



The mnemonic muse: Nostalgia fosters creativity through openness to experience [☆]



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HIGHLIGHTS

- We examined the effect of nostalgia on creativity.
- Four experiments show that nostalgia increased creativity.
- The effect of nostalgia emerged above and beyond general positive affect.
- The effect of nostalgia on creativity was mediated by openness to experience.

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ABSTRACT

We proposed and tested the hypothesis that nostalgia fosters creativity. In Experiments 1 and 2, we examined whether nostalgia increases creativity. Nostalgia, relative to control, sparked creative prose in a writing task. We proceeded to test the mediating role of openness to experience. As hypothesized, openness to experience emerged as a plausible mediator of nostalgia's positive influence on creativity in Experiment 3. Finally, in Experiment 4, nostalgia, mediated by openness, boosted creativity above and beyond positive affect. The findings showcase the relevance of nostalgic reverie for the present and future, and establish nostalgia as a force of creative endeavors.

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Nostalgia, 'a sentimental longing or wistful affection for the past' (*The New Oxford Dictionary of English*, 1998), has been linked to creativity. Nearly 3000 years ago, Homer famously crafted the epic poem about Odysseus, whose nostalgic yearning for homeland and family fueled his conquests over temptations and monstrosities (Homer, 1921). The Romantic Movement included nostalgic art (Austin, 2003), as expressed in fiction (e.g., Fyodor Dostoyevsky; Hudspith, 2004) and poetry (e.g., William Wordsworth; Goodman, 2008). Contemporary creative culture prominently features nostalgia. Examples are the 1978 film *Grease* (Flinn, 1992), the 1980s "retro" movement (Cook, 2009), the television series *The Wonder Years* (1988–1993), and *That 70s Show* (1998–2006; Marchegiani & Phau, 2013).

The cultural association of nostalgia with the aforementioned creative works may suggest that nostalgia is a conservative, traditionalist sentiment. After all, authors have argued that nostalgia takes people back to a glorified past (Flinn, 1992). Such an impression, however, would be

largely unwarranted. Rather, nostalgia impacts on the present and on the future (Sedikides, Wildschut, Arndt, & Routledge, 2008; Sedikides et al., 2015). For example, nostalgia triggers self-regulatory strivings to cope with discomfort (e.g., loneliness; Zhou, Sedikides, Wildschut, & Gao, 2008), increases empathy (Zhou, Wildschut, Sedikides, Shi, & Feng, 2012), breeds inspiration (Stephan et al., 2015), and raises optimism (Cheung et al., 2013). In all, nostalgia harnesses the past for engaging with the present and future. Consistent with this view, we hypothesize that nostalgia fosters creativity and influences creative expression. We begin by reviewing the literatures on creativity and nostalgia.

Creativity

In order to qualify as creative, ideas or behaviors need to be both original and useful (Feist, 1998). Thus, creativity involves a utilitarian contribution and not just an unorthodox one, and in that way can be distinguished from mere originality or divergent thinking. The quality and frequency of creativity are a function of both individual differences and situations (Feldhusen & Goh, 1995; Sternberg, 1999; Van Tilburg & Igou, 2014). Established assessments of creativity range from personality measurement (Gough, 1979) and self-report indices (Ivencin, 2007) to

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evaluation of written prose (Proulx, 2012; Proulx & Inzlicht, 2012; Thrash, Maruskin, Cassidy, Fryer, & Ryan, 2010) and analysis of drawn aliens' characteristics (Ward, 1994). On the societal level, creativity thrives within pluralistic cultural environments (Leung, Maddux, Galinsky, & Chiu, 2008; Simonton, 1997) whose members are open to experience (Leung & Chiu, 2010).

Creativity enjoys a celebrated status within psychology. As stated by Simonton (2000), "Creativity is among the most important and pervasive of all human activities" (p. 151). The benefits of creativity have been documented in settings such as organizational innovation (Amabile, Conti, Coon, Lazenby, & Herron, 1996), technological progression (Mokyr, 1990), and problem-solving (Friedman & Förster, 2005). Indeed, researchers (Sternberg, 1999; Sternberg & Lubart, 1995) have advocated the promotion of creativity at the individual and societal level. Taken together, creativity occupies a prominent place in psychology and is a catalyst of scientific, economic, and cultural advancement (Chikszentmihalyi, 1999). Creativity does not merely involve the future, it contributes to a *valuable* future.

Nostalgia

Nostalgia has a turbulent past. It was historically regarded a brain mal-function, psychiatric disorder, or variant of depression (for a review, see Sedikides et al. (2015)). Following due empirical scrutiny, the last decade has witnessed an overhaul in scholarly understanding of this emotion.

Hepper, Ritchie, Sedikides, and Wildschut (2012) adopted a prototype approach in their examination of lay conceptualizations of nostalgia. They found that the prototypical experience of nostalgia is bittersweet: it contains both pleasant and unpleasant features, albeit the former overshadow the latter (see also: Abeyta, Routledge, Sedikides, and Wildschut (2014)). Nostalgia entails fond evocation of momentous events in which the self and significant others occupy central roles—evocations that are often characterized by redemptive narratives where one conquers adversity (Wildschut, Sedikides, Arndt, & Routledge, 2006). Moreover, nostalgia is experienced across the lifespan (Hepper, Robertson, Wildschut, Sedikides, & Routledge, 2014) and can be prompted by a range of stimuli, including guided narratives (Wildschut, Sedikides, Routledge, Arndt, & Cordaro, 2010; Wildschut et al., 2006), music or song lyrics (Cheung et al., 2013; Routledge et al., 2011), and scents (Reid, Green, Wildschut, & Sedikides, 2014). In all, nostalgia is a common, self-relevant, predominantly positive, and social emotion that is experienced by people of all ages and cultures (Hepper et al., 2014).

Nostalgia exerts a profound influence on the present and the future. For example, chronically or in-the-moment lonely individuals evoke nostalgia to strengthen their social connectedness (a sense of belongingness or acceptance; Zhou et al., 2008). Also, nostalgia increases empathy towards needy strangers (Zhou, Wildschut, Sedikides, Shi, & Feng, 2012). Moreover, nostalgic reverie makes life seem meaningful in the face of existential threat such as mortality salience (Juhl, Routledge, Arndt, Sedikides, Wildschut, 2010; Routledge et al., 2008) or boredom (Van Tilburg, Igou, & Sedikides, 2013), and it assuages physical coldness (Zhou, Wildschut, Sedikides, Chen, & Vingerhoets, 2012). In addition to these self-regulatory benefits, nostalgia engenders an approach orientation (Stephan et al., 2014), inspiration (Stephan et al., 2015), and optimism (Cheung et al., 2013). But why would nostalgia foster creativity?

Nostalgia, creativity, and openness

Let us pose the question somewhat differently. If nostalgia fostered creativity, how would it do so? We postulate that nostalgia's impact on creativity is rooted in the openness to experience (henceforth: openness) that nostalgia promotes. According to McCrae (1987), openness entails a variety of features that revolve around "an interest in varied experience for its own sake" (p. 1259). Openness is a core aspect of personality (McCrae & Sutin, 2009), encompassing such characteristics as

reflectiveness and inventiveness (McCrae, 1987; McCrae & Costa, 1987). Yet, openness is susceptible to context-dependent influences (Bergeman et al., 1993). One such influence, we submit, is nostalgia. It is the impact of nostalgia on openness that fosters creative behavior.

The literature is consistent with the proposition that nostalgic evocation begets openness. Nostalgia increases inspiration (Stephan et al., 2015), which is characterized by openness (Hart, 1998) and correlates with openness (Thrash & Elliot, 2003; see also McCrae (1987); McCrae and Sutin (2009)). Also, nostalgia facilitates the transition of avoidance motivation to approach motivation. As an example, Stephan et al. (2014) reported that behavioral inhibition is associated with nostalgia, which in turn leads to activation of the behavioral approach system. This transition may indicate that nostalgia builds the self-regulatory resources to transit from a guarded or restrained orientation to an exploratory or adventurous one, thus reflecting openness to engage with novelty. Research on the influence of nostalgia on optimism is consistent with this reasoning. Cheung et al. (2013) showed that nostalgia promotes self-regulatory resources (i.e., social connectedness, self-esteem), which in turn facilitate an optimistic outlook. Approach orientation and optimism are both associated with adopting less conservative standards and favoring riskier options in evaluating thoughts and behaviors (Anderson & Galinsky, 2006; Friedman & Förster, 2000, 2002), which are proclivities associated with openness (Hinze, Doster, & Joe, 1997; Nicholson, Soane, Fenton-O'Creedy, & Willman, 2005; Van Hiel & Mervielde, 2004). Together, these findings provide a basis for the hypothesis that nostalgia augments openness.

Openness, in turn, has been extensively linked to creative endeavors. A meta-analysis by Feist (1998) established that openness predicts creativity in both scientific and artistic contexts, and yields one of the largest predictive effects relative to neuroticism, extraversion, conscientiousness, and agreeableness. Hirsh and Peterson (2008) found that openness predicts higher scores on a self-report measure of creative accomplishments in several domains (e.g., visual arts, scientific enquiry, music) above and beyond other big-five personality factors. Silvia, Nusbaum, Berg, Martin, and O'Conner (2009) obtained positive correlations between openness and measures of everyday life creativity, creative achievements, and the extent to which individuals considered creativity to be part of their self-concepts. Extending these findings to a behavioral level of analysis, Miller and Tal (2007) demonstrated that openness predicts creativity in writing and drawing. In all, openness is an established predictor of creativity.

We examined, in four experiments, the hypothesized positive influence of nostalgia on creativity, and the proposed mediating role of openness. We started (Experiments 1–2) by testing whether nostalgic evocation propels creative behavior in the form of prose. Next, we probed the underlying process by testing whether nostalgia augments openness and whether openness mediates nostalgia's impact on creativity (Experiment 3). We concluded by testing whether nostalgia, as mediated by openness, promotes creativity above and beyond an affectively positive experience (Experiment 4).

Experiments 1 and 2: nostalgia facilitates creative prose

We investigated the facilitative role of nostalgia on creativity in the context of written stories. Subsequent to a nostalgia manipulation, we asked participants to compose prose. In Experiment 1, participants wrote about a princess, a racecar, and a cat. In Experiment 2, participants finished a story that sets out with a mysterious noise on a cold winter evening. Given their design and procedural similarity, we combine reporting of the two experiments for parsimony.¹

¹ In the combined sample (Experiments 1–2), we obtained a main effect of gender on creativity, $F(1, 164) = 3.929, p = .049, \eta^2 = .02$. Women ($M = 4.15, SD = 1.33$) wrote more creative stories than men ($M = 3.70, SD = 1.44$). We obtained no other significant main or interaction effects involving gender on the nostalgia manipulation check (Experiments 1–4), positive affect (Experiment 4), openness (Experiments 3–4), and creativity (Experiments 1–4).

Method

Participants and design

We randomly assigned 175 University of Limerick undergraduate students (94 men, 81 women; $M_{\text{age}} = 19.77$, $SD = 3.62$) to the nostalgia ($N = 87$) or control ($N = 87$) condition of Experiment 1 ($N = 51$ psychology undergraduates) and Experiment 2 ($N = 124$ non-psychology undergraduates).² We rewarded participants with €4 or course credit.

Materials and procedure

Participants read the following instructions in the nostalgia and control conditions, respectively:

“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 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?”

In both conditions, participants spent 5 min on a written account of the experience. Next, they completed a 3-item nostalgia manipulation check (1 = *strongly disagree*, 6 = *strongly agree*). The items were: “Right now, I am feeling quite nostalgic,” “Right now, I’m having nostalgic feelings,” “I feel nostalgic at the moment;” combined sample ($\alpha = .93$). Both the nostalgia induction and manipulation check have been extensively validated by prior research (Hepper et al., 2012; Routledge et al., 2011; Wildschut et al., 2006).

Subsequently, participants received several sheets of lined paper to write a story. In Experiment 1, participants were instructed that the story had to mention three elements: a princess, a cat, and a race car (Proulx, 2012; see also Proulx and Inzlicht (2012)). In Experiment 2, participants were instructed to finish a story that started with the sentence: “One cold winter evening, a man and a woman were alarmed by a sound coming from a nearby house” (Thrash et al., 2010). Participants worked on these stories for approximately 30 min. We then assessed creativity using evaluative coding (Thrash et al., 2010). We asked two coders, familiar with the construct of creativity but unaware of conditions and hypotheses, to code the stories for creativity on: “How creative do you consider the story to be?”, (1 = *not at all*, 7 = *very much*). This rating was consistent across coders ($\alpha = .71$). We computed a creativity index by averaging the rating across coders.³

Results and discussion

Manipulation check

We conducted a 2 (condition: nostalgia, control) \times 2 (experiment: 1, 2) Analysis of Variance (ANOVA) on state nostalgia (i.e., the manipulation check). Participants in the nostalgia condition ($M = 4.79$, $SD = 1.03$, $N = 87$) reported feeling more nostalgic than those in the control

condition ($M = 3.59$, $SD = 1.57$, $N = 87$), $F(1, 170) = 25.23$, $p < .001$, $\eta^2 = .13$. Neither the experiment main effect, $F(1, 170) = 0.09$, $p = .761$, $\eta^2 = .00$, nor the interaction, $F(1, 170) = 0.72$, $p = .398$, $\eta^2 = .00$, were significant.⁴

Creativity

We conducted a 2 (condition: nostalgia, control) \times 2 (experiment: 1, 2) ANOVA on the creativity composite. Participants in the nostalgia condition ($M = 4.17$, $SD = 1.52$, $N = 86$) produced more creative prose than controls ($M = 3.65$, $SD = 1.23$, $N = 86$), $F(1, 168) = 5.26$, $p = .023$, $\eta^2 = .03$. Neither the experiment main effect, $F(1, 168) = 2.70$, $p = .102$, $\eta^2 = .02$, nor the interaction, $F(1, 168) = 0.38$, $p = .846$, $\eta^2 = .00$, were significant. Nostalgia fosters creativity.⁵

Experiment 3: openness to experience mediates nostalgia's creativity boost

The results of Experiments 1–2 indicate that nostalgia fosters creativity. We proposed that this effect is due to the openness that nostalgia elicits. Our rationale was based on a convergent set of findings. Nostalgia instigates approach tendencies (Stephan et al., 2014) and optimism (Cheung et al., 2013) both of which reduce conservatism and diminish aversion to risk (Anderson & Galinsky, 2006; Friedman & Förster, 2000, 2002); these effects, in turn, are positively associated with openness (Hinze et al., 1997; Van Hiel & Mervielde, 2004). Additionally, nostalgia breeds inspiration (Stephan et al., 2015), which is positively related to openness (McCrae & Sutin, 2009; Thrash & Elliot, 2003; see also McCrae (1987)). Indeed, openness is a causal precursor of creativity (Feist, 1998). Openness, then, is a potential mediator of nostalgia's influence on creativity. Following the logic of convergent operations (Campbell & Fiske, 1959), we introduced a different measure of creativity, self-reported creativity and tested whether openness mediates nostalgia's positive influence on creativity in Experiment 3.

Method

Participants and design

We randomly assigned 62 University of Limerick psychology undergraduates (33 women, 29 men; $M_{\text{age}} = 23.84$, $SD = 6.64$) to the nostalgia ($N = 31$) or control ($N = 31$) conditions. We rewarded participation with course credit or candy.

Materials and procedure

We manipulated and assessed ($\alpha = .95$) nostalgia similarly to Experiments 1–2. Participants then completed the 10-item openness to experience subscale of the 44-item Big Five personality measure (Benet-Martínez & John, 1998). Sample items are: “I see myself as someone who is inventive,” “I see myself as someone who is curious about many different things,” “I see myself as someone who has an active imagination” (1 = *disagree strongly*, 5 = *agree strongly*), and formed an openness composite ($\alpha = .81$) after recoding reversed items. Participants then completed Ivcevic's (2007) 12-item creativity scale. Sample items are: “My strategy towards challenging tasks is to...” (1 = *creative*

² We recruited as many undergraduate participants as possible during the course of several weeks for each of Experiments 1–3. Given the more open-ended nature of the writing task in Experiment 2 relative to Experiment 1 (see procedure), and the expected increase in response variation that this entailed, we recruited a larger sample of non-psychology undergraduates in Experiment 2.

³ Coders also rated the stories on the item “How well written is this story?” Technical ability may not reflect creativity, and indeed the correlation between the two items was low ($r = .29$, $p < .001$).

⁴ We carried out separate analyses by experiment. In each experiment, participants reported higher levels of nostalgia in the nostalgia condition ($M_1 = 4.71$, $SD_1 = 1.27$, $N = 25$; $M_2 = 4.83$, $SD_2 = 0.93$, $N = 25$) than in the control condition ($M_1 = 3.77$, $SD_1 = 1.64$, $N = 62$; $M_2 = 3.52$, $SD_2 = 1.55$, $N = 62$), $F_1(1, 48) = 5.08$, $p = .029$, $\eta^2 = .10$, and $F_2(1, 122) = 32.60$, $p < .001$, $\eta^2 = .21$.

⁵ We carried out separate analyses by experiment. In Experiment 1, nostalgia ($M = 4.48$, $SD = 1.72$, $N = 24$) did not produce significantly more creative prose compared to control ($M = 3.90$, $SD = 1.41$, $N = 24$), $F(1, 46) = 1.65$, $p = .205$, $\eta^2 = .04$. In Experiment 2, nostalgia ($M = 4.05$, $SD = 1.43$, $N = 62$) did significantly increase creativity compared to control ($M = 3.56$, $SD = 1.17$, $N = 62$), $F(1, 122) = 4.45$, $p = .037$, $\eta^2 = .04$.

and novel solutions, 6 = traditional and familiar solutions), “When working on a challenging task I am someone who...” (1 = resists temptation or distraction, 6 = allows my imagination to wander and explore), and “When solving challenging tasks I tend to propose strategies that are...” (1 = innovative and risky, 6 = cautious and dependable, reversed). We computed a composite score ($\alpha = .70$) after recoding reversed items.

Results and discussion

Manipulation check

We conducted an ANOVA (condition: nostalgia, control) with state nostalgia as the dependent measure. Participants in the nostalgia condition ($M = 4.33, SD = 1.20, N = 31$) reported higher nostalgia than those in the control condition ($M = 2.99, SD = 1.38, N = 31$), $F(1, 60) = 16.82, p < .001, \eta^2 = .22$, attesting to the effectiveness of the nostalgia induction.

Openness

An ANOVA (condition: nostalgia, control) on the openness composite indicated that participants in the nostalgic condition ($M = 3.83, SD = 0.57, N = 31$) scored higher on openness than controls ($M = 3.45, SD = 0.72, N = 31$), $F(1, 60) = 5.36, p = .024, \eta^2 = .08$. Nostalgia augmented openness.

Creativity

A similar ANOVA on the creativity composite indicated that participants in the nostalgia condition ($M = 4.12, SD = 0.64, N = 31$) reported greater creativity compared to controls ($M = 3.76, SD = 0.64, N = 31$), $F(1, 60) = 4.42, p = .040, \eta^2 = .07$. Nostalgia fostered creativity.

Mediation analyses

To examine whether the boost in creativity subsequent to nostalgic reverie is plausibly due to openness, we conducted a mediation analysis (Hayes & Preacher, 2013; Fig. 1, top values). So far, we have reported effects of nostalgia on creativity and openness, the mediator. We regressed creativity on both the nostalgia condition, entered as dummy variable (0 = ordinary event, 1 = nostalgic event), and openness. Openness predicted higher levels of creativity, $B = 0.32, S_e = 0.12, t(59) = 2.62, p = .011$, whereas the nostalgia condition no longer had a significant effect on creativity, $B = 0.22, S_e = 0.16, t(59) = 1.36, p = .179$. Importantly, 5000 accelerated and bias-corrected bootstraps (Hayes & Preacher, 2013) confirmed that the indirect effect of the nostalgia manipulation through openness to experience on creativity was significantly positive, $B = 0.12, S_e = 0.08, 0.014 < B_{95} < 0.318$. The effect of nostalgia on creativity is plausibly mediated by openness.

Experiment 4: nostalgia fosters creativity above and beyond positive affect

Experiments 1–2 provided initial evidence that nostalgia spurs creativity, and Experiment 3 indicated that the positive influence of nostalgia on creativity is mediated by openness to experience. However, the content of nostalgic narratives is more positive than negative (Abeyta et al., 2014; Stephan, Sedikides, & Wildschut, 2012; Wildschut et al., 2006). Also, nostalgia typically (Hepper et al., 2012; Stephan et al., 2012; Verplanken, 2012; Wildschut et al., 2006) but not always (Zhou, Wildschut, Sedikides, Shi, & Feng, 2012, Studies 2–4) increases positive affect. Although research has begun to establish unique effects of nostalgia above and beyond positive affect (Cheung et al., 2013; Routledge, Wildschut, Sedikides, Juhl, & Arndt, 2012, Studies 2–3; Stephan et al., 2012, Study 2), it is not clear whether nostalgia would uniquely engender creativity. Experiment 4 sought to address this issue by comparing nostalgia against an affectively positive control: experiencing a stroke of luck. Participants wrote creative sentences about 10 common words based on the linguistic creativity measure developed and validated by Zhu, Xu, and Khot (2009). We propose that the experience of nostalgia in particular, rather than positive affect in general, propels creativity. Thus, we hypothesized that nostalgic reverie, as mediated by openness, fosters creativity compared to contemplating a positive event.

Method

Participants and design

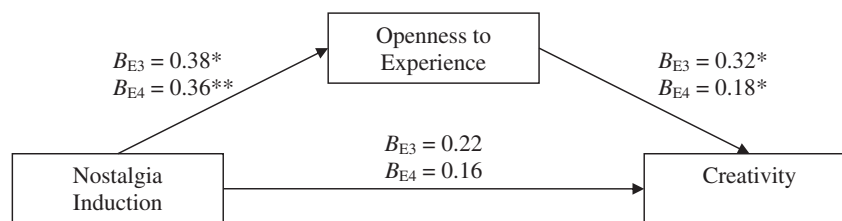
We randomly assigned 106 individuals located in the U.S. and recruited from an online research website (www.MTurk.com; 75 women, 31 men; $M_{age} = 40.07, SD = 12.91$) to the nostalgia ($N = 50$) or luck ($N = 56$) condition. We rewarded participants with \$0.40.

Materials and procedure

Participants in the nostalgia condition brought to mind and described a nostalgic event as in Experiments 1–2. In the luck control condition, participants read the following instructions:

Please bring to mind a lucky event in your life. Specifically, try to think of a positive past event that was brought on by chance rather than through your own actions (e.g., you unexpectedly found a lost item). Bring this lucky experience to mind. Immerse yourself in the lucky experience. How does it make you feel?

In both conditions, participants took 5 min to generate a written account of the experience. Next, they completed the same nostalgia manipulation check as in Experiments 1–3 ($\alpha = .88$). They also completed a 3-item positive affect manipulation check (1 = strongly disagree, 6 = strongly agree) using similar phrasing: “Right now, I am feeling quite positive,” “Right now, I’m having positive feelings,” I feel



Note: * $p \leq .05$; ** $p \leq .01$; E_3 indicates values for Experiment 3, E_4 indicates values for Experiment 4.

Fig. 1. Openness mediates nostalgia's impact on creativity (Experiments 3 & 4). Note: * $p \leq .05$; ** $p \leq .01$; E_3 indicates values for Experiment 3, E_4 indicates values for Experiment 4.

positive at the moment;" $\alpha = .71$). We randomized the order of the six items. Subsequently, we asked participants to fill out the 10-item openness measure, as in Experiment 3 (Benet-Martínez & John, 1998). We computed an openness composite ($\alpha = .82$) after recoding reversed items.

Next, we assessed creativity based on Zhu et al.'s (2009) linguistic creativity measure. We instructed participants to "try to write a creative sentence about each keyword," followed by ten common words (sun, water, warm, eating, money, tasty, sea, beautiful, pain, fun; <http://www.kuleuven.be/semlab/>; De Deyne & Storms, 2008). Two coders, familiar with the construct of creativity, but unaware of conditions and hypotheses, coded the sentences for creativity on the item: "How creative do you consider this sentence to be?" (1 = *not at all*, 7 = *very much*). Ratings were consistent across coders for each rated word (all Spearman–Brown corrected $r_s \geq .62$), and hence we aggregated scores into a creativity composite (overall $\alpha = .92$).

Results and discussion

Manipulation check

We conducted a one-way ANOVA (condition: nostalgia, luck), with state nostalgia as the dependent variable. Participants in the nostalgia condition ($M = 5.16$, $SD = 0.99$, $N = 50$) reporting feeling more nostalgic than those in the luck condition ($M = 4.07$, $SD = 1.40$, $N = 55$), $F(1, 103) = 20.89$, $p < .001$, $\eta^2 = .17$. The nostalgia manipulation was effective.

Positive affect

A similar ANOVA (condition: nostalgia, luck) with positive affect as the dependent variable evidenced no significant difference between the nostalgia condition ($M = 5.26$, $SD = 0.67$, $N = 50$) and the luck condition ($M = 4.96$, $SD = 1.03$, $N = 55$), $F(1, 103) = 3.08$, $p = .082$, $\eta^2 = .03$. Positive affect was high in both conditions and numerically higher in the nostalgia condition.

Openness

An ANOVA (condition: nostalgia, luck) on openness indicated that participants in the nostalgic condition ($M = 3.78$, $SD = 0.51$, $N = 50$) scored higher on openness than those in the luck condition ($M = 3.42$, $SD = 0.76$, $N = 53$), $F(1, 101) = 8.11$, $p = .005$, $\eta^2 = .07$. The effect of nostalgia on openness remained after controlling for positive affect, $F(1, 99) = 5.55$, $p = .020$, $\eta^2 = .05$.

Creativity

We performed an ANOVA (condition: nostalgia, luck) on the creativity measure. Participants in the nostalgia condition ($M = 1.85$, $SD = 0.52$, $N = 50$) displayed higher linguistic creativity compared to those in the luck condition ($M = 1.62$, $SD = 0.44$, $N = 56$), $F(1, 104) = 6.33$, $p = .013$, $\eta^2 = .06$. Controlling for positive affect yielded similar results, $F(1, 102) = 5.72$, $p = .019$, $\eta^2 = .05$.

Mediation analyses

We conducted a mediation analysis (Hayes & Preacher, 2013; Fig. 1, bottom values) to test whether openness mediated the effect of nostalgia on creativity, as in Experiment 3. Results so far indicate that nostalgia increases creativity and openness. A regression analysis in which creativity was predicted by the nostalgia condition (0 = *lucky event*, 1 = *nostalgic event*) and openness showed that openness predicted higher levels of creativity, $B = 0.18$, $S_e = 0.07$, $t(100) = 2.50$, $p = .014$, whereas the nostalgia condition no longer had a significant effect on creativity, $B = 0.16$, $S_e = 0.10$, $t(100) = 1.68$, $p = .095$. We then

performed 5000 accelerated and bias-corrected bootstraps (Hayes & Preacher, 2013), which confirmed that the indirect effect of the nostalgia manipulation through openness on creativity was significantly positive, $B = 0.07$, $S_e = 0.03$, $0.016 < B_{95} < 0.150$. This mediated effect remained significantly positive after controlling for positive affect, $B = 0.06$, $S_e = 0.03$, $0.009 < B_{95} < 0.141$. Consistent with Experiment 3, the effect of nostalgia on creativity was mediated by openness.

Summary

Nostalgia fostered a sense of openness and creativity in comparison to positive experience (i.e., lucky event). Transmitted through openness, nostalgia promotes a sense of creativity above and beyond positive affect.

General discussion

Although nostalgia has been widely implicated in explanations of creative works (Austin, 2003; Cook, 2009; Flinn, 1992), we examined for the first time the impact of this emotion on creativity *itself*. We anticipated nostalgia to increase openness, based on research that established nostalgia as an approach-oriented emotion (Stephan et al., 2014), a source of inspiration (Stephan et al., 2015), and a contributor to constructive engagement with the present and future (Cheung et al., 2013; Zhou, Wildschut, Sedikides, Shi, & Feng, 2012). Given the documented and strong link between openness and creative behavior (Feist, 1998; Hirsh & Peterson, 2008; Silvia et al., 2009), we hypothesized that openness would act as a plausible mediator of nostalgia's creativity enhancing impact. In four experiments, we examined these hypothesized effects of nostalgia on creativity, as well as the proposed mediating role of openness.

In the two initial experiments, we tested nostalgia's influence on creative behavior in the form of written prose, following procedures introduced by Proulx (2012; see also Proulx and Inzlicht (2012)) and by Thrash et al. (2010). Experiments 1–2 evidenced more creatively written stories among participants who engaged in nostalgic reverie relative to participants in an autobiographical control condition. These experiments provide first evidence of the creativity-enhancing potential of nostalgia. We next probed the process underlying this effect of nostalgia on creativity. We proposed openness, a known precursor of creative behavior (Feist, 1998), to mediate nostalgia's creativity enhancing capacity. Experiment 3 showed that nostalgia led to higher levels of openness, which in turn contributed to creativity, measured with an established scale (Ivencic, 2007). In Experiment 4, we additionally tested whether these patterns emerge above and beyond positive affect. Even in comparison to an affectively positive control condition, nostalgia, mediated by openness, boosted creativity. The findings are consistent with the hypotheses that nostalgia fosters creativity, and that this effect is mediated by elevated levels of openness.

Implications, limitations, and future directions

Nostalgia has suffered an undeserved, bad reputation (Sedikides et al., 2015). Our research contributes to the rehabilitation of nostalgia by illustrating its creativity-enhancing potential. Creativity is key to human development and societal progress (Chikszentmihalyi, 1999; Sternberg, 1999). The capacity to be playful and inventive with ideas stands at the root of major scientific discoveries and cultural achievements (Sternberg & Lubart, 1999). Nostalgia's potential to foster creativity is exciting and promising.

Nostalgia features regularly as a topic within creative works (Cook, 2004; Flinn, 1992). However, rather than examining nostalgia as featured in creative expressions, we focused on nostalgia's impact on creativity. This suggests an interesting direction for future research. Could these two roles—nostalgia as topic of creative work and nostalgia as source of creativity—strengthen each other? Would the nostalgia

present in, for example, the literary works of Homer (1921), Dostoyevsky (Hudspith, 2004), and Wordsworth (Goodman, 2008) be a potent source of creativity? By identifying nostalgia as a fountain of creativity, our research enables forays into examinations of the role of nostalgic art as an impetus for creative endeavors.

We treated and measured openness as a variable affected by contextual variation. This practice may appear somewhat unorthodox given the status of openness as a relatively stable personality trait (McCrae & Costa, 1987). Yet, environmental factors are known to mold openness (Bergeman et al., 1993), and openness has been treated as a mediator of time-varying variables such as age (Cornelis, Van Hiel, Roets, & Kossowska, 2009). Our research then demonstrates that openness can change in response to variations in level of nostalgia, and future investigations will do well to examine how durable these changes are.

The dual pathway to creativity model (De Dreu, Baas, & Nijstad, 2008) distinguishes between two complementary processes that contribute to creativity. The flexibility pathway involves the “use of broad and inclusive cognitive categories, through flexible switching among categories, approaches, and sets, and through the use of remote (rather than close) associations” (Nijstad, De Dreu, Rietzschel, & Baas, 2010, p. 43). The persistence pathway “represents the possibility of achieving creative ideas, insights, and problem solutions through hard work, the systematic and effortful exploration of possibilities, and in-depth exploration of only a few categories or perspectives” (p. 42). How does nostalgia fit into this dual pathway to creativity model? Our finding that nostalgia increases creativity through openness may indicate the involvement of the flexibility pathway (Nijstad et al., 2010, p. 67). Consistent with this suggestion, nostalgic recollections involve representing events in terms of global features (Stephan et al., 2012). De Dreu et al. (2008) speculated that global information enhances flexibility. Future research would need to examine the link between nostalgia and flexibility/persistence pathways towards creativity.

Through nostalgia, people can assimilate features from past selves into their present selves, providing a sense of self-continuity (Sedikides, Wildschut, Routledge, & Arndt, 2014). Perhaps the fusion of past and present that nostalgia facilitates provides a basis for creative performance. Indeed, creativity benefits from combining concepts that seem disparate (Finke, Ward, & Smith, 1992). For example, Wan and Chiu (2002, Study 2) found that the creative construction of LEGO models was boosted after participants worked on novel conceptual combination problems (e.g., listing “a piece of furniture that is also a kind of fish”) compared to participants who completed ordinary conceptual combination problems instead (e.g., listing “a piece of coat that is also a kind of animal skin;” Hampton, 1997). The potential of nostalgia to augment creativity and openness may be rooted in its capacity to merge features of the past and present.

We were concerned with creativity at the level of individual performance. How do our findings speak to creativity at the level of cultural achievements (Simonton, 1997, 2000) or cultural influences on individual performance (Leung & Chiu, 2010; Leung et al., 2008)? Nostalgia could qualify as one of the mediating mechanisms that underlie the enhanced creativity of individuals who have lived abroad (Maddux & Galinsky, 2009; Tadmor, Galinsky, & Maddux, 2012) or the creativity stemming from multicultural experiences (Leung & Chiu, 2008; Maddux, Adam, & Galinsky, 2010). Nostalgic reverie may be implemented as a psychological resource helping to cope with acculturation stress among immigrants and international students (Sedikides, Wildschut, Routledge, Arndt, & Zhou, 2009), and this reverie may in part explain the boost in creativity documented in earlier research on culture and creativity. These ideas merit further empirical scrutiny.

Coda

Portrayals of nostalgia can be observed within various forms of creative expression, especially within the arts. Rather than studying nostalgia as topic of creative work, we examined nostalgia's impact on creative

behavior. We suggested that nostalgia fosters creativity as a result of the openness that flows from nostalgia. The results of four experiments were consistent with this hypothesis. Nostalgia sparked creatively written stories (Experiments 1 and 2). Nostalgia stimulated openness, and this enhanced openness mediated nostalgia's contribution to creativity (Experiment 3 and 4). In nostalgic reverie, memory turns muse.

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