *b* = .22, *SE* = .05, *t* = 4.68, *p* < .001, 95%CI [.13, .31]. The Condition × Trait Nostalgia interaction was not significant, *b* = .07, *SE* = .09, *t* = 0.75, *p* = .452, 95%CI [-.11, .26].

With rumination as moderator, the main effect of condition was not significant, *b* = .21, *SE* = .12, *t* = 1.72, *p* = .087, 95%CI [-.03, .45], and neither was the main effect of rumination, *b* = -.01, *SE* = .00, *t* = -1.29, *p* = .198, 95%CI [-.02, .00], or the Condition × Rumination interaction, *b* = .00, *SE* = .01, *t* = 0.20, *p* = .843, 95%CI [-.02, .02]. Finally, with counterfactual thinking as moderator, the main effect of Condition was not significant, *b* = .21, *SE* = .12, *t* = 1.70, *p* = .091, 95%CI [-.03, .45]. The main effect of counterfactual thinking was significant, *b* = .02, *SE* = .01, *t* = -2.46, *p* = .015, 95%CI [.00, .03], but the Condition × Counterfactual Thinking interaction was not so, *b* = .01, *SE* = .01, *t* = 0.97, *p* = .331, 95%CI [-.01, .04].

**PVSS Constructs.** To further examine the effects of induced nostalgia on the PVSS constructs, we conducted exploratory moderation analyses. Results for the PVSS constructs corresponded closely to those for the PVSS composite and we therefore report them in Supplement Materials (see Supplemental Analyses Study 2, “Exploratory Moderation Analyses”). To summarize, induced nostalgia generally increased Reward Valuation, Action Selection, and Initial Responsiveness (*p*s ≤ .047). Trait nostalgia demonstrated consistently positive associations with all PVSS constructs (*p*s ≤ .003). Additionally, counterfactual thinking was positively associated with Reward Valuation, Reward Anticipation, Action Selection, Initial Responsiveness, and Reward Satiation (*p*s ≤ .039), whereas rumination was negatively associated with Reward Expectancy (*p* = .016). However, no significant Condition × Trait interactions emerged for any construct, suggesting that trait levels of nostalgia, rumination, or counterfactual thinking did not moderate the effects of induced nostalgia on PVSS.

***Discussion***

Induced nostalgia significantly increased positive valence system activation regarding Reward Valuation, Action Selection, and Initial Responsiveness. We observed non-significant effects for Reward Expectancy, Effort, Reward Satiation, and Reward Anticipation. The significant findings for Reward Valuation, Action Selection, and Initial Responsiveness held when controlling for self-transcendent (i.e., awe, admiration, elevation) narrative content. Further, the effects of induced nostalgia on these three positive valence system constructs remained significant even when traits (i.e., nostalgia, rumination, counterfactual thinking) and Trait × Condition interactions were included in the model. In all, exploratory analyses showed robust support for the effect of induced nostalgia on Reward Valuation, Action Selection, and Initial Responsiveness. Consistent with Study 1, trait nostalgia was associated with a broad-spectrum increase in state positive valence system activation. Further, the three constructs that were significantly increased by the nostalgia induction were also among the ones that were most strongly associated with trait nostalgia.[[3]](#footnote-3)

**General Discussion**

Across two studies, nostalgia was linked to activation of the positive valence system. Trait nostalgia was associated with higher activation of all seven subscales of the PVSS over the preceding two weeks (Study 1) and in-the-moment (Study 2). Further, induced nostalgia elevated Reward Valuation, Action Selection, and Initial Responsiveness (Study 2). Nostalgia evinced consistently broad associations with positive valence system activation at the trait level, but more specific associations at the state level. However, the three positive valence system constructs that were significantly strengthened by induced nostalgia were also among the ones that manifested the strongest associations with trait nostalgia across studies.

An explanation for why the induced effects in Study 2 were strongest for Reward Valuation, Action Selection, and Initial Responsiveness may be derived from the regulatory model of nostalgia (Wildschut & Sedikides, 2023a). This model proposes that nostalgia activates the positive valence system to help people maintain psychological equanimity. If nostalgia serves this regulatory function by increasing positive valence system activation, then it makes sense that its effects would be particularly pronounced on the most proximal processes before (Reward Valuation), during (Action Selection), and after (Initial Responsiveness) reward receipt. In contrast, Reward Expectancy, Effort Valuation, Reward Anticipation, and Reward Satiation may reflect more temporally distal or cognitively elaborated aspects of reward processing that are less easily modulated by a brief nostalgic episode. For example, Reward Satiation refers to declining incentive value over time as a reinforcer is consumed, whereas Effort Valuation involves computing value based on perceived physical or cognitive costs (National Institute of Mental Health [NIMH], n.d.-a, n.d.-b). Reward Anticipation entails projecting forward to future incentives, whereas Reward Expectancy, which likely aligns with the RDoC concept of reward prediction error, relies on learned expectations (National Institute of Mental Health [NIMH], n.d.-c, n.d.-d).

In the moment, nostalgic engagement may amplify reward processes that are most proximal to reward receipt, such as enhanced feelings of value or importance (Reward Valuation), more decisive goal-directed behavior (Action Selection), and stronger emotional responses to reward outcomes (Initial Responsiveness). Over time, repeated activation of these immediate reward processes may lead to broader shifts in how people experience and respond to rewards. For example, they may start to expect good outcomes more often (Reward Expectancy), feel more willing to work toward goals even if effort is required (Effort Valuation), look forward to future rewards with greater anticipation (Reward Anticipation), and experience changes in how satisfied or fulfilled they feel after receiving a reward (Reward Satiation). This pattern may help to explain the robust trait-level associations we observed across studies. In line with RDoC guidance, future research should incorporate multiple units of analysis beyond self-report, including behavioral, physiological, and neural measures. Such approaches will be important not only for understanding how nostalgia relates to individual PVSS constructs, but also for examining how it shapes the interplay between these constructs over time, at both state and trait levels.

Another notable pattern emerged regarding trait nostalgia’s differential associations with the PVSS, rumination, and counterfactual thinking. Specifically, nostalgia was more strongly correlated with PVSS subscales than rumination, but not more so than counterfactual thinking. One possible explanation lies in the functional overlap between nostalgia and upward counterfactual thinking. Although both rumination and counterfactual thinking involve reflecting on the past and imagining better alternatives, rumination is typically linked to maladaptive, negatively valenced self-focus. In contrast, counterfactual thinking, albeit often associated with regret, can also involve goal-relevant simulations that engage the positive valence system. This interpretation aligns with prior research (Wildschut et al., 2023), which emphasizes the importance of controlling for both counterfactual thinking and rumination when studying nostalgia due to their shared cognitive features. Although we found that counterfactual thinking did not moderate the effect of induced nostalgia on any PVSS construct (see Supplemental Materials), future research should examine whether specific forms of counterfactual thinking (e.g., downward vs. upward) differentially moderate the relation between nostalgia and PVSS constructs.

**Constraints on Generality**

All participants were from the U.K. Notwithstanding evidence that nostalgia is pancultural (Hepper et al., 2014) and has similar psychological consequences across cultures (Hepper et al., 2024), culture shapes reward-related cognitive processing (Kim et al., 2012). Future research, taking a cultural neuroscientific perspective (Kitayama et al., 2019), can help to clarify the generality of nostalgia’s impact on the positive valence system.

**Limitations and Future Directions**

Study 2’s results suggest that nostalgia activates the positive valence system. In accord with this interpretation, van Tilburg et al. (2018) characterized nostalgia in terms of positive valence and approach motivation. Using multidimensional scaling analysis, they found that nostalgia is most similar to three positive, approach-oriented emotions: self-compassion, pride, gratitude. This raises the possibility that our findings are driven by the activation of other self-relevant positive emotions. However, controlling for the presence of self-transcended emotions (i.e., awe, admiration, elevation) did not change the interpretation of our findings. Similarly, research points to the distinctiveness of nostalgia from other self-relevant emotions. Van Tilburg et al. (2019) examined the cognitive appraisal profile (i.e., participants’ evaluations of events or situations in which an emotion occurs) of nostalgia and other emotions. Nostalgic events were appraised as unique, pleasant, involving irretrievable loss, and entailing high levels of psychologically distance. No other emotion produced such a profile. Thus, emotions like self-compassion, pride, and gratitude could not easily account for our results. Nevertheless, it is possible that activation of the positive valence system mediates effects of nostalgia on self-relevant and self-transcendent emotions. Future research should test these possibilities. Finally, the effects in Study 2 were relatively small, possibly because even ordinary events can carry positive valence for some participants (Figure 3). This aligns with the idea that people seek meaning even in the ordinary (Sommer et al., 2013).

Another limitation of the present research pertains to the internal consistency and discriminant validity of the Positive Valence Systems Scale (PVSS). Several subscales exhibited relatively low Cronbach’s alpha values (e.g., Reward Expectancy α = .61; Reward Anticipation α = .54), and we observed high inter-subscale correlations (Figure 2), raising questions about the distinctiveness of the underlying constructs. This psychometric pattern is consistent with the original PVSS validation study (Khazanov et al., 2019), which showed strong loadings on a general positive valence factor and limited evidence for separable subdimensions. Although these findings support the PVSS as a tool for assessing broad reward-related functioning, they also suggest that individual subscales may not fully capture distinct constructs as intended. As such, we urge caution in interpreting subscale-level effects and recommend that future work explore hierarchical or bifactor modeling approaches to better isolate general versus specific variance across the PVSS domains. The Positive Valence Systems are one overarching domain in National Institute of Mental Health’s Research Domain Criteria. Within this domain, three constructs have been identified (each with three sub-constructs). They are: Reward Responsiveness (Reward Anticipation, Initial Reward Responsivity, Reward Satiation), Reward Learning (Probabilistic/Reinforcement Learning, Reward Prediction Error, Habits), Reward Valuation (Probability, Delay, Effort). Not all three constructs are equally represented on the PVSS, but all three sub-constructs of Reward Responsiveness are represented on the PVSS. In Table 2, we illustrate how the constructs and subconstructs of the National Institute of Mental Health’s Research Domain Criteria map onto the PVSS and Study 2’s nostalgia induction. Nostalgia uniquely impacted Initial Responsivity, perhaps reflecting its regulatory role (Wildschut & Sedikides, 2023a,b). The Reward Prediction Error and Habits sub-constructs of Reward Learning seemingly represent the Reward Expectancy and Action Selection subscales of the PVSS, respectively. Nostalgia influenced the latter but not the former. However, moving beyond self-report would further help to address nostalgia’s impact on Reward Learning and its sub-constructs. Finally, Reward Valuation is represented as its sub-construct, Effort Valuation. Nostalgia influenced Reward Valuation but not Effort Valuation, suggesting that the effects of nostalgia on Reward Valuation are likely driven by the other sub-constructs (Probability, Delay).

**Theoretical Implications**

Study 2 afforded a test of nostalgia’s causal impact on the positive valence system. Prior work has rarely examined nostalgia’s influence on it, despite nostalgia’s role in regulating approach-avoidance motivation (Stephan et al., 2014). Further, previous investigations have been fragmented, focusing on single positive valence system constructs. By simultaneously assessing seven PVSS constructs, we provided evidence that nostalgia causally impacts Reward Valuation, Action Selection, and Initial Responsiveness. This specificity offers conceptual clarification to the literature. The finding that nostalgia increases Reward Valuation may explain why nostalgia strengthens the desire for rewards in general (Sedikides et al., 2018; Stephan et al., 2014, Study 3) and in social contexts (Abeyta et al., 2015). The finding that nostalgia galvanizes Initial Responsiveness may explain why induced nostalgia intensifies ventral striatum activity (Yang et al., 2022), which is linked to initial reward responsiveness (Filimon et al., 2020). As choosing to help others is rewarding (Aknin et al., 2018), the finding that nostalgia increases Action Selection (i.e., choosing to pursue rewards) may explain why nostalgia solidifies decisions to help a hapless experimenter (Stephan et al., 2014, Study 5) or donate to charity (Zhou et al., 2012).

Moreover, our findings inform the regulatory model of nostalgia (Wildschut & Sedikides, 2023a). They suggest that Reward Valuation, Action Selection, and Initial Responsiveness are central to nostalgia’s role in maintaining psychological equanimity in the face of threat (perhaps due to proximity to reward receipt). These effects may be particularly strong for social rewards, given nostalgia’s inherently social nature.

Finally, although conceptualizing (Stijovic et al., 2024) and measuring (Ruff & Fehr, 2014) social reward responsivity present challenges, one way to do so is through decontextualization (Tamir & Hughes, 2018). This method involves simplifying complex socially rewarding behaviors to identify the core elements that shape reward responsivity in minimalistic contexts. From this perspective, the influence of nostalgia on Reward Valuation, Action Selection, and Initial Responsiveness may reflect fundamental components of social reward responsivity. Future research should address this possibility.

**Coda**

Although this is the first demonstration of construct-specific effects of nostalgia on the positive valence system, it relied exclusively on self-report. Independent replications and extensions are needed. Given that the positive valence system spans genes, molecules, cells, circuits, physiology, and behavior, moving beyond self-report would further elucidate nostalgia’s role in influencing the positive valence system.

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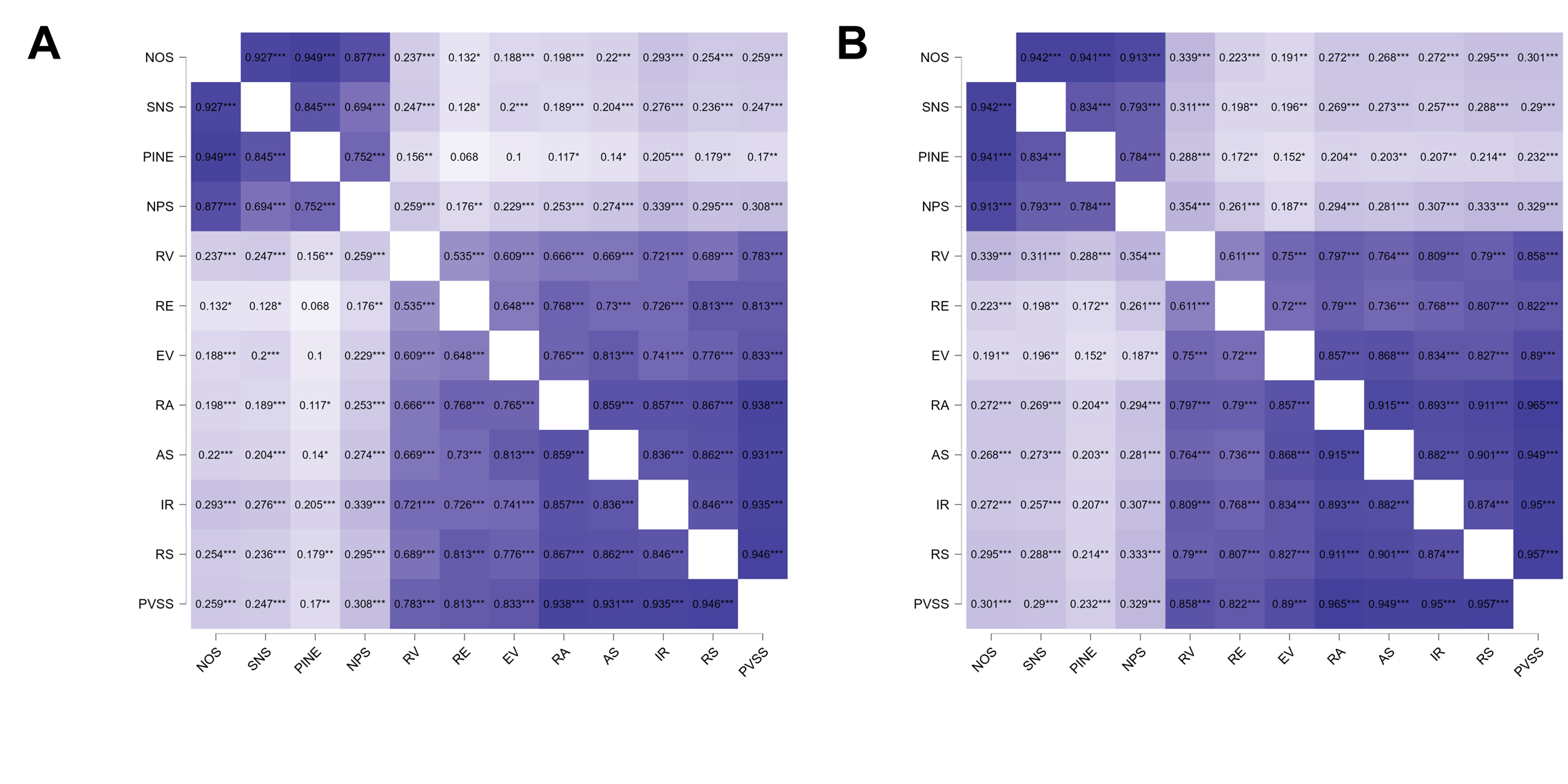
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**Figure 1**

*Bivariate Correlations Between Nostalgia and Positive Valence System in Study 1 (Panel A) and Study 2 (Panel B)*

Note. NOS = Nostalgia Composite; SNS = Southampton Nostalgia Scale; PINE = Personal Inventory of Nostalgic Experiences; NPS = Nostalgia Prototype Scale; RV = Reward Valuation; RE = Reward Expectancy; EV = Effort Valuation; RA = Reward Anticipation; AS = Action Selection; IR = Initial Responsiveness; RS = Reward Satiation; PVSS = Positive Valence System Scale Total Score. \*\*\*p < .001. \*\*p < .01. \*p < .05.

**Figure 2**

*Bivariate Correlations Between Nostalgia, Rumination, and Counterfactual Thinking Study 1 (Panel A) and Study 2 (Panel B)*

A close-up of a chart

AI-generated content may be incorrect.Note. PVSS = Positive Valence System Scale Total Score. \*\*\*p < .001. \*\*p < .01. \*p < .05.

**Figure 3**

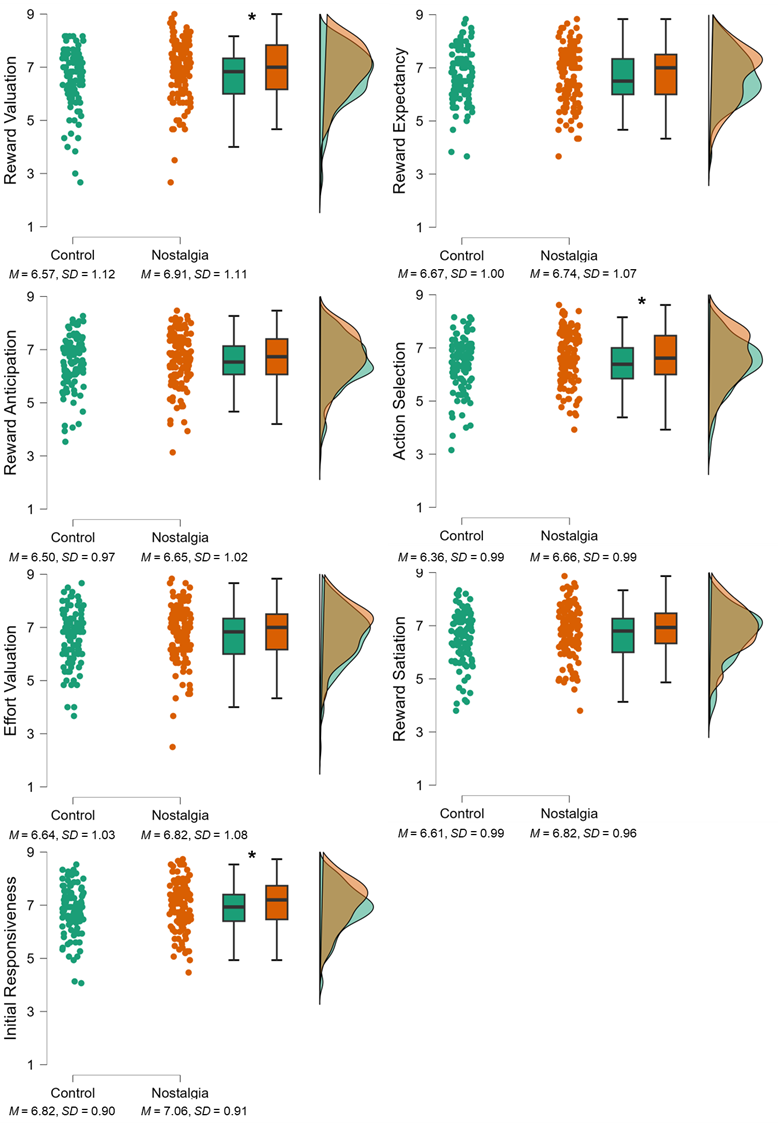
*Keywords listed in the nostalgia (A) and control (B) conditions (Study 2)*

A collage of words

AI-generated content may be incorrect.

**Figure 4**

*Raincloud Plots Depicting the Effect of Inducted Nostalgia on PVSS Constructs (Study 2)*



Note. PVSS = Positive Valence System Scale. \* = Significant Bonferroni-corrected simple main effect.

**Table 1**

*Means, Standard Deviations, and Simple Main Effects Controlling for* *Trait Nostalgia, Rumination, and Counterfactual Thinking (Study 2)*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Nostalgia  (*n* = 125) | | Control  (*n* = 103) | | *F*  (1, 223) | *p* | Partial η2 |
| PVSS Construct | *M* | *SD* | *M* | *SD* |  |  |  |
| Reward Valuation | 6.91 | 1.11 | 6.57 | 1.12 | 7.19 | .008 | .031 |
| Reward Expectancy | 6.74 | 1.07 | 6.67 | 1.00 | 0.35 | .552 | .002 |
| Effort Valuation | 6.82 | 1.08 | 6.64 | 1.03 | 1.88 | .172 | .008 |
| Reward Anticipation | 6.65 | 1.02 | 6.50 | 0.97 | 1.46 | .229 | .006 |
| Action Selection | 6.66 | 0.99 | 6.36 | 0.99 | 6.17 | .014 | .027 |
| Initial Responsiveness | 7.06 | 0.91 | 6.82 | 0.90 | 4.86 | .029 | .021 |
| Reward Satiation | 6.82 | 0.96 | 6.61 | 0.99 | 3.21 | .074 | .014 |

Note. PVSS = Positive Valence System Scale.

**Table 2**

*Mapping the Subconstructs of the National Institute of Mental Health’s (NIMH) Research Domain Criteria onto the Positive Valence System Scale and the Nostalgia Induction*

|  |  |  |  |
| --- | --- | --- | --- |
| **NIMH Constructs and Subconstructs** | **PVSS Analogue** | **Impacted by Induced Nostalgia** | |
| Reward Responsiveness |  |  | |
| Reward Anticipation | Reward Anticipation | No | |
| Initial Response to Reward | Initial Responsiveness | Yes | |
| Reward Satiation | Reward Satiation | No | |
|  | | |
| Reward Learning |  |  | |
| Probabilistic and Reinforcement Learning | Not Represented |  | |
| Reward Prediction Error | Reward Expectancy | No | |
| Habit | Action Selection | Yes | |
|  | | |
| Reward Valuation | Reward Valuation | Yes | |
| Probability | Not Represented |  | |
| Delay | Not Represented |  | |
| Effort | Effort Valuation | No | |

1. We preregistered examining the effect of nostalgia (vs. control) on the PVSS total score. Given that this analysis is redundant with the mixed ANOVA, we did not report it in text but we do so below for completeness. Participants in the nostalgia condition (*M* = 6.83, *SD* = 0.92) had a higher PVSS total score than controls (*M* = 6.60, *SD* = 0.91), *F*(1, 226) = 3.28, *p* = .071, η2 = .014. Means and *p*-values differ slightly from those reported for the mixed ANOVA due to the unequal item counts across PVSS constructs. [↑](#footnote-ref-1)
2. These analyses were requested by a reviewer and hence were not preregistered. [↑](#footnote-ref-2)
3. We conducted a mini meta-analysis (Goh et al., 2016) of the associations (*r*s) between nostalgia and each of the PVSS constructs in Studies 1 and 2. The first, second, and fourth largest associations between trait nostalgia and PVSS constructs were for Initial Responsiveness, Reward Valuation, and Action Selection. [↑](#footnote-ref-3)