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Autobiographical Memory Functions of Nostalgia in Comparison to Rumination and Counterfactual Thinking: Similarity and Uniqueness

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Abstract

We compared and contrasted nostalgia with rumination and counterfactual thinking in terms of their autobiographical memory functions. Specifically, we assessed individual differences in nostalgia, rumination, and counterfactual thinking, which we then linked to self-reported functions or uses of autobiographical memory (Self-Regard, Boredom Reduction, Death Preparation, Intimacy Maintenance, Conversation, Teach/Inform, Bitterness Revival). We tested which memory functions are shared and which are uniquely linked to nostalgia. The commonality among nostalgia, rumination, and counterfactual thinking resides in their shared positive associations with all memory functions: individuals who evinced a stronger propensity toward past-oriented thought (as manifested in nostalgia, rumination, and counterfactual thinking) reported greater overall recruitment of memories in the service of present functioning. The uniqueness of nostalgia resides in its comparatively strong positive associations with Intimacy Maintenance, Teach/Inform, and Self-Regard and weak association with Bitterness Revival. In all, nostalgia possesses a more positive functional signature than do rumination and counterfactual thinking.

Keywords: autobiographical memory, nostalgia, rumination, counterfactual thinking, memory functions

Autobiographical Memory Functions of Nostalgia in Comparison to Rumination and Counterfactual Thinking: Similarity and Uniqueness

The recollection of meaningful, personal memories often gives rise to nostalgia. Following a prototype approach (Rosch, 1978), according to which people's understanding of nostalgia is shaped by repeated experience and becomes cognitively organized around a prototype, Hepper, Ritchie, Sedikides, and Wildschut (2012) found that laypersons conceptualize nostalgia as a predominantly positive, social, and past-oriented emotion. In nostalgic reverie, one remembers an event from one's past—typically a fond, meaningful memory. One views the recalled experience through rose-tinted glasses, misses the object of one's nostalgia (e.g., a loved one or period of life, such as childhood), and may even long to return to the past. Accordingly, one feels sentimental, predominantly happy but with a tinge of sadness and longing. These lay conceptions of nostalgia are cross-culturally shared (Hepper et al., 2014) and fit with formal definitions: *The New Oxford Dictionary of English* (1998) defines nostalgia as “a sentimental longing or wistful affection for the past” (p. 1266).

Previous experimental studies demonstrated that nostalgia, as induced via vivid autobiographical writing (Wildschut, Sedikides, Arndt, & Routledge, 2006), musical excerpts (Cheung et al., 2013), song lyrics (Routledge et al., 2011), or scents (Reid, Green, Wildschut, & Sedikides, 2015), increases positive affect, elevates self-regard and felt authenticity, instills a sense of meaning in life, promotes optimism, and strengthens approach motivation (for reviews, see Sedikides & Wildschut, 2016; Sedikides, Wildschut, Arndt, & Routledge, 2008; Sedikides, Wildschut, Routledge, Arndt et al., 2015). More recent studies show that nostalgia also increases self-continuity (i.e., connection between past and present selves; Sedikides et al., 2016; Sedikides, Wildschut, Routledge, & Arndt, 2015), inspiration (Stephan et al., 2015), and creativity (Van Tilburg, Sedikides, & Wildschut, 2015). The most diverse evidence, however, relates to the beneficial impact of nostalgia on social connectedness. Nostalgia inductions increase feelings of being protected and loved, reduce attachment anxiety and attachment avoidance, promote empathy and helping behavior (e.g., charitable giving), boost

interpersonal competence, and strengthen perceptions of social support (Stephan et al., 2014; Wildschut et al., 2006; Wildschut, Sedikides, Routledge, Arndt, & Cordaro, 2010; Zhou, Sedikides, Wildschut, & Gao, 2008; Zhou, Wildschut, Sedikides, Shi, & Feng, 2012).

Whereas this evidence pertains to the psychological functions of momentary nostalgia (state nostalgia), the functional aspects of individual differences in nostalgia proneness (trait nostalgia) are not well charted. The key objective of the present research, therefore, was to shed light on the functional signature of nostalgia proneness by examining its association with the self-reported functions, or uses, of autobiographical memory. The second objective was to examine the similarities and uniqueness of nostalgia in relation to two other types of past-oriented reflection that have attracted extensive scholarly attention and have been linked conceptually with nostalgia: rumination and counterfactual thinking.

Rumination

Rumination is defined as “thoughts and behaviors that focus the individual's attention on the negative mood, the causes and consequences of this mood, and self-evaluations related to the mood” (Rusting & Nolen-Hoeksema, 1998, p. 790). Rumination deepens depression and increases negative thinking. Ruminators use negative thoughts and memories to understand their current distress. Hence, they experience more difficulties to engage in problem solving and instrumental behavior (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Furthermore, ruminators have lower self-esteem and self-compassion, while their self-worth is more contingent on social approval, appearance, and performance (Neff & Vonk, 2009). Although we are not aware of prior research examining the relation between nostalgia and rumination, evidence indicates that nostalgia proneness is positively correlated with neuroticism (Barrett et al., 2012; Seehusen et al., 2013; Stephan et al., 2014), which, in turn, is related to rumination (Roberts, Gilboa, & Gotlib, 1998). Thus, whereas experimental research has highlighted the psychological benefits of state nostalgia, correlational research has sometimes raised question marks regarding the adaptiveness of trait nostalgia. Scholars in the psychodynamic tradition also proposed a link between rumination and nostalgia,

describing the latter as “a regressive manifestation closely related to the issue of loss, grief, incomplete mourning, and, finally, depression” (Castelnuovo-Tedesco, 1980, p. 110). In light of this evidence and theoretical speculation, it is important to clarify the similarities and differences between nostalgia and rumination.

Counterfactual Thinking

Counterfactual thinking refers to the mental representation of alternatives to the past and imagining how things could have turned out differently. Thoughts of how things could have turned out better are called upward counterfactuals, whereas thoughts of how things could have been worse are called downward counterfactuals. Individuals who engage in upward counterfactual thinking often experience negative affect, whereas individuals who engage in downward counterfactual thinking often experience relief (Epstude & Roese, 2008; Roese, 1997). Counterfactual thinking typically occurs after self-relevant negative events (Summerville & Roese, 2008) and is frequently accompanied by wishful thinking and feelings of regret (Epstude & Roese, 2008). Prior research links nostalgia with counterfactual thinking, albeit indirectly. Gilovich, Medvec, and Kahneman (1998) instructed participants to recall their biggest regrets and then to rate the extent to which each regret made them feel a number of emotions. Some of these emotions were considered hot (e.g., angry, ashamed, disgusted, embarrassed) and some were considered wistful (e.g., nostalgic, contemplative, sentimental, wistful). Results indicated that hot emotions were endorsed more for action (compared to inaction) regrets, whereas wistful emotions (including nostalgia) were endorsed more for inaction (compared to action) regrets. These findings suggest that counterfactual thinking (in particular as it relates to the contemplation of inaction regrets) and nostalgia may be linked. It is therefore important to shed light on the similarities and differences between nostalgia and counterfactual thinking.

Autobiographical Memory Functions

We compared and contrasted nostalgia with rumination and counterfactual thinking in terms of the self-reported functions or uses of autobiographical memory. Although the term

“functions” carries a connotation of “adaptiveness,” we do not use the term in this way. Instead, we use it to denote “uses of memory” or “motives for remembering” (Bluck & Alea, 2011; Bluck, Alea, Habermas, & Rubin, 2005; Harris, Rasmussen, & Berntsen, 2014). Harris, et al. (2014) distinguished between two approaches to the study of memory functions: the cognitive and the reminiscence one. According to the cognitive approach, autobiographical memory serves three major functions (Bluck et al., 2005; Pillemer, 1992). First, memories carry information about who people are and how people have developed over time, and therefore serve a self or identity function (Bluck & Alea, 2008; Conway, 2005). Second, memories are a source of knowledge that can help people to solve current problems and plan for the future, and thus serve a directive or problem-solving function (Pillemer, 2003). Third, sharing memories with others strengthens social bonds and intimacy in relationships, and thereby serves a social or communicative function (Alea & Bluck, 2007; Pasupathi, 2001).

The reminiscence approach specifies a broader range of functions to capture fully the many uses of autobiographical memories in everyday life. Within this tradition, Webster (1997, 2003) advanced an influential taxonomy that distinguishes eight memory functions. Based on factor analysis, these functions are: Problem Solving (using past problem-solving strategies to inform and guide present actions); Identity (drawing on memories to clarify and delineate one’s personal identity); Conversation (referring to shared past experiences to enliven conversations); Boredom Reduction (recalling past experiences to counteract tedium and monotony); Intimacy Maintenance (drawing on memories to acquire symbolic proximity to close [deceased] others in lieu of their physical presence); Death Preparation (recruiting memories to cope with awareness of one’s mortality); Teach/Inform (sharing memories to relay to others important insights about life and/or oneself); and Bitterness Revival (using memories to rekindle resentment stemming from the perception of having been wronged by others). Washington (2009) subsequently proposed a modification of Webster’s model that involved the combination of Problem-Solving and Identity to form a function she labelled Self-Regard.

Whereas there is considerable conceptual overlap between the cognitive and reminiscence approaches (i.e., both specify functions pertaining to identity, problem solving, and social relations; Bluck et al., 2005; Cappeliez, O'Rourke, & Chaudhury, 2005), evidence suggests that Webster's (1993) taxonomy captures critical aspects of memory usage that are not represented in the cognitive approach. For instance, this taxonomy encompasses functions that are negatively valenced (Bitterness Revival; Wong & Watt, 1991) and become more influential in older age (Death Preparation; Webster & McCall, 1999). For our present purposes, then, this model has two key benefits. First, it captures the self-oriented, existential, and sociality functions examined in previous experimental studies of nostalgia (Sedikides, Wildschut, Routledge, Arndt et al., 2015). Second, it allows us to compare nostalgia to rumination and counterfactual thinking in terms of additional memory functions that have attracted attention from scholars in the field of autobiographical memory but, thus far, have not been considered in relation to nostalgia. We therefore relied on Washington's (2009) revised version of Webster's (1997, 2003) comprehensive taxonomy of memory functions.

Overall, we propose that nostalgia is characterised by a more positive (and less negative) functional signature than are rumination and counterfactual thinking. Specifically, in light of prior evidence for the intensely social nature of nostalgia, we predicted that nostalgia (compared to rumination and counterfactual thinking) would be more strongly associated with Intimacy Maintenance. Several theories concur that self-regard at least partly originates from social connectedness. These are attachment theory (Bowlby, 1969/1982), contingencies of self-worth (Crocker & Wolfe, 2001), sociometer theory (Leary, 2005), and terror-management theory (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). We therefore further predicted that nostalgia would be more strongly associated with Self-Regard. In contrast, rumination and counterfactual thinking (compared to nostalgia) should be more strongly associated with Bitterness Revival—a negatively-valenced function (Harris et al., 2014).

Method

Participants

Two hundred and eighty-one participants completed the study online (195 women, 86 men; $M_{age} = 28.86$, $SD_{age} = 13.54$, $Range_{age} = 18-81$). One hundred and thirty-one were workers of Amazon Mechanical Turk with a 95% or better job acceptance rate. They took part in the study for \$.50. One hundred fifty participants were University of Southampton undergraduates who took part for course credit. The study was conducted with the formal approval of the University of Southampton psychology ethics committee.

Procedure and Materials

We presented study materials on a website hosted by the University of Southampton. After providing informed consent, participants completed (in random order) measures assessing nostalgia, rumination, and counterfactual thinking, as well as a measure assessing the memory functions.

Nostalgia. We assessed nostalgia proneness with the Southampton Nostalgia Scale (SNS; Barrett et al., 2010; Routledge, Arndt, Sedikides, & Wildschut, 2008; Sedikides, Wildschut, Routledge, Arndt et al., 2015). This is a 7-item scale that assesses nostalgic tendencies (1 = *not at all*, 7 = *very much*). We averaged the items to create the nostalgia proneness score ($\alpha = .95$).

Rumination. We assessed rumination with the revised version of the Ruminative Responses Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). This 10-item scale (1 = *almost never*, 4 = *almost always*) assesses "... responses to depressed mood that are self-focused . . . symptom focused . . . and focused on the possible consequences and causes of the mood . . ." (Nolen-Hoeksema, Larson, & Grayson, 1999, p. 1064). The scale comprises two 5-item subscales or facets, labelled Brooding and Reflection. Brooding refers to moody pondering, characterised by anxious and gloomy thinking styles (e.g., "Think 'Why do I have problems other people don't have?'"). Reflection entails engagement in a neutral contemplation, with the goal to reflect on what happened and the attempt to cope with the problems (e.g., "Go someplace alone to think about your feelings"). The brooding and

reflection facets of rumination were positively correlated in the present sample ($r[281] = .51$, $p < .001$; also see Treynor et al.). We therefore averaged all items to form an overall rumination index ($\alpha = .86$). Analyses in which we treated the brooding and reflection facets separately are available online as Supplemental Material.

Counterfactual thinking. We assessed counterfactual thinking with the Counterfactual Thinking for Negative Events Scale (CTNES; Rye, Cahoon, Ali, & Daftary, 2008). Participants were instructed to reflect on a recent negative event and then indicated how frequently they experienced various types of counterfactual thought (1 = *never*, 5 = *very often*). The CTNES comprises four 4-item facets: Nonreferent Downward measures downward counterfactual thinking without reference to oneself or others (e.g., “I count my blessings when I think how much worse things could have been”), Other-Referent Upward assesses upward counterfactuals that reference others’ actions (e.g., “If another person (or other people) had not been so inconsiderate, things would have been better”), Self-Referent Upward assesses upward counterfactual thoughts that reference one’s own actions (e.g., “I wish I had a time machine so I could just take back something I said or did”), and Nonreferent Upward measures upward counterfactual thinking without reference to oneself or others (e.g., “I think about how much better things could have been”). We averaged across facets to form a reliable, overall counterfactual-thinking index ($\alpha = .84$). A limitation of this approach is that the CTNES is predominantly relevant to upward counterfactual thinking (only one facet pertains to downward counterfactuals). To address this limitation, we conducted facet-level analyses and made the results available online as Supplemental Material.

Autobiographical memory functions. We measured the functions or uses of autobiographical memory with the 39-item Modified Reminiscence Functions Scale (MRFS; Washington, 2009). Washington modified Webster’s (1993) original Reminiscence Functions Scale (RFS) to improve its readability, clarity, and ease of use. Whereas the RFS comprises eight subscales (each assessing one of the memory functions specified in Webster’s [1997,

2003] influential taxonomy), the MRFS includes seven subscales. This is because Washington collapsed the highly correlated Identity and Problem Solving subscales to create a new subscale, labelled Self-Regard. We presented items as completions to the stem “When I reminisce it is:” (1 = *never*, 5 = *very often*). Cronbach’s reliability coefficients ranged from .76 to .93.

Data-Analytic Strategy

We followed three steps to examine associations between the variable set comprising nostalgia, rumination, and counterfactual thinking (Set 1) and the variable set comprising the memory functions (Set 2). First, we calculated zero-order correlations among the study variables. These analyses provided a first impression of the associations within and between the two variable sets. They do not, however, control for potential overlap among variables within each set. To begin to address this issue, we next conducted a series of multiple regression analyses in which we regressed each memory function onto nostalgia, rumination, and counterfactual thinking. By so doing, we controlled for overlap among the variables in Set 1 and shed light on their unique associations with the memory functions. Still, these analyses did not control for overlap within Set 2. As a final step, we therefore performed canonical correlation analysis. A canonical variable is an optimal linear combination of the manifest variables in a set, analogous to a latent variable in factor analysis. A canonical correlation is the correlation between two canonical variables. In canonical correlation analysis, the first canonical variables are the linear combinations of two variable sets producing the largest canonical correlation. After these linear combinations are partialled from the data, the search for the next-largest canonical correlation starts. The analysis is terminated when the number of canonical correlations equals the number of variables in the smaller set (Nunnally & Bernstein, 1994).

Results

Zero-Order Correlations

We present means, standard deviations, and zero-order correlations for all variables in Table 1. Nostalgia proneness, rumination, and counterfactual thinking were positively intercorrelated. The magnitude of the associations indicated that these three types of past-oriented thought are related, yet distinct, and justify further exploration of their similarities and differences in terms of memory functions. Furthermore, the seven memory functions were positively intercorrelated. All but one of these associations were statistically significant, the exception being the association between Teach-Inform and Bitterness Revival. Finally, nostalgia, rumination, and counterfactual thinking were positively correlated with all memory functions. All but one of these associations were statistically significant, the exception being the association between rumination and Teach-Inform.

Multiple Regression Analyses

Next, we conducted a series of multiple regression analyses, in which we entered nostalgia, rumination, and counterfactual thinking as simultaneous predictors of the memory functions (Table 2). Nostalgia was a unique positive predictor of all memory functions except Bitterness Revival. Rumination uniquely predicted higher ratings on Boredom Reduction and Bitterness Revival only. Finally, counterfactual thinking was a unique positive predictor of all memory functions except Self-Regard. Past research indicates that Bitterness Revival is consistently associated with poor psychological health outcomes (Westerhof, Bohlmeijer, & Webster, 2010). It is therefore noteworthy that nostalgia was not uniquely associated with this negatively-valenced function, whereas rumination and counterfactual thinking were.

Canonical Correlation Analysis

As a final step, we performed canonical correlation analysis. We present results in Table 3. Of the three possible canonical correlations (equal to the number of variables in the smallest set), two were statistically significant on the basis of a sequential F approximation. Examination of explained variance in the first canonical correlation (R_c^2) reveals that the variable set comprising nostalgia, rumination, and counterfactual thinking accounted for 45% of the variance in the variable set comprising the memory functions. Explained variance in

the second canonical correlation was 15%. These results indicate substantial prediction of memory functions from nostalgia, rumination, and counterfactual thinking (consistent with the preceding correlational and regression analyses).

One can interpret canonical correlations by examining which manifest variables in each set make meaningful contributions to their respective canonical variables. Two indicators facilitate this assessment: standardized canonical coefficients and canonical structure correlations (Table 3). Canonical coefficients reflect the independent contribution of each manifest variable to the canonical variable, controlling for the other manifest variables in the set (analogous to regression coefficients). Structure correlations are the correlation between the manifest variable and the canonical variable (analogous to factor loadings). When variables in a set are intercorrelated, as they were in both sets under consideration (Table 1), canonical structure correlations are generally preferred for determining which manifest variables figure prominently in the canonical variables (Stevens, 2002). We therefore relied primarily on the structure correlations.

The first canonical variable for Set 1 is a weighted sum of nostalgia, rumination, and counterfactual thinking with approximately equal emphasis on each. The structure correlations thus portray a general propensity toward past-oriented thought. For Set 2, the first canonical variable is a weighted sum of all memory functions. Each memory function made a substantive contribution to the canonical variable, with least emphasis on Teach/Inform and most on Bitterness Revival. Hence, the structure correlations reveal a general tendency to recruit autobiographical memories in the service of assorted needs and goals. In all, the first canonical correlation indicates that the commonality among nostalgia, rumination, and counterfactual resides in shared positive associations with all memory functions. Individuals with a strong general propensity toward past-oriented thought (as manifested in nostalgia, rumination, and counterfactual thinking) are also versatile in their use of autobiographical memory to support psychological functioning across different domains.

The second canonical variable for Set 1 is a weighted difference emphasizing nostalgia in contrast to rumination and counterfactual thinking. The structure correlations thus portray a unique propensity toward nostalgia, as opposed to the latter forms of past-oriented thought. For Set 2, the second canonical variable is a weighted difference emphasizing Intimacy Maintenance, Teach/Inform, and Self-Regard in contrast to Bitterness Revival. The structure correlations therefore depict a specific focus on recruiting memories to satisfy the psychological imperatives of social connectedness (as supported by Intimacy Maintenance and Teach/Inform) and self-esteem (as supported by Self-Regard), while eschewing the maladaptive resentment in Bitterness Revival. Accordingly, the second canonical correlation reveals a more positive functional signature for nostalgia (compared to rumination and counterfactual thinking).

Discussion

There is mounting experimental support for the psychological benefits of assorted nostalgia inductions (for reviews, see Sedikides & Wildschut, 2016; Sedikides et al., 2008; Sedikides, Wildschut, Routledge, Arndt et al., 2015), and evidence suggests that nostalgia often produces these benefits by virtue of its capacity to augment social connectedness. For example, it is through social connectedness that nostalgia inductions increase meaning in life, fortify self-esteem, heighten self-continuity, and boost optimism (Cheung, Sedikides, & Wildschut, 2016; Cheung et al., 2013; Routledge et al., 2011; Sedikides & Wildschut, 2017; Sedikides et al., 2016). In comparison to this expanding experimental literature, research on individual differences in nostalgia proneness is emerging more slowly. We therefore aimed to shed light on the functional signature of nostalgia proneness by examining its associations with the self-reported functions of autobiographical memory. To bring nostalgia into sharper focus, we also examined its similarities and uniqueness in relation to rumination and counterfactual thinking.

We focused our analyses on the relations within and between two variable sets: one set comprising nostalgia, rumination and counterfactual thinking (Set 1), and another set

comprising the seven memory functions (Set 2). Results revealed a pattern of positive zero-order correlations within and between these two variable sets, suggesting that the commonality among nostalgia, rumination, and counterfactual thinking resides in their general connections to functional recruitment of autobiographical memories. Subsequent canonical correlational analysis corroborated this interpretation: Individuals who frequently engage in past-oriented thought (as manifested in nostalgia, rumination, and counterfactual thinking) are also versatile in their use of autobiographical memory to meet assorted needs and goals.

The uniqueness of nostalgia (vs. rumination and counterfactual thinking) resides mainly in its strong positive associations with Intimacy Maintenance, Teach/Inform, and Self-Regard, and weak association with Bitterness Revival. In particular, the clearest evidence for nostalgia's distinctiveness is found in its comparatively strong link with Intimacy Maintenance and weak link with Bitterness Revival, which were borne out in each analysis (correlation, regression, canonical correlation). A literature review on the relation between memory functions and mental health concluded that Bitterness Revival is "negatively related to almost all aspects of mental health that have been studied (Westerhof et al., 2010, p. 706). Such evidence unequivocally supports the position that Bitterness Revival is a negatively-valenced function and, accordingly, that nostalgia possesses a more positive functional signature than do rumination and counterfactual thinking.

We acknowledge, however, that the valence of Intimacy Maintenance is a more contested issue. Whereas some studies showed a negative relation between Intimacy Maintenance and mental health, most have found no relation (Westerhof et al., 2010). Furthermore, whereas one study grouped Intimacy Maintenance with Bitterness Revival and Boredom Reduction (Harris et al., 2014, Study 1), other studies grouped it with Teach/Inform and Death Preparation (Harris et al., Study 4), or co-located it with Death Preparation within the same quadrant of a circumplex array (Webster, 2003). Consistent with the latter studies, we found that Intimacy Maintenance was more closely aligned with Teach/Inform ($r = .53$)

and Death Preparation ($r = .52$) than with Boredom Reduction ($r = .20$) and Bitterness Revival ($r = .29$) (Table 1).

Harris et al. (2014) speculated that the valence of Intimacy Maintenance “depends on the specific content that people think about to serve this function and the phenomenology of their remembering, as well as the frequency. For example, complicated grief is characterised by persistent, intrusive memories of the deceased ...” (p. 18). Indeed, in a minority of cases, using memories to acquire proximity to deceased loved ones (as captured by Intimacy Maintenance) is fraught with resentment, bitterness, and recrimination. More commonly, however, memories of the deceased are a source of solace that accompanies resilient coping (Bonanno, 2004). It is noteworthy, in this light, that the canonical variable contrasting nostalgia with rumination and counterfactual thinking was positively correlated with a canonical variable contrasting Intimacy Maintenance with Bitterness Revival (Table 3, under Canonical variable 2). Does nostalgia provide a unique mechanism for acquiring and maintaining proximity to close (deceased) others that is free from maladaptive resentment? This is a priority for future research.

Limitations

A potential limitation of our research is that we did not distinguish between facets of rumination and counterfactual thinking. Scientific descriptions of individual differences entail a trade-off between parsimony and precision, or bandwidth and fidelity (John, Hampson, & Goldberg, 1991; Paunonen & Ashton, 2001; Schimmack, Oishi, Furr, & Funder, 2004). For example, distinguishing between the brooding and reflection facets of rumination allows for a more precise description of individual differences but reduces parsimony, because these facets are intercorrelated and hence provide partially redundant information. By treating rumination and counterfactual thinking as unitary constructs, we prioritized parsimony. Paunonen (1998) cautioned, however, that “aggregating personality traits into their underlying personality factors could result in decreased predictive accuracy due to the loss of trait-specific but criterion-valid variance” (p. 538). This concern is pertinent to the present

context, because facets of rumination and counterfactual thinking are differentially related to affect, cognition, and motivation (Epstude & Roese, 2008; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). For example, whereas reflection entails neutral musing, brooding involves negative affect (e.g., anxiety). Also, whereas downward counterfactuals are associated with positive affect (e.g., relief), upward counterfactual thought is typically associated with negative affect (e.g., regret). These distinctions were borne out by the results of supplemental facet-level analyses, which are available online as Supplemental Material. Reflection (compared to brooding) and downward (compared to upward) counterfactuals more closely resembled nostalgia in terms of their associations with memory functions. To be precise, nostalgia, reflection, and downward counterfactuals were more strongly associated with adaptive memory functions than were brooding and upward counterfactuals, which were linked with Bitterness Revival. Yet, nostalgia could be distinguished, even from reflection and downward counterfactual thoughts, in terms of its unique positive association with Intimacy Maintenance (compared to other memory functions).

Another potential limitation concerns the assessment of counterfactual thinking. The CTNES instructs participants to reflect on a recent negative event and then indicate how frequently they experienced various types of counterfactual thought following this event. The instrument's emphasis on negative events is justified by abundant evidence that counterfactual thinking is more frequent following failure than success (Gilovich 1983; Roese & Olson, 1997). We did not, however, specify the type of negative event that participants should recall. Morrison, Epstude, and Roese (2012) showed that life regrets involving communal goals (e.g., relating to romance and family) are felt more intensely than regrets involving more agentic goals (e.g., relating to work and education), because the former entail stronger threats to belonging. This implies that the association between counterfactual thinking and memory functions, in particular Intimacy Maintenance, may vary as a function of regret type. Specifically, counterfactuals concerning negative events in the

communal (compared to agentic) domain should be more strongly linked with Intimacy Maintenance. This is a fruitful direction for future research.

Conclusion

Before closing, we should reiterate that we equated memory functions with “uses of memory” or “motives for remembering” and, by so doing, followed in the footsteps of other scholars in the field of autobiographical memory (Bluck & Alea, 2011; Bluck et al., 2005; Harris et al., 2014). The correlational nature of our evidence cannot uphold strong claims about the adaptiveness of self-reported memory functions or uses. To substantiate further the notion that nostalgia possesses a more positive functional signature than rumination and counterfactual thinking, future investigations would do well to harness experimental nostalgia inductions and build on existing evidence for their assorted beneficial effects, particularly within the domain of social connectedness. The present study thus provides the impetus for further unification of experimental research that has highlighted the psychological benefits of nostalgia and correlational research that, until recently, has queried the adaptiveness of nostalgia.

Disclosure Statement

The authors report no conflicts of interest.

References

- Alea, N., & Bluck, S. (2007). I'll keep you in mind: The intimacy function of autobiographical memory. *Applied Cognitive Psychology, 21*, 1091-1111.
doi:10.1002/acp
- Barrett, F. S., Grimm, K. J., Robins, R. W., Wildschut, T., Sedikides, C., & Janata, P. (2010). Music-evoked nostalgia: Affect, memory, and personality. *Emotion, 10*, 390-403.
doi:10.1037/a0019006
- Bluck, S., & Alea, N. (2008). Remembering being me: The self-continuity function of autobiographical memory in younger and older adults. In F. Sani (Ed.), *Self-continuity: Individual and collective perspectives* (pp. 55-70). New York, NY: Psychology Press.
- Bluck, S., & Alea, N. (2011). Crafting the TALE: Construction of a measure to assess the functions of autobiographical remembering. *Memory, 19*, 470-486.
doi:10.1080/09658211.2011.590500
- Bluck, S., Alea, N., Habermas, T., & Rubin, D. C. (2005). A tale of three functions: The self-reported uses of autobiographical memory. *Social Cognition, 23*, 91-117.
doi:10.1521/soco.23.1.91.59198
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely adverse events? *American Psychologist, 59*, 20-28. doi:10.1037/0003-066X.59.1.20
- Bowlby, J. (1969/1982). *Attachment and loss: Vol. 1. Attachment*. New York, NY: Basic Books.
- Cappeliez, P., O'Rourke, N., & Chaudhury, H. (2005). Functions of reminiscence and mental health in later life. *Aging and Mental Health, 9*, 295-301.
doi:10.1080/13607860500131427
- Castelnuovo-Tedesco, P. (1980). Reminiscence and nostalgia: The pleasure and pain of remembering. In S. I. Greenspan & G. H. Pollack (Eds.), *The course of life: Psychoanalytic contributions toward understanding personality development: Vol.*

III: Adulthood and the aging process (pp. 104-118). Washington, DC: US Government Printing Office.

Cheung, W. Y., Sedikides, C., & Wildschut, T. (2016). Induced nostalgia increases optimism (via social connectedness and self-esteem) among individuals high, but not low, in trait nostalgia. *Personality and Individual Differences, 90*, 283-288.

doi:10.1016/j.paid.2015.11.028

Cheung, W. Y., Wildschut, T., Sedikides, C., Hepper, E. G., Arndt, J., & Vingerhoets, A. J. (2013). Back to the future: Nostalgia increases optimism. *Personality and Social Psychology Bulletin, 39*, 1484-1496. doi:10.1177/0146167213499187

Conway, M. A. (2005). Memory and the self. *Journal of Memory and Language, 53*, 594-628.

doi:10.1016/j.jml.2005.08.005

Crocker, J., & Wolfe, C. T. (2001). Contingencies of self-worth. *Psychological Review, 108*, 593-623. doi:10.1037/0033-295X.108.3.593

Epstude, K., & Roese, N. J. (2008). The functional theory of counterfactual thinking.

Personality and Social Psychology Review, 12, 168-192.

doi:10.1177/1088868308316091

Gilovich, T. (1983). Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology, 44*, 1110-1126. doi:10.1037/0022-3514.44.6.1110

Gilovich, T., Medvec, V. H., & Kahneman, D. (1998). Varieties of regret: A debate and partial resolution. *Psychological Review, 105*, 602-605. doi:10.1037/0033-

295X.105.3.602

Harris, C. B., Rasmussen, A. S., & Berntsen, D. (2014). The functions of autobiographical memory: An integrative approach. *Memory, 22*, 559-581.

doi:10.1080/09658211.2013.806555

Hepper, E. G., Ritchie, T. D., Sedikides, C., & Wildschut, T. (2012). Odyssey's end: Lay conceptions of nostalgia reflect its original Homeric meaning. *Emotion, 12*, 102-119.

doi:10.1037/a0025167

- Hepper, E. G., Wildschut, T., Sedikides, C., Ritchie, T. D., Yung, Y.-F., Hansen, N., & Zhou, X. (2014). Pancultural nostalgia: Prototypical conceptions across cultures. *Emotion, 14*, 733-747. doi:10.1037/a0036790
- John, O. P., Hampson, S. E., & Goldberg, L. R. (1991). The basic level in personality-trait hierarchies: Studies of trait use and accessibility in different contexts. *Journal of Personality and Social Psychology, 60*, 348-361. doi:10.1037/0022-3514.60.3.348
- Leary, M. R. (2005). Sociometer theory and the pursuit of relational value: Getting to the root of self-esteem. *European Review of Social Psychology, 16*, 75-111. doi:10.1080/10463280540000007
- Morrison, M., Epstude, K., & Roese, N. J. (2012). Life regrets and the need to belong. *Social Psychological and Personality Science, 3*, 675-681. doi:10.1177/1948550611435137
- Neff, K., & Vonk, R. (2009). Self-compassion versus global self-esteem: two different ways of relating to oneself. *Journal of Personality, 77*, 23-50. doi:10.1111/j.1467-6494.2008.00537.x
- Nolen-Hoeksema, S., Larson, J., & Grayson, C. (1999). Explaining the gender difference in depressive symptoms. *Journal of Personality and Social Psychology, 77*, 1061-1072. doi:10.1037//0022-3514.77.5.1061.
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science, 3*, 400-424. doi:10.1111/j.1745-6924.2008.00088.x
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Pasupathi, M. (2001). The social construction of the personal past and its implications for adult development. *Psychological Bulletin, 127*, 651-672. doi:10.1037/0033-2909.127.5.651
- Paunonen, S. V. (1998). Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology, 74*, 538-556. doi:10.1037/0022-

3514.74.2.538

- Paunonen, S. V., & Ashton, M. C. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology, 81*, 524-539.
doi:10.1037/0022-3514.81.3.524
- Pillemer, D. B. (1992). Remembering personal circumstances: A functional analysis. In E. Winograd & U. Neisser (Eds.), *Affect and accuracy in recall: Studies of "flashbulb" memories* (Emory symposia in cognition 4th ed., pp. 236-264). New York, NY: Cambridge University Press.
- Pillemer, D. B. (2003). Directive functions of autobiographical memory: The guiding power of the specific episode. *Memory, 11*, 193-202. doi:10.1080/09658210244000360
- Pyszczynski, T., Greenberg, J., Solomon, S., Arndt, J., & Schimel, J. (2004). Why do people need self-esteem? A theoretical and empirical review. *Psychological Bulletin, 130*, 435-468. doi:10.1037/0033-2909.130.3.435
- Reid, C. A., Green, J. D., Wildschut, T., & Sedikides, C. (2014). Scent-evoked nostalgia. *Memory, 23*, 157-166. doi:10.1080/09658211.2013.876048
- Roberts, J. E., Gilboa, E., & Gotlib, I. H. (1998). Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cognitive Therapy and Research, 22*, 401-423. doi:10.1023/A:1018713313894
- Roese, N. J. (1997). Counterfactual thinking. *Psychological Bulletin, 121*, 133-148.
doi:10.1037/0033-2909.121.1.133
- Roese, N. J., & Olson, J. M. (1997). Counterfactual thinking: The intersection of affect and function. *Advances in Experimental Social Psychology, 29*, 1-59. doi:10.1016/S0065-2601(08)60015-5
- Rosch, E. (1978). Principles of categorization. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and categorization* (pp. 27-71). Hillsdale, NJ: Erlbaum.

Routledge, C., Arndt, J., Sedikides, C., & Wildschut, T. (2008). A blast from the past: The terror management function of nostalgia. *Journal of Experimental Social Psychology*, *44*, 132-140. doi:10.1016/j.jesp.2006.11.001

Routledge, C., Arndt, J., Sedikides, C., Wildschut, T., Hart, C. M., Juhl, J., & Schlotz, W. (2011). The past makes the present meaningful: Nostalgia as an existential resource. *Journal of Personality and Social Psychology*, *101*, 638-652. doi:10.1037/a0024292

Rye, M.S., Cahoon, M.B, Ali, R.S, & Daftary, T. (2008). Development and validation of the counterfactual thinking for negative events scale. *Journal of Personality Assessment*, *90*, 261-269. doi:10.1080/00223890701884996

Rusting, C. L., & Nolen-Hoeksema, S. (1998). Regulating responses to anger: Effects of rumination and distraction on angry mood. *Journal of Personality and Social Psychology*, *74*, 790-803. doi:10.1037/0022-3514.74.3.790

Schimmack, U., Oishi, S., Furr, M., & Funder, D. C. (2004). *Personality and Social Psychology Bulletin*, *30*, 1062-1075. doi:10.1177/0146167204264292

Sedikides, C., & Wildschut, T. (2016). Past forward: Nostalgia as a motivational force. *Trends in Cognitive Sciences*, *20*, 319-321. doi:10.1016/j.tics.2016.01.008

Sedikides, C., & Wildschut, T. (2017). Finding meaning in nostalgia. *Review of General Psychology*. Advance online publication. doi:10.1037/gpr0000109.

Sedikides, C., Wildschut, T., Arndt, J., & Routledge, C. (2008). Nostalgia: past, present, and future. *Current Directions in Psychological Science*, *17*, 304-307. doi:10.1111/j.1467-8721.2008.00595.x

Sedikides, C., Wildschut, T., Cheung, W.-Y., Routledge, C., Hepper, E. G., Arndt, J., Vail, K., Zhou, X., Brackstone, K., & Vingerhoets, A. J. J. M. (2016). Nostalgia fosters self-continuity: Uncovering the mechanism (social connectedness) and the consequence (eudaimonic well-being). *Emotion*, *16*, 524-539. doi:10.1037/emo0000136

- Sedikides, C., Wildschut, T., Routledge, C., & Arndt, J. (2015). Nostalgia counteracts self-discontinuity and restores self-continuity. *European Journal of Social Psychology, 45*, 52-61. doi:10.1002/ejsp.2073
- Sedikides, C., Wildschut, T., Routledge, C., Arndt, J., Hepper, E. G., & Zhou, X. (2015). To nostalgize: Mixing memory with affect and desire. *Advances in Experimental Social Psychology, 51*, 189-273. doi:10.1016/bs.aesp.2014.10.001
- Seehusen, J., Cordaro, F., Wildschut, T., Sedikides, C., Routledge, C., Blackhart, G. C., . . . Vingerhoets, A. J. J. M. (2013). Individual differences in nostalgia proneness: The integrating role of the need to belong. *Personality and Individual Differences, 55*, 904-908. doi:10.1016/j.paid.2013.07.020
- Stephan, E., Sedikides, C., Wildschut, T., Cheung, W. Y., Routledge, C., & Arndt, J. (2015). Nostalgia-evoked inspiration: Mediating mechanisms and motivational implications. *Personality and Social Psychology Bulletin, 41*, 1395-1410. doi:10.1177/0146167215596985
- Stephan, E., Wildschut, T., Sedikides, C., Zhou, X., He, W., Routledge, C., Cheung, W. Y., & Vingerhoets, A. J. J. M. (2014). The mnemonic mover: Nostalgia regulates avoidance and approach motivation. *Emotion, 14*, 545-561. doi:10.1037/a0035673
- Stevens, J. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Mahwah, NJ: Erlbaum.
- Summerville, A., & Roese, N. J. (2008). Dare to compare: Factbased versus simulation-based comparison in daily life. *Journal of Experimental Social Psychology, 44*, 664-671. doi:10.1016/j.jesp.2007.04.002
- The New Oxford dictionary of English.* (1998). Oxford, England: Oxford University Press.
- Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology, 76*, 284-304. doi:10.1037/0022-3514.76.2.284

- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27*, 247-259.
doi:0.1023/A:1023910315561
- Van Tilburg, W. A., Sedikides, C., & Wildschut, T. (2015). The mnemonic muse: Nostalgia fosters creativity through openness to experience. *Journal of Experimental Social Psychology, 59*, 1-7. doi:10.1016/j.jesp.2015.02.002
- Washington, G. (2009). Modification and psychometric testing of the reminiscence functions scale. *Journal of Nursing Measurement, 17*, 134-147. doi:10.1891/1061-3749.17.2.134
- Webster, J. D. (1993). Construction and validation of the reminiscence functions scale. *Journal of Gerontology: Psychological Sciences, 48*, 256-262.
doi:10.1093/geronj/48.5.P256
- Webster, J. D. (1997). The Reminiscence Functions Scale: A replication. *International Journal of Aging and Human Development, 44*, 137-148. doi:10.2190/AD4D-813D-F5XN-W07G
- Webster, J. D. (2003). The reminiscence circumplex and autobiographical memory functions. *Memory, 11*, 37-41. doi:10.1080/09658210244000379
- Webster, J. D., & McCall, M. E. (1999). Reminiscence functions across adulthood: A replication and extension. *Journal of Adult Development, 6*, 73-85.
doi:10.1023/A:10216 28525902
- Westerhof, G. J., Bohlmeijer, E., & Webster, J. D. (2010). Reminiscence and mental health: a review of recent progress in theory, research, and interventions. *Ageing & Society, 30*, 697-721. doi: 10.1017/S0144686X09990328
- Wildschut, T., Sedikides, C., Arndt, J., & Routledge, C. (2006). Nostalgia: Content, triggers, functions. *Journal of Personality and Social Psychology, 91*, 975-993.
doi:10.1037/0022-3514.91.5.975

- Wildschut, T., Sedikides, C., Routledge, C., Arndt, J., & Cordaro, F. (2010). Nostalgia as a repository of social connectedness: The role of attachment-related avoidance. *Journal of Personality and Social Psychology*, *98*, 573-586. doi:10.1037/a0017597
- Wong, P. T., & Watt, L. M. (1991). What types of reminiscence are associated with successful aging? *Psychology and Aging*, *6*, 272-279. doi:10.1037/0882-7974.6.2.272
- Zhou, X., Sedikides, C., Wildschut, T., & Gao, D. G. (2008). Counteracting loneliness: On the restorative function of nostalgia. *Psychological Science*, *19*, 1023-1029. doi:10.1111/j.1467-9280.2008.02194.x
- Zhou, X., Wildschut, T., Sedikides, C., Shi, K., & Feng, C. (2012). Nostalgia: The gift that keeps on giving. *Journal of Consumer Research*, *39*, 39-50. doi: 10.1086/662199

Table 1. *Zero-Order Correlations Among Study Variables.*

	<i>M</i>	<i>SD</i>	Zero-order correlation											
			1	2	3	4	5	6	7	8	9	10		
1. Nostalgia	4.45	1.50	--											
2. Rumination	2.27	0.67	.27	--										
3. Counterfactual thinking	2.96	0.66	.35	.56	--									
4. Self-regard	3.06	0.84	.35	.20	.26	--								
5. Boredom Reduction	2.88	0.98	.28	.34	.35	.36	--							
6. Death Preparation	2.05	1.00	.23	.16	.31	.50	.27	--						
7. Teach/Inform	2.65	0.97	.25	.05	.22	.51	.15	.59	--					
8. Intimacy Maintenance	2.87	1.03	.43	.16	.29	.32	.20	.52	.53	--				
9. Conversation	2.81	0.85	.30	.22	.27	.64	.44	.44	.52	.34	--			
10. Bitterness Revival	2.53	0.91	.26	.52	.53	.14	.35	.35	.10	.29	.14	--		

Note. $N = 281$. Correlations equal to or greater than .14 are significant at $p < .05$, two-tailed.

Table 2. *Multiple Regression Analyses Predicting Memory Functions from Nostalgia, Rumination, and Counterfactual Thinking: Standardised Regression Coefficients.*

Predictors	Outcome variables: Memory functions						
	Self-regard	Boredom Reduction	Death Preparation	Teach/Inform	Intimacy Maintenance	Conversation	Bitterness Revival
Nostalgia	.29***	.17**	.14*	.20**	.38***	.23***	.06
Rumination	.05	.20**	-.03	-.13	-.04	.08	.33***
Counterfactual thinking	.13	.18**	.28***	.23***	.18**	.15*	.32***
Model R^2	.14***	.18***	.11***	.09***	.21***	.13***	.35***

Note. Tabled values are standardised regression coefficients. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. *Canonical Correlations of Nostalgia, Rumination, and Counterfactual Thinking with Memory Functions.*

	Canonical variable 1		Canonical variable 2	
	Canonical	Structure	Canonical	Structure
Set 1:				
Nostalgia	0.38	.66	0.96	.73
Rumination	0.44	.80	-0.59	-.44
Counterfactual thinking	0.47	.85	-0.19	-.18
Set 2:				
Self-Regard	0.24	.50	0.42	.43
Boredom Reduction	0.22	.63	0.03	.01
Death Preparation	-0.17	.45	-0.23	.17
Teach-Inform	-0.02	.33	0.00	.43
Intimacy Maintenance	0.26	.55	0.90	.69
Conversation	0.15	.50	-0.13	.27
Bitterness Revival	0.71	.85	-0.65	-.42
R_c	.67***		.38***	
R_c^2	.45		.15	

Note. Canonical = standardised canonical coefficient. Structure = canonical structure correlation. R_c = canonical correlation. Canonical coefficients are standardised by multiplying the raw coefficients with the standard deviation of the associated variable and are not bounded between -1 and 1.

*** $p < .001$.