

The Mnemonic Mover:
Nostalgia Regulates Avoidance and Approach Motivation

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Abstract

In light of its role in maintaining psychological equanimity, we proposed that nostalgia—a self-relevant, social, and predominantly positive emotion—regulates avoidance and approach motivation. We advanced a model in which (a) avoidance motivation triggers nostalgia and (b) nostalgia, in turn, increases approach motivation. As a result, nostalgia counteracts the negative impact of avoidance motivation on approach motivation. Five methodologically diverse studies supported this regulatory model. Study 1 used a cross-sectional design and showed that avoidance motivation was positively associated with nostalgia. Nostalgia, in turn, was positively associated with approach motivation. In Study 2, an experimental induction of avoidance motivation increased nostalgia. Nostalgia then predicted increased approach motivation. Studies 3-5 tested the causal effect of nostalgia on approach motivation and behavior. These studies demonstrated that experimental nostalgia inductions strengthened approach motivation (Study 3) and approach behavior as manifested in reduced seating distance (Study 4) and increased helping (Study 5). The findings shed light on nostalgia's role in regulating the human motivation system.

Keywords: nostalgia, nostalgia proneness, avoidance motivation, approach motivation, self-regulation

The Mnemonic Mover:

Nostalgia Regulates Avoidance and Approach Motivation

Nostalgia has had a tumultuous past. The term was introduced by the Swiss physician Johannes Hofer (1688/1934) to refer to the adverse psychological and physiological symptoms displayed by Swiss mercenaries serving abroad. Hofer regarded nostalgia as “a cerebral disease” (p. 387) and his view of nostalgia as a neurological affliction remained influential throughout the 17th and 18th century. Symptoms were thought to include persistent thinking of home, bouts of weeping, anxiety, irregular heartbeat, anorexia, and insomnia (McCann, 1941). By the early 19th century, however, nostalgia became regarded as a form of melancholia or depression (Rosen, 1975; McCann, 1941). Nostalgia remained consigned to the realm of psychological disorders for much of the 20th century. Scholars described nostalgia as an “immigrant psychosis” (Frost, 1938, p. 801), a “mentally repressive compulsive disorder” (Fodor, 1950, p. 25), and “a regressive manifestation closely related to the issue of loss, grief, incomplete mourning, and, finally, depression” (Castelnuovo-Tedesco, 1998, p. 110). In part, this doleful view can be attributed to the fact that nostalgia has long been equated with homesickness. Yet, by the late 20th century, there were compelling reasons for nostalgia and homesickness to part ways. Adult participants regard nostalgia as different from homesickness. For example, they associate the words *warm*, *old times*, *childhood*, and *yearning* more frequently with nostalgia than homesickness (Davis, 1979). Furthermore, whereas homesickness research focused on the psychological problems (e.g., separation anxiety) that can arise when young people transition beyond the home environment (Fisher, 1989; Stroebe, Van Vliet, Hewstone, & Willis, 2002; M. A. L. van Tilburg & Vingerhoets, 2005), nostalgia transcends social groups and age. For example, nostalgia is found cross-culturally, and among well-functioning adults and children (Hepper et al., 2013; Sedikides, Wildschut, & Baden, 2004; Sedikides, Wildschut, Arndt, & Routledge, 2008; Zhou, Sedikides, Wildschut, & Gao, 2008).

Affective Signature of Nostalgia

Whereas researchers now agree that nostalgia is a discrete emotion, distinct from homesickness (Frijda, 1986, 2007; Johnson-Laird & Oatley, 1989; Ortony, Clore, & Collins,

1988), they disagree on its affective signature. Some view nostalgia as primarily negative, involving grief for the loss of an irretrievable past (Best & Nelson, 1985; Hertz, 1990; Ortony et al., 1988; Peters, 1985). Others argue that nostalgia is primarily positive, based on affection for the past (Batcho, 1998; Davis, 1979; Sedikides et al., 2004). Still other authors frame nostalgia as ambivalent, resulting from comparing the present to a favored past (Cavanaugh, 1989; Frijda, 2007; Johnson-Laird & Oatley, 1989; Mills & Coleman, 1994; Socarides, 1977). To inject empirical evidence into this theoretical debate, Hepper, Ritchie, Sedikides, and Wildschut (2012) adopted a prototype approach examining lay conceptions of nostalgia. They proposed that nostalgia does not fit into a clear-cut category defined by a unifying set of necessary and sufficient attributes but, rather, possesses many attributes, each of which is more or less representative of a prototype (Rosch, 1978). According to this view, defining nostalgia as either positive or negative is oversimplified, but positive emotions can be more representative of nostalgic experiences than negative emotions (or vice versa). Indeed, Hepper et al. showed that positive affect (e.g., happiness) features centrally in the prototypical nostalgic experience, whereas negative affect (e.g., sadness, anxiety) features only peripherally. These results resonate with findings that the content of nostalgic narratives is more positive than negative, and that recalling nostalgic memories gives rise to more positive than negative affect (Wildschut, Sedikides, Arndt, & Routledge, 2006; Wildschut, Sedikides, Routledge, Arndt, & Cordaro, 2010). In light of this evidence, Werman's (1977) characterization of nostalgia as "a joy tinged with sadness" (p. 393) seems particularly fitting.

In addition to viewing nostalgia as a predominantly (albeit not exclusively) positive emotion, laypersons conceptualize it as a social and past-oriented emotion (Hepper et al., 2012). In nostalgic reverie, one remembers an event from one's past—typically a fond, personally meaningful memory such as one's childhood or a close relationship. One often views the memory through rose-tinted glasses, misses that time or person, and may even long to return to the past. As a result, one typically feels sentimental, most often happy but with a touch of loss and longing. These lay conceptions of nostalgia dovetail with formal dictionary definitions; *The New Oxford Dictionary of English* (1998) defines nostalgia as "a sentimental longing or wistful affection for the past" (p. 1266).

Nostalgia Is Triggered by Aversive Stimuli

There is growing evidence that aversive stimuli trigger nostalgia. For example, nostalgia is triggered by loneliness (Wildschut et al., 2006; Zhou et al., 2008), social exclusion (Seehusen et al., 2013), negative mood (Barrett et al., 2010; Wildschut et al., 2006), boredom (W. A. P. van Tilburg, Igou, & Sedikides, 2013), discontinuity between one's past and present (Sedikides, Wildschut, Gaertner, Routledge, & Arndt, 2008; Sedikides et al., 2013), meaninglessness (Routledge et al., 2011; Routledge, Wildschut, Sedikides, Juhl, & Arndt, 2012), and thermoregulatory (cold) discomfort (Zhou, Wildschut, Sedikides, Chen, & Vingerhoets, 2012). In turn, nostalgia counteracts these aversive states. Zhou et al. (2008, Study 2) found, for instance, that a loneliness induction decreased perceived social support. At the same time, the loneliness induction increased nostalgia. Nostalgia, in turn, predicted increased perceived social support. Accordingly, when loneliness and nostalgia jointly predicted perceived social support (i.e., when nostalgia was controlled), the negative effect of loneliness on perceived social support was strengthened (a suppressor situation; Paulhus, Robins, Trzesniewski, & Tracy, 2004). Nostalgia, then, counteracted the negative effect of loneliness on perceived social support.

We propose that these findings illustrate a broader capacity of nostalgia to offset psychological distress and maintain psychological equanimity (Sedikides et al., 2004, Sedikides, Wildschut, Arndt, & Routledge, 2008; Wildschut, Sedikides, & Cordaro, 2011). Although it might seem counterintuitive that aversive stimuli should trigger the predominantly positive emotion of nostalgia, recent evidence shows that individuals are highly attuned to positive information following negative events and that this tuning to positivity subserves psychological homeostasis (DeWall & Baumeister, 2007; DeWall et al., 2011; Sedikides, 2012). Such evidence raises the possibility that research on nostalgia might inform the fundamental question of how the human avoidance-approach motivational system is regulated (Shah & Gardner, 2008).

Nostalgia Regulates Avoidance and Approach Motivation

Behavior is driven by two fundamental action tendencies: avoidance and approach (Carver, 2001; Higgins, 1997; Miller, 1944). For the purposes of the present research, we

follow in the footsteps of previous studies and regard behavioral inhibition system (BIS) activation and behavioral approach system (BAS) activation as operationalizations of avoidance and approach motivation, respectively (Beer, 2002; Blair, Peters, & Granger, 2004; Cooper, Shapiro, & Powers, 1998; Elliot, Gable, & Mapes, 2006; Heimpel, Elliot, & Wood, 2006; Sherman, Mann, & Updegraff, 2006; Sutton & Davidson, 1997; Updegraff, Sherman, Luyster, & Mann, 2007). The BIS provides the neuroanatomical substrate for aversive or avoidance motivation. This system is sensitive to signals of punishment or nonreward, inhibiting goals and ongoing behavior that are likely to lead to painful outcomes. It underlies the experience of negative feelings such as anxiety, sadness, frustration, and fear. The BIS has also been linked with inhibition (rather than avoidance *per se*; Arnett & Newman, 2000). Notwithstanding the theoretical importance of a distinction between avoidance and inhibition, BIS activation will, in practice, frequently progress to avoidance motivation, because the BIS is more sensitive to cues for punishment and threat than to the presence of rewards (Amodio, Master, Yee, & Taylor, 2007). The behavioral approach system (BAS) provides the neuroanatomical substrate for appetitive or approach motivation. This system is sensitive to signals of reward or nonpunishment, facilitating goals and behavior that are likely to lead to positive outcomes. The BAS underlies the experience of positive feelings such as hope, happiness, and elation. (For reviews, see: Carver, 2006; Carver & White, 1994; Elliot, 2008; Gray, 1990.)

It has been proposed that avoidance and approach motivations occur in parallel (Cacioppo, Gardner, & Berntson, 1999), and that their coordination is crucial for adaptive functioning (Carver, 2006; Elliot, 2008; Tamir & Diener, 2008). An underexplored question, however, concerns the psychological mechanisms that reinforce approach motivation in the presence of avoidance motivation. Identifying such mechanisms is important: research suggests that unopposed avoidance motivation adversely affects such diverse outcomes as task involvement, intrinsic motivation, and achievement in academic context (Elliott & Church, 1997), relationship functioning (Gable, 2006), as well as general wellbeing (Elliot, Sedikides, Murayama, Tanaka, Thrash, & Mapes, 2012; Elliot & Sheldon, 1997). Highlighting this issue, Elliot and Friedman (2007) stated: “a pressing question is whether

interventions may be developed to shift an individual toward the pursuit of approach goals” (p. 111). In light of previous evidence for the restorative benefits of nostalgia in the context of loneliness (Zhou et al., 2008), we propose that the psychological significance of nostalgia resides in its capacity to counteract avoidance motivation and increase approach motivation.

Figure 1 is a schematic representation of our theoretical formulation. It depicts a regulatory model in which avoidance motivation impacts on approach motivation in two distinct ways. First, the direct effect of avoidance motivation is to decrease approach motivation (path *c*). This path is consistent with a central tenet of Gray’s biopsychological theory of personality that BIS activation has an inhibitory effect on the BAS (Gray, 1981, 1987, 1990; Gray & McNoughton, 2000; Matthews & Gilliland, 1999). Second, there is an indirect effect of avoidance motivation on approach motivation via nostalgia. This indirect effect (denoted as path *ab*) consists of a positive effect of avoidance motivation on nostalgia (path *a*) and a subsequent positive effect of nostalgia on approach motivation (path *b*). Path *a* is underpinned by the aforementioned evidence that nostalgia is triggered by aversive stimuli (Barrett et al., 2010; Routledge et al., 2011, 2012; Sedikides et al., 2013; Seehusen et al., 2013; W. A. P. van Tilburg et al., 2013; Wildschut et al., 2006; Zhou et al., 2008; Zhou, Wildschut, Sedikides, Chen, et al. 2012). Path *b*, in turn, rests on evidence that inductions of nostalgia augment positive states, including social connectedness and empathy (Turner, Wildschut, & Sedikides, 2012; Wildschut et al., 2006, 2010; Zhou, Wildschut, Sedikides, Shi, & Feng, 2012), positive mood and self-esteem (Hepper et al., 2012; Wildschut et al., 2006), continuity between one’s past and present (Sedikides et al., 2013), perceptions of meaningfulness (Routledge et al., 2011, 2012), as well as thermoregulatory comfort (Zhou, Wildschut, Sedikides, Chen, et al., 2012). The proposed regulatory model (Figure 1) thus provides a general framework for integrating hitherto separate strands of research on the triggers (path *a*) and functions (path *b*) of nostalgia.

A defining feature of the proposed regulatory model is that the indirect effect of avoidance motivation on approach motivation via nostalgia is positive (path *ab*) and therefore directionally opposite to the negative direct effect of avoidance motivation on approach motivation (*c*). This pattern of relations is known as a suppressor situation (Collins &

Schmidt, 1997; Paulhus et al., 2004; Tzelgov & Henik, 1991). Such situations can be described in terms of an implicit causal model involving an initial predictor (avoidance motivation), an intervening variable (nostalgia), and an outcome (approach motivation). Suppression occurs when the indirect effect of the initial predictor via the intervening variable (path *ab*) is directionally opposite to its direct effect (path *c*). The regulatory model therefore predicts that, when the opposing indirect effect via nostalgia is controlled, the partial negative direct effect of avoidance motivation on approach motivation (path *c'*) is strengthened (MacKinnon & Fairchild, 2009; Paulhus, et al., 2004). Countering earlier skepticism regarding the robustness of suppressor situations (Wiggins, 1973), Paulhus et al. (2004) demonstrated that these situations are replicable and proposed that “the number of genuine suppressor situations in behavioral science may be far greater than has been assumed and a more vigorous search for such effects is warranted” (p. 323). A practical advantage of framing our predictions in terms of an intervening variable model is that it allowed us to capitalize on statistical developments that have accompanied the advance of these models in psychology. Accordingly, we used the PROCESS macro (Hayes, 2013; model 4) to compute bootstrap standard errors and 95% confidence intervals to evaluate the statistical significance of indirect effects.

To be sure, we do not mean to suggest that avoidance motivation is always dysfunctional. A basic distancing-approaching distinction can be identified across different phyla within the animal kingdom (Schneirla, 1959), and these deep phylogenetic roots point to a vital and indispensable role for biological systems that alert the organism to danger. However, if avoidance motivation were to persist unopposed even after the threat has subsided, it would give rise to prolonged incapacitation, as in the case of phobias (Gray, 1987). We propose that nostalgia plays a role in preventing such scenarios by counteracting avoidance motivation and increasing approach motivation.

Overview

We tested the regulatory model in five methodologically diverse studies. In Study 1, we tested in a cross-sectional design the notion that avoidance motivation predicts increased nostalgia, and that nostalgia, in turn, predicts increased approach motivation. This study

provided a correlational test of all paths in the regulatory model. In Study 2, we used an experimental design to examine the idea that avoidance motivation causes increased nostalgia, and that nostalgia, in turn, predicts increased approach motivation. This study offered a causal test of the paths from avoidance motivation to nostalgia and approach motivation, and a correlational test of the path from nostalgia to approach motivation. Finally, Studies 3-5 tested the causal path from nostalgia to approach motivation (Study 3) and approach behavior, as manifested in seating distance (Study 4) and helping (Study 5). Jointly, then, these five studies assessed the regulatory model by combining the measurement-of-mediation method (Baron & Kenny, 1986) with the experimental-causal-chain method (Spencer, Zanna, & Fong, 2005).

Study 1

In Study 1, we tested the regulatory model (Figure 1) in a large and diverse sample, using trait-level measures of BIS activation, nostalgia, and BAS activation. Our key objective was to investigate the indirect effect of avoidance motivation (BIS) on approach motivation (BAS) via nostalgia. Our second objective was to find out whether this predicted indirect effect holds even when controlling for domain-level personality dimensions. We therefore also examined the indirect effect of avoidance motivation (BIS) on approach motivation (BAS) via nostalgia, controlling for the Big Five personality factors (John, Naumann, & Soto, 2008). These analyses are important, because they address the question of whether the predicted indirect effect is unique or can be explained more parsimoniously in terms of the domain-level personality dimensions. We tested the indirect effects with the PROCESS macro (Hayes, 2013; model 4) in SAS 9.3. By using the term “indirect effect” in the context of this correlational study, we are adopting the parlance of intervening variable models but do not claim evidence for causal relations.

Method

Participants. Five hundred thirty-three members of the Dutch general public (272 females) responded voluntarily to an online survey. Materials were presented on a website hosted by Tilburg University. The sample was heterogeneous with respect to age, relationship status, and educational background. Mean age was 40.11 ($SD_{age} = 12.62$; range = 13-64).

Forty-one percent of participants were married; 14% were cohabiting; 8% were in a relationship, 26% were single; 5% were divorced; and 2% were widowed (a further 3% selected the “other” option). Four percent of participants had completed primary education only; 4% had completed secondary education having received basic vocational training (LBO); 38% had completed secondary education having received advanced vocational training (MBO); 54% had completed college (HBO) or university.

Procedure. We assessed nostalgia proneness with the Nostalgia Inventory (NI; Batcho, 1995) and the Southampton Nostalgia Scale (SNS; Routledge, Arndt, Sedikides, & Wildschut, 2008). For the NI, participants rated the extent to which they felt nostalgic (1 = *not at all nostalgic*, 7 = *very nostalgic*) about 20 specific aspects of their past (e.g., “Having someone to depend on,” “The way people were,” “My family,” “My childhood home”). We averaged the items to form an index ($\alpha = .90$). For the SNS, participants responded to five items that assess global frequency of (e.g., “How often do you experience nostalgia”), proneness to (e.g., “How prone are you to feeling nostalgia”), and personal relevance of (“How important is it for you to bring to mind nostalgic experiences?”) nostalgic engagement (1 = *not at all*, 7 = *very much*). Here, we also formed an index ($\alpha = .92$). Prior research showed that the NI and SNS are significantly correlated in US ($r[38] = .40, p = .013$; Routledge et al., 2008) and Chinese ($r[193] = .41, p < .001$; Zhou et al., 2008) samples. In the present study, the NI and SNS were also significantly correlated ($r[533] = .63, p = .001$). As in prior research (Zhou et al., 2008), we therefore standardized (z scores) and then averaged the two scales to create a composite that captures both global (SNS) and aspect-specific (NI) feelings of nostalgia. We present results for the nostalgia composite, but separate analyses for the NI and SNS produced essentially identical results.

We assessed motivation with the BIS/BAS scales (Carver & White, 1994). The BIS/BAS scales consist of 20 items (1 = *very uncharacteristic of you*, 4 = *very characteristic of you*). Seven items pertain to behavioral inhibition or avoidance motivation (e.g., “I worry about making mistakes”), and 13 items pertain to behavioral activation or approach motivation. In a factor analysis (allowing correlated factors), Carver and White (1994) reported that, whereas the seven BIS items formed a single factor, the 13 BAS

items formed three correlated factors. Carver and White labeled these BAS-related scales Fun Seeking (4 items), Drive (4 items), and Reward Responsiveness (5 items). Fun Seeking (e.g., “I will often do things for no other reason than that they might be fun”) refers to “both a desire for new rewards and a willingness to approach a potentially rewarding event on the spur of the moment” (Carver & White, 1994, p. 322). Drive (e.g., “I go out of my way to get things I want”) refers to “the persistent pursuit of desired goals” (Carver & White, 1994, p. 322). Finally, Reward Responsiveness (e.g., “It would excite me to win a contest”) refers to “positive responses to the occurrence or anticipation of reward” (Carver & White, 1994, p. 322). Carver and White reported small negative correlations of BIS with Fun Seeking (-.08) and Drive (-.12), and a larger positive correlation of BIS with Reward Responsiveness (.28).

We assessed the Big Five factors with the revised Ten Item Personality Inventory (TIPI-r; Denissen, Geenen, Selfhout, & Van Aken, 2008), whereby respondents rate themselves (1 = *extremely like the left adjective pair* to 7 = *extremely like the right adjective pair*) along five bipolar items (Extraversion: *extraverted, enthusiastic* versus *reserved, quiet*; Agreeableness: *critical, quarrelsome* versus *sympathetic, warm*; Conscientiousness: *dependable, self-disciplined* versus *disorganized, careless*; Neuroticism: *anxious, easily upset* versus *calm, emotionally stable*; Openness to Experience: *open to new experiences, complex* versus *conventional, uncreative*). Six participants did not complete the TIPI-r.

Results

Preliminary analyses revealed that neither age nor gender qualified the key findings. We therefore omitted these variables from the analyses reported below.¹ We present descriptive statistics, reliability coefficients, and zero-order correlations among the study variables in Table 1. In agreement with previous research (Carver & White, 1994), we found small, non-significant negative correlations of BIS with Fun Seeking and Drive, a larger positive correlation of BIS with Reward Responsiveness, and positive correlations among the three BAS-related scales.

Testing the regulatory model. We proceeded by examining, for each BAS-related dimension, the regulatory model depicted in Figure 1. We present relevant results in Table 2. For ease of interpretation, column labels in Table 2 correspond to path labels in Figure 1. BIS

was positively correlated with nostalgia (Table 2, column *a*). In turn, nostalgia was positively correlated with all three BAS-related scales (Table 2, column *b*). This pattern of correlations is consistent with the postulated positive indirect effects of BIS on the BAS-related dimensions via nostalgia.

Next, we ran multiple regression analyses, regressing each of the three BAS-related dimensions onto BIS and nostalgia. We present the results in Table 2. The previously marginal association between BIS and Fun Seeking (Table 2, column *c*) became more negative and reached statistical significance after controlling for nostalgia (Table 2, column *c'*). Likewise, the previously non-significant association between BIS and Drive became more negative and reached statistical significance after controlling for nostalgia (Table 2, columns *c* vs. *c'*). The positive association between BIS and Reward Responsiveness was weakened (but remained statistically significant) after controlling for nostalgia (Table 2, columns *c* vs. *c'*). In each regression analysis, there was a significant positive association between nostalgia and the relevant BAS-related dimension (Table 2, column *b'*). In summary, when BIS and nostalgia jointly predicted Fun Seeking and Drive, the negative association of BIS with these BAS-related dimensions was strengthened and became significant (i.e., a suppressor situation; Paulhus et al., 2004). When BIS and nostalgia jointly predicted Reward Responsiveness, the positive association of BIS with this BAS-related dimension was weakened but remained significant (i.e., a redundancy situation; Paulhus et al., 2004).

As a final step, we used the PROCESS macro (Hayes, 2013; model 4) to test the indirect effects of BIS on the BAS-related dimensions via nostalgia. We present results in Table 3. Consistent with our theoretical formulation, there were significant positive indirect effects of BIS via nostalgia on each BAS-related dimension.²

Controlling for the Big Five factors. A key objective of Study 1 was to test whether the indirect effects of BIS on the BAS-related dimensions via nostalgia remained significant when controlling for the Big Five factors. The importance of these supplementary analyses is underscored by significant correlations of the Big Five factors with the BIS/BAS scales and nostalgia proneness (Table 1: Big Five factors). With respect to the BIS/BAS scales,

Extraversion was negatively correlated with BIS and positively correlated with all three BAS-related dimensions; Agreeableness was positively correlated with Fun Seeking and Drive; Conscientiousness was negatively correlated with Fun Seeking; Neuroticism was positively correlated with BIS and negatively correlated with Fun Seeking and Reward Responsiveness; and Openness/Intellect was positively correlated with BIS and with Fun Seeking. This pattern of correlations is consistent with prior research showing that Neuroticism and Extraversion are most robustly correlated with the BIS/BAS scales (Smits & Boeck, 2006), and with the theoretical perspective that Neuroticism and Extraversion can be mapped onto the BIS and BAS dimensions, respectively (Gray, 1981). With respect to the nostalgia composite, we mostly found small correlations that did not exceed $r = .10$. The two exceptions were a positive correlation between Neuroticism and nostalgia (See also: Barrett et al., 2010; Seehusen et al., 2013) and a positive correlation between Extraversion and nostalgia.

Next, we again used the PROCESS macro (Hayes, 2013; model 4) to test the indirect effects of BIS on the BAS-related dimensions via nostalgia. This time, we simultaneously controlled for the Big Five factors by including them as a set of covariates. (Separate analyses in which we treated each Big Five factor as a single covariate produced identical results.) We present results in Table 3 (Table 3: Controlling for the Big Five factors). In each analysis, the indirect effect via nostalgia remained statistically significant.

Alternative models. The proposed causal sequence of avoidance motivation \Rightarrow nostalgia \Rightarrow approach motivation (Figure 1) is one of six possible sequences in which these three variables can be arranged. We used the PROCESS macro (Hayes, 2013; model 4) to examine the remaining five sequences, separately for each BAS-related dimension. We simultaneously controlled for the Big Five factors by including them as a set of covariates. In the analyses with Fun Seeking and Drive, only the alternative sequence of approach motivation \Rightarrow nostalgia \Rightarrow avoidance motivation produced a significant indirect effect. In the analyses with Reward Responsiveness, all five alternative sequences yielded a significant indirect effect. From a purely statistical viewpoint, then, the most plausible alternative sequence is one in which approach motivation increases nostalgia, which then increases

avoidance motivation. This alternative model is incompatible, however, with prior research demonstrating that negative states trigger nostalgia and that nostalgia augments positive states (for a review, see Sedikides, Wildschut, Arndt, & Routledge, 2008). Still, rather than relying on previous findings, a more compelling strategy for substantiating the postulated causal sequence of avoidance motivation \Rightarrow nostalgia \Rightarrow approach motivation is to supplement the measurement-of-mediation method used in Study 1 with the experimental-causal-chain method (Spencer et al., 2005). We did so in Studies 2-5.

Discussion

Study 1 provided preliminary correlational evidence for our regulatory model (Figure 1). In a cross-sectional design, we examined the relations among avoidance motivation, nostalgia, and approach motivation. We assessed avoidance motivation (BIS) and approach motivation (Fun Seeking, Drive, and Reward Responsiveness) with the BIS/BAS scales. We observed distinct result patterns for Fun Seeking and Drive on the one hand, and for Reward Responsiveness on the other hand. Analyses involving Fun Seeking and Drive supported our theoretical formulation. Specifically, avoidance motivation (BIS) predicted increased nostalgia. Nostalgia, in turn, predicted increased approach motivation (Fun Seeking and Drive). When avoidance motivation and nostalgia jointly predicted approach motivation, the negative association between avoidance motivation and approach motivation was strengthened and became statistically significant (i.e., a suppressor situation; Paulhus et al., 2004). Results revealed a significant indirect effect of avoidance motivation on approach motivation via nostalgia. This indirect effect remained significant when controlling for the Big Five personality domains.

The regulatory model did not obtain support from analyses involving Reward Responsiveness. When avoidance motivation (BIS) and nostalgia jointly predicted Reward Responsiveness, the positive association between avoidance motivation and Reward Responsiveness was weakened but remained significant (i.e., a redundancy situation; Paulhus et al., 2004). We return to this issue in the General Discussion.

Study 2

The cross-sectional design of Study 1 did not allow for a causal ordering of avoidance motivation, nostalgia, and approach motivation. To begin to address this issue, Study 2 tested experimentally the causal effect of avoidance motivation on nostalgia and concomitant approach motivation. We induced avoidance motivation and then assessed nostalgia and approach motivation. In accordance with our regulatory model, we hypothesized that participants in the avoidance-motivation (compared to control) condition would report higher levels of nostalgia. We further hypothesized that avoidance-induced nostalgia would, in turn, predict increased approach motivation. Finally, when avoidance motivation (vs. control) and nostalgia jointly predict approach motivation, the negative effect of avoidance motivation (vs. control) on approach motivation should be strengthened.

Method

Participants and design. We recruited 303 participants (174 men, 128 women, 1 gender unreported) via MTurk. Mean age was 31.86 ($SD_{\text{age}} = 10.96$; range = 18-75). All participants were from the US, had a 95% or higher job acceptance rate, and were paid \$0.10. We randomly assigned them to the avoidance-motivation and control conditions.

Procedure. We induced avoidance motivation by instructing participants to think about their life as it might unfold in the future and to list five instances of situations or events that they were concerned could happen and wanted to avoid. In the control condition, we instructed participants to think about how their life might unfold in the future and to list five instances of normal situations or ordinary events that could happen. We gauged the effectiveness of this manipulation with the following two items (adapted from Lockwood, Jordan, & Kunda, 2002): “Right now, I am focused on preventing negative events in my life” and “Right now, I imagine experiencing bad things that I fear might happen to me” (1 = *strongly disagree*, 6 = *strongly agree*). We averaged these two items to create a composite ($\alpha = .61$; $M = 3.50$, $SD = 1.34$). As control variables, we also assessed current positive affect (PA) and negative affect (NA) by instructing participants to rate how “happy” and “sad” they felt (1 = *strongly disagree*, 6 = *strongly agree*). Controlling for PA and NA was important, because imagining future situations or events that one is concerned might happen and wants

to avoid (compared to future situations or events that are normal or ordinary) could, in addition to inducing avoidance motivation, increase NA and/or decrease PA. Participants then completed a state version of the NI. They rated (1 = *not at all*, 5 = *very much*) the extent to which they were missing 20 aspects of their past “at this moment.” We averaged the 20 items to create a composite index of state nostalgia ($\alpha = .92$; $M = 2.34$, $SD = 0.81$). Next, we assessed approach motivation with the BAS-related dimensions of the BIS/BAS scales (1 = *very uncharacteristic of you right now*, 6 = *very characteristic of you right now*): Fun Seeking ($\alpha = .88$; $M = 3.77$, $SD = 1.13$), Drive ($\alpha = .92$; $M = 3.91$, $SD = 1.17$), and Reward Responsiveness ($\alpha = .86$; $M = 4.89$, $SD = 0.77$). Finally, we assessed participants’ perceptions of the imagined events in terms of their anticipated probability (1 = *highly probable events [highly likely to occur]*, 7 = *highly improbable events [highly unlikely to occur]*) and duration (1 = *short-term events [lasting no longer than a few days]*, 7 = *long-term events [lasting for a long time]*). We used the latter two items as control variables.

Results

Preliminary analyses revealed that neither age nor gender qualified the key findings. We therefore omitted these variables from the analyses reported below.³

Manipulation check. Attesting to the effectiveness of the manipulation, participants in the avoidance condition ($M = 4.66$, $SD = 0.89$) scored higher on the state-avoidance index than those in the control condition ($M = 2.93$, $SD = 1.15$), $F(1, 301) = 175.10$, $p < .001$, $d = 1.52$.

State nostalgia. We hypothesized that avoidance motivation (compared to control) would lead to higher levels of nostalgia. Consistent with the hypothesis, participants reported being more nostalgic in the avoidance-motivation ($M = 2.65$, $SD = 0.73$) than in the control ($M = 2.18$, $SD = 0.81$) condition, $F(1, 301) = 23.75$, $p < .001$, $d = 0.56$.

Approach motivation. Results revealed a non-significant trend for participants in the avoidance-motivation (compared to control) condition to score lower on Fun Seeking ($M_{\text{avoidance}} = 3.63$, $SD = 1.09$ vs. $M_{\text{control}} = 3.84$, $SD = 1.15$), $F(1, 301) = 2.25$, $p = .135$, $d = 0.17$. We observed a similar trend for participants in the avoidance-motivation (compared to control) condition to score lower on Drive ($M_{\text{avoidance}} = 3.77$, $SD = 1.23$ vs. $M_{\text{control}} = 3.98$, SD

= 1.13), $F(1, 301) = 2.23, p = .136, d = 0.17$. The result pattern was reversed for Reward Responsiveness, with slightly and non-significantly higher scores in the avoidance-motivation (compared to control) condition ($M_{\text{avoidance}} = 4.93, SD = 0.82$ vs. $M_{\text{control}} = 4.86, SD = 0.74$), $F(1, 301) = 0.57, p = .542, d = 0.09$.

Testing the regulatory model. Our key prediction is that the negative effect of manipulated avoidance motivation (vs. control) on approach motivation will be strengthened when the positive association between nostalgia and approach motivation is controlled. We tested this prediction next. To facilitate a comparison with Study 1 findings, we conducted these analyses in a multiple regression framework.

We conducted separate multiple regression analyses, modeling the three BAS-related dimensions as a function of manipulated avoidance motivation (contrast coded: -1 = *control*, 1 = *avoidance*) and nostalgia. We present the results in Table 4. The effect of avoidance motivation (vs. control) on Fun Seeking became more negative and reached statistical significance after controlling for nostalgia (Table 4, columns *c* vs. *c'*). The effect of avoidance motivation (vs. control) on Drive also became more negative and reached statistical significance after controlling for nostalgia (Table 4, columns *c* vs. *c'*). The effect of avoidance motivation (vs. control) on Reward Responsiveness was unaffected (and remained non-significant) after controlling for nostalgia (Table 4, columns *c* vs. *c'*). The analyses revealed significant unique associations of nostalgia with Fun Seeking and Drive, but not with Reward Responsiveness (Table 4, column *b'*). Thus, consistent with Study 1, when avoidance motivation (vs. control) and nostalgia jointly predicted Fun Seeking and Drive, the negative effect of avoidance motivation (vs. control) on these BAS-related dimensions was strengthened (i.e., a suppressor situation; Paulhus et al., 2004).

We used the PROCESS macro (Hayes, 2013; model 4) to test the indirect effects. There were significant indirect effects of avoidance motivation (vs. control) via nostalgia on Fun Seeking and Drive, but not on Reward Responsiveness (Table 5).

Controlling for affect. We next examined if increased NA (and/or or decreased PA) could account for the indirect effect of avoidance motivation (vs. control) on Fun Seeking and Drive via nostalgia. We used the PROCESS macro (Hayes, 2013) to re-test the indirect

effects of avoidance motivation (vs. control) on the BAS-related dimensions via nostalgia. This time, we controlled for NA (“sad”) and PA (“happy”) by including them as a set of covariates (Table 5: Controlling for NA and PA). The indirect effects of avoidance motivation (vs. control) on Fun Seeking and Drive via nostalgia remained significant. (Separate analyses in which we treated NA and PA as single covariates produced identical results.)

Controlling for probability and duration of imagined events. We also examined if variation in the anticipated probability and duration of the imagined events could account for the indirect effect of avoidance motivation (vs. control) on Fun Seeking and Drive via nostalgia. We again used the PROCESS macro (Hayes, 2013) to re-test the indirect effects of avoidance motivation (vs. control) on the BAS-related dimensions via nostalgia. In these analyses, we controlled for probability and duration ratings by including them as a set of covariates (Table 5: Controlling for anticipated probability and duration of imagined events). The indirect effects of avoidance motivation (vs. control) on Fun Seeking and Drive via nostalgia remained significant. (Separate analyses in which we treated probability and duration ratings as single covariates produced identical results.)

Alternative model. As a final step, we tested whether an alternative model can account for the findings. Given that avoidance motivation (vs. control) was manipulated, it cannot be preceded in the causal chain by nostalgia or approach motivation. However, given that nostalgia and approach motivation were both measured, their order in the causal chain could be reversed. Accordingly, we used the PROCESS macro (Hayes, 2013, model 4) to test the indirect effect of avoidance motivation (vs. control) on nostalgia via the BAS-related dimensions. These analyses revealed that there were no significant indirect effects (denoted as *ab*) of avoidance motivation (vs. control) on nostalgia via Fun Seeking ($ab = -.02, SE = .013, 95\% CI = -.048, .004$), Drive ($ab = -.01, SE = .008, 95\% CI = -.032, .001$), or Reward Responsiveness ($ab = .002, SE = .005, 95\% CI = -.004, .021$). The alternative model, in which approach motivation preceded nostalgia, was not viable.

Discussion

Study 2 was an experimental test of the regulatory model (Figure 1) and provided corroborating evidence for our theoretical formulation. We manipulated avoidance motivation and then assessed nostalgia and approach motivation. We operationalized approach motivation in terms of the BAS-related dimensions of the BIS/BAS scales. As in Study 1, we obtained distinct result patterns for Fun Seeking and Drive on the one hand, and for Reward Responsiveness on the other hand. The regulatory model received strong support in analyses involving Fun Seeking and Drive. Specifically, avoidance motivation (vs. control) increased nostalgia. Avoidance-induced nostalgia, in turn, predicted increased approach motivation. Furthermore, when avoidance motivation (vs. control) and nostalgia jointly predicted approach motivation, the negative effect of avoidance motivation (vs. control) was strengthened and became statistically significant. Replicating Study 1, results revealed a significant indirect effect of avoidance motivation (vs. control) on approach motivation via nostalgia. This indirect effect remained significant when controlling for NA (“sad”) and PA (“happy”), and when controlling for the anticipated probability and duration of imagined events. Furthermore, an alternative model, in which the proposed causal order of nostalgia and approach motivation was reversed, could be ruled out. The regulatory model did not garner support from analyses involving Reward Responsiveness. We return to this issue in the General Discussion.

Study 3

Studies 1-2 produced correlational evidence for the postulated path from nostalgia to increased approach motivation. Study 2 further showed that a model in which approach motivation precedes nostalgia in the causal chain was not viable. Yet, we have yet to establish the causal impact of nostalgia on approach motivation. This was the key objective of Study 3. Specifically, we induced nostalgia and then assessed approach motivation with the BAS-related dimensions of the BIS/BAS scales. In accordance with our regulatory model, we hypothesized that participants would report higher levels of approach motivation in the nostalgia (compared to control) condition.

Method

Participants and design. One hundred and twenty participants (93 females, 27 males) from the US ($n = 63$) and Europe ($n = 57$) voluntarily completed an on-line ($n = 79$) or paper-and-pencil ($n = 41$) version of the experiment. Participants were undergraduates and members of the general public. Mean age was 22.73 ($SD_{age} = 6.86$, $Range_{age} = 18-56$). We randomly assigned participants to one of two conditions (nostalgia vs. control).

Procedure. Participants in the nostalgia condition were instructed to "...bring to mind a nostalgic event in your life." In the control condition, they were instructed to "...bring to mind an ordinary event in your life." Participants were then instructed to write down four keywords relevant to the event, and to take a few moments to think about the event and how it made them feel. Next, participants rated (1 = *strongly disagree*; 6 = *strongly agree*) two items that were administered as a manipulation check (e.g., "Right now, I am feeling quite nostalgic"; $\alpha = .94$; $M = 3.68$, $SD = 1.50$). Both the nostalgia induction and manipulation check have been validated by prior research in the US (Juhl, Routledge, Arndt, Sedikides, & Wildschut, 2010; Routledge et al., 2008, 2011, 2012; Vess, Arndt, Routledge, Sedikides, & Wildschut, 2012), the UK (Hepper et al., 2012; Stephan, Sedikides, & Wildschut, 2012; Wildschut et al., 2006, 2010), Ireland (W. A. P. van Tilburg et al., 2013), and China (Zhou et al., 2008; Zhou, Wildschut, Sedikides, Chen, et al., 2012; Zhou, Wildschut, Sedikides, Shi, et al., 2012). For instance, the validity of the nostalgia induction was supported by findings that an alternative manipulation based on song lyrics produced identical results (i.e., convergent validation; Routledge et al., 2011). Hepper et al. (2012) further found that nostalgia can be induced in both younger and older individuals by instructing them to recall an event from their past that is characterized by highly prototypic features of nostalgia (e.g., "sentimental," "love," "longing," "rose-tinted memories," "childhood," "family"). Crucially, results for this prototype-based nostalgia induction converged with results for a nostalgia induction that was identical to the one implemented in the present research. Thus, the manner in which we operationalized "nostalgia" in Study 3 coincides with lay conceptions of nostalgia across the age range and with formal dictionary definitions of the term as "a sentimental longing or wistful affect for the past" (*New Oxford Dictionary of English*, 1998, p. 1266).

Finally, we assessed approach motivation with the BAS-related dimensions of the BIS/BAS scales (1 = *very uncharacteristic of you right now*, 6 = *very characteristic of you right now*): Fun Seeking ($\alpha = .86$; $M = 4.22$, $SD = 1.21$), Drive ($\alpha = .87$; $M = 4.00$, $SD = 1.13$), and Reward Responsiveness ($\alpha = .74$; $M = 4.79$, $SD = 0.84$).

Results

Preliminary analyses indicated that neither age nor gender qualified the key findings reported below, and we therefore omitted these variables from the analyses.⁴

Manipulation check. As intended, participants felt more nostalgic in the nostalgia ($M = 4.30$, $SD = 1.49$) than in the control ($M = 3.09$, $SD = 1.28$) condition, $F(1, 118) = 22.81$, $p < .001$, $d = 0.88$. The manipulation was effective.

Approach motivation. We next turned to the main question of this study, namely whether nostalgia strengthens BAS activation. Nostalgic participants ($M = 4.48$, $SD = 1.00$) scored significantly higher than control participants ($M = 3.97$, $SD = 1.34$) on Fun Seeking, $F(1, 118) = 5.65$, $p = .019$, $d = 0.44$. Nostalgic participants ($M = 4.28$, $SD = 1.04$) also scored significantly higher than control participants ($M = 3.74$, $SD = 1.15$) on Drive, $F(1, 118) = 7.37$, $p = .008$, $d = 0.50$. Finally, nostalgic ($M = 4.84$, $SD = 0.80$) and control ($M = 4.73$, $SD = 0.88$) participants did not differ significantly on Reward Responsiveness, $F(1, 118) = 0.56$, $p = .457$, $d = 0.14$.

Discussion

Building on correlational evidence for a link between nostalgia and increased approach motivation (Studies 1-2), Study 3 demonstrated that nostalgia increased BAS-related Drive and Fun Seeking. As in the preceding studies, Reward Responsiveness showed a different result pattern.

A limitation of Studies 1-3 is that they examined exclusively self-reported approach motivation (as assessed with the BAS-related dimensions of the BIS/BAS scales). That is, we assessed approach motivation in terms of global action tendencies (“I will often do things for no other reason than that they might be fun”; “I go out of my way to get things I want”) rather than concrete behavior. It is easier to characterize emotions in terms of their associated action tendencies than by behavioral manifestations (Mackie, Devos, & Smith, 2000;

Roseman, Wiest, & Swartz, 1994). To begin, actual behaviors are more constrained by situational factors or social sanctions than are global action tendencies. Also, global action tendencies can be channeled into a variety of behaviors, and it is difficult to predict precisely these diverse behavioral manifestations.

Thus, the main objective of Studies 4-5 was to surmount these challenges and examine the effect of nostalgia on approach behavior. Approach and avoidance motives shape human functioning across life domains and, accordingly, these motives may be manifested in a range of highly diverse personal goals and actions (Elliot & Friedman, 2007). At a fundamental level, however, approach relates to proximity (Bandura, Adams, & Beyer, 1977). Accordingly, we selected actions linked to interpersonal proximity that have been previously identified as behavioral manifestations of approach motivation (seating distance in Study 4, helping in Study 5), and tested the effect of nostalgia on each. We examined approach behavior in an interpersonal context, because prior research indicates that nostalgia serves as a well of social connectedness (Sedikides, Wildschut, Arndt, & Routledge, 2008). For example, on the basis of their prototype analysis of the nostalgia construct, Hepper et al. (2012) concluded that people and relationships (friends, family, partners) along with interpersonal proximity (belonging, cuddles, tender moments, warmth, love) are centrally defining features of nostalgia. In addition, when experimentally induced, nostalgia produces sentiments of being protected and loved, reduces attachment anxiety and attachment avoidance, increases empathy and charitable donations, and strengthens perceptions of social support (Wildschut et al., 2006, 2010; Zhou et al., 2008; Zhou et al., 2012). Taken together, the literature indicates that interpersonal interactions provide a suitable context for examining the effect of nostalgia on approach behavior.

A supplementary goal of Studies 4-5 was to examine the role of PA. After all, prior research indicates that the content of nostalgic narratives is more positive than negative (Wildschut et al., 2006), and nostalgia often (Hepper et al., 2012; Stephan et al., 2012; Verplanken, 2012; Wildschut et al., 2006, 2010; Zhou, Wildschut, Sedikides, Shi et al., 2012, Study 1) but not always so (Zhou, Wildschut, Sedikides, Shi et al., 2012, Studies 2-4) increases PA. This raises the possibility that, in Study 3, increased PA underpinned the

positive effect of nostalgia on approach motivation. Although investigations have begun to establish unique effects of nostalgia above and beyond PA (Routledge et al., 2012; Stephan et al., 2012; Turner, Wildschut, & Sedikides, 2012; Turner, Wildschut, Sedikides, & Gheorghiu, 2013; Zhou, Wildschut, Sedikides, Shi, et al., 2012), we needed to gauge the role of PA in the context of current research. We also examined the role of NA but, because few studies have found effects of nostalgia on NA (cf. Stephan et al., 2012), this was a secondary focus. In Studies 4-5, we pursued these objectives in East-Asian (Chinese) samples, with an eye toward increasing the generalizability of our findings.

Study 4

In Study 4, we followed in the footsteps of previous research and operationalized approach behavior as the physical proximity that participants established between themselves and another person (Holland, Roeder, Van Baaren, Brandt, & Hannover, 2004; Macrae, Bodenhausen, Milne, & Jetten, 1994; Smith & Bargh, 2008). We hypothesized that participants in the nostalgia condition would establish closer physical proximity to another person than would participants in the control condition.

Method

Participants and design. Sixty-four Sun Yat-Sen University undergraduates (44 females, 20 males) took part in the study in exchange for 5 Yuan (\$0.15). Mean age was 21.92 ($SD_{age} = 2.37$, range = 17-33). We randomly assigned them to one of two conditions (nostalgia vs. control).

Procedure. The nostalgia manipulation and manipulation check (1 = *strongly disagree*; 7 = *strongly agree*; $\alpha = .90$, $M = 4.41$, $SD = 1.82$) were identical to those of Study 3. Next, participants proceeded to complete the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS comprises 10 items assessing PA (e.g., “interested,” “enthusiastic”) and 10 items assessing NA (e.g., “distressed,” “scared”). PANAS instructions directed participants to indicate to what extent they were feeling each emotion “right now” (1 = *not all*, 5 = *very much*). We created overall measures of PA ($\alpha = 0.84$, $M = 3.03$, $SD = 0.73$) and NA ($\alpha = 0.86$, $M = 1.60$, $SD = 0.59$) by averaging the relevant items.

Next, participants learned that they would have a brief conversation with another person (i.e., also a participant) who was located in an adjoining room. Ostensibly to prepare the room for this forthcoming interaction, the experimenter instructed participants to place two chairs (one for the participant and one for the other person) in a designated area within the room. The experimenter then left the room, supposedly to fetch the other person. We took the distance between the two chairs (seating distance) as an index of approach social behavior. We measured seating distance center-to-center.

Results and Discussion

Preliminary analyses revealed no significant effects involving gender. We therefore omitted this variable from the analyses reported below.

Manipulation check. As intended, participants felt more nostalgic in the nostalgia ($M = 5.23$, $SD = 1.66$) than control ($M = 3.59$, $SD = 1.61$) condition, $F(1, 62) = 16.11$, $p < .001$, $d = 1.02$. The manipulation was effective.

PANAS. The nostalgia and control conditions did not differ significantly on either PA ($M_{nostalgia} = 3.14$, $SD = 0.73$ vs. $M_{control} = 2.92$, $SD = 0.72$), $F(1, 62) = 1.51$, $p = .223$, $d = 0.31$, or NA ($M_{nostalgia} = 1.64$, $SD = 0.60$ vs. $M_{control} = 1.57$, $SD = 0.59$), $F(1, 62) = 0.23$, $p = .631$, $d = 0.12$. PA significantly exceeded NA in both the nostalgia, $F(1, 62) = 73.20$, $p < .001$, $d = 1.56$, and control, $F(1, 62) = 59.23$, $p < .001$, $d = 1.32$, condition. Recalling a nostalgic event gave rise to more PA than NA, as did recalling an ordinary event. The finding that participants mildly enjoyed recalling an ordinary event is reassuring, because it indicates that the control condition provides a suitable baseline.

Approach behavior: seating distance. As hypothesized, participants in the nostalgia condition placed the two chairs closer together ($M = 85.70$ cm, $SD = 27.17$) than did those in the control condition ($M = 104.51$, $SD = 21.32$), $F(1, 62) = 9.49$, $p = .003$, $d = 0.78$. The effect of nostalgia on seating distance remained significant after controlling for PA ($F[1, 61] = 8.84$, $p = .004$, $d = 0.76$) and NA ($F[1, 61] = 9.11$, $p = .004$, $d = 0.77$) in Analyses of Covariance (ANCOVAs). In all, nostalgia increased approach behavior, and did so independently of PA or NA.

Study 5

Helping behavior requires establishing emotional and/or physical proximity to others and, indeed, research shows that individuals who are comfortable with interpersonal closeness and interdependence are more likely to be helpful (Mikulincer, Shaver, Gillath, & Nitzberg, 2005). Accordingly, helping behavior has been regarded as a manifestation of social approach motivation (Snyder & Stuermer, 2009; Vohs, Mead, & Goode, 2006). We hypothesized that participants in the nostalgia condition would display more helping behavior than would participants in the control condition.

Method

Participants and design. Forty-one Sun Yat-Sen University undergraduates (29 females, 12 males) took part in exchange for 5 Yuan (\$0.15). Mean age was 22.63 ($SD_{age} = 2.36$, range = 19-33). We randomly assigned them to conditions (nostalgia vs. control).

Procedure. The nostalgia manipulation and manipulation check (1 = *strongly disagree*; 7 = *strongly agree*; $\alpha = .93$, $M = 4.21$, $SD = 1.84$) were identical to those of Studies 3-4. As in Study 4, the manipulation check was followed by the PANAS (Watson et al., 1988). PANAS instructions directed participants to indicate to what extent they were feeling each emotion “right now” (1 = *not at all*, 5 = *very much*). We created overall measures of PA ($\alpha = 0.86$, $M = 3.05$, $SD = 0.76$) and NA ($\alpha = 0.84$, $M = 1.49$, $SD = 0.55$) by averaging the relevant items.

Next, a staged mishap provided the opportunity to offer help. An experimenter (who was unaware of the experimental condition to which participants had been assigned) walked into the room holding a folder of papers and a box of pencils, and spilled the pencils in front of the participant. The number of pencils picked up by the participant constituted the measure of helpfulness (Vohs et al., 2006).

Results and Discussion

Preliminary analyses revealed no significant effects involving gender. Therefore, we omitted this variable from subsequent analyses.

Manipulation check. As intended, participants in the nostalgia condition ($M = 5.30$, $SD = 1.56$) reported feeling more nostalgic than those in the control condition ($M = 3.17$, $SD = 1.45$), $F(1, 39) = 22.58$, $p < .001$, $d = 1.52$. The manipulation was effective.

PANAS. The nostalgia and control conditions did not differ significantly on either PA ($M_{nostalgia} = 3.10$, $SD = 0.80$ vs. $M_{control} = 3.00$, $SD = 0.73$), $F(1, 39) = 0.17$, $p = .679$, $d = 0.13$, or NA ($M_{nostalgia} = 1.56$, $SD = 0.55$ vs. $M_{control} = 1.43$, $SD = 0.56$), $F(1, 39) = 0.50$, $p = .485$, $d = 0.23$. PA significantly exceeded NA in both the nostalgia, $F(1, 39) = 54.87$, $p < .001$, $d = 1.64$, and control condition, $F(1, 39) = 59.24$, $p < .001$, $d = 1.67$. As in Study 4, recalling a nostalgic event gave rise to more PA than NA, as did recalling an ordinary event.

Approach behavior: helping. The number of pencils picked up by the participants (out of 27 total) served as the index of helpfulness. Participants in the nostalgia condition ($M = 18.20$, $SD = 3.32$) gathered more pencils than those in the control condition ($M = 14.67$, $SD = 5.42$), $F(1, 39) = 6.27$, $p = .017$, $d = 0.80$. The effect of nostalgia on the number of gathered pencils remained significant after controlling for PA ($F[1, 38] = 6.29$, $p = .017$, $d = 0.81$) and NA ($F[1, 38] = 5.68$, $p = .022$, $d = 0.77$) in ANCOVAs. In a conceptual replication of Study 4, Study 5 showed that nostalgia increased approach behavior, above and beyond PA and NA.⁵ Moreover, the findings of both studies were obtained in an East-Asian culture, thus expanding the scope of this research.

General Discussion

We proposed that nostalgia—a self-relevant, social, and predominantly positive emotion—regulates the avoidance and approach motivational system. Avoidance and approach motivations are thought to occur in parallel (Cacioppo et al., 1999), and their coordination facilitates adaptive functioning (Carver, 2006; Elliot, 2008; Tamir & Diener, 2008). How would nostalgia regulate this motivational system? The answer, we reasoned, lies in nostalgia's restorative function (Sedikides et al., 2004; Sedikides, Wildschut, Arndt, & Routledge, 2008; Sedikides, Wildschut, Routledge, Arndt, & Zhou, 2009). In particular, we proposed a regulatory model in which (a) avoidance motivation triggers nostalgia and (b) nostalgia, in turn, increases approach motivation (Figure 1).

We garnered both correlational and experimental evidence for this regulatory model. In Studies 1-2, we tested the full model using cross-sectional (Study 1) and experimental (Study 2) designs. Across both studies, analyses that treated Fun Seeking and Drive as indices of approach motivation supported our theoretical formulation. Specifically, avoidance motivation was positively associated with (Study 1) and increased (Study 2) nostalgia. Nostalgia, in turn, was positively associated with approach motivation (Studies 1-2). When avoidance motivation and nostalgia jointly predicted approach motivation, the negative associative (Study 1) and causal (Study 2) link between avoidance motivation and approach motivation was strengthened and became statistically significant (i.e., a suppressor situation; Paulhus et al., 2004). Results revealed a significant indirect effect of avoidance motivation on approach motivation via nostalgia—an indirect effect that proved robust when we included pertinent control variables (Studies 1-2). These findings are consistent with the idea that avoidance-induced nostalgia strengthens approach motivation, thereby counteracting the potentially adverse influence of avoidance motivation. The regulatory model was not supported by analyses involving Reward Responsiveness. In Study 1, we observed that, when avoidance motivation (BIS) and nostalgia jointly predicted Reward Responsiveness, the positive association between avoidance motivation and Reward Responsiveness was weakened but remained significant (i.e., a redundancy situation; Paulhus et al., 2004). In Study 2, the result pattern for Reward Responsiveness matched neither the hypothesized suppressor situation nor the redundancy situation observed in Study 1.

Studies 3-5 addressed a limitation of Studies 1-2 by providing vital evidence for a causal effect of nostalgia on approach motivation (Study 3) and approach behavior (Studies 4-5). In Study 3, an experimental induction of nostalgia increased approach motivation, as assessed by Fun Seeking and Drive. As in Studies 1-2, results for Reward Responsiveness manifested a distinct (null) pattern. In Studies 4-5, we implemented a convergent operations strategy (Campbell & Fiske, 1959) to examine the causal effect of nostalgia on approach behavior. These studies showed, in an East Asian culture, that nostalgia increased approach behavior as manifested in seating distance (Study 4) and helping behavior (Study 5), and did so above and beyond PA and NA.

On balance, the entirety of the evidence gathered in Studies 1-5 supports the proposed regulatory model (Figure 1). Yet, the findings also qualify our theoretical formulation. In Studies 1-3, we observed distinct result patterns for Fun Seeking and Drive on the one hand, and Reward Responsiveness on the other hand. Notably, previous research has shown that, whereas Fun Seeking and Drive are negatively correlated with BIS, Reward Responsiveness is positively correlated with BIS (Carver & White, 1994). This pattern of correlations, which we replicated in Study 1 (Table 1), suggests that Reward Responsiveness differs in important ways from Fun Seeking and Drive. Carver and White's (1994, Study 2) findings offer some insight into these differences. They obtained evidence for a double dissociation (Teuber, 1955), whereby both Fun Seeking and Drive (but not Reward Responsiveness or BIS) were positively associated with the Minnesota Multiphasic Personality Inventory (MMPI) Hypomania subscale (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), whereas both Reward Responsiveness and BIS (but not Fun Seeking or Drive) were positively associated with Tridimensional Personality Questionnaire (TPQ) Reward Dependence subscale (Cloninger, 1987). Thus, on the one hand, Fun Seeking and Drive (relative to Reward Responsiveness and BIS) were characterized more by excitability and euphoria. On the other hand, Reward Responsiveness and BIS (relative to Fun Seeking and Drive) were more characterized by a tendency toward maintaining behavior previously associated with reward. As suggested by Carver and White, this concern, as assessed by the TPQ Reward Responsiveness subscale (e.g., "I like to please other people as much as I can"), could "reflect a dependence on other people that could be motivated as easily by desire to avoid social disapproval as by desire to gain social reward" (p. 322). In all, this evidence indicates that Reward Responsiveness and BIS are relatively more dependent on environmental contingencies, whereas Fun Seeking and Drive are relatively more dependent on intrinsic motivational forces. It is likely, then, that Fun Seeking and Drive, with their reference to pursuit of desired goals (Carver & White, 1994), represent a more prototypical or faithful operationalization of approach motivation than Reward Responsiveness. Regardless, these effects are subject to further empirical confirmation before firm conclusions are drawn.

We have found, in our prior research, that nostalgia is triggered by several discomforting stimuli or states, including loneliness (Wildschut et al., 2006, Zhou et al., 2008), social exclusion (Seehusen et al., 2013), negative mood (Barrett et al., 2010; Wildschut et al., 2006), boredom (W. A. P. van Tilburg et al., 2013), discontinuity between one's past and present (Sedikides et al., 2013), meaninglessness (Routledge et al., 2011, 2012), and thermoregulatory (cold) discomfort (Zhou et al., 2012). We argue that all these stimuli represent instances of avoidance motivation. As such, our formulation would be applicable in those instances as well. Future research would do well to examine whether (a) these stimuli are associated with, or lead to, negative psychological and physiological (e.g., health) consequences, (b) the stimuli are concurrently associated with, or trigger, nostalgia, and (c) nostalgia then counteracts the adverse consequences of these stimuli. This homeostatic function of nostalgia is plausible, given that, in addition to the above, experimentally induced nostalgia elevates social connectedness and empathy (Turner et al., 2012, 2013; Wildschut et al., 2006; Zhou, Wildschut, Sedikides, Shi, et al., 2012), raises positive mood and self-esteem (Hepper et al., 2012; Wildschut et al., 2006), decreases boredom (W. A. P. van Tilburg et al., 2013), increases perceptions of continuity between one's past and present (Sedikides et al., 2013), strengthens meaningfulness (Routledge et al., 2011, 2012), and maintains subjective thermoregulatory comfort (Zhou, Wildschut, Sedikides, Chen, et al., 2012).

Limitations and Future Directions

Across the five studies, we used a convergent operations approach (Campbell & Fiske, 1959) to test the regulatory model (Figure 1). The independent variable—avoidance motivation—was measured with the BIS subscale in Study 1 and manipulated in Study 2. The intervening variable—nostalgia—was measured in Studies 1-2 and manipulated in Studies 3-5. Finally, the dependent variable—approach motivation—was assessed with the BAS subscales in Studies 1-3 and in terms of behavioral manifestations in Studies 4-5.

Nonetheless, there is scope for increasing methodological diversity in at least three areas. First, we used only a single experimental induction of avoidance motivation, whereby participants were instructed to bring to mind negative future events they were concerned

could happen and wanted to avoid (compared to ordinary future events). It is possible that bringing to mind future events that one wishes to avoid renders positive aspects of one's past particularly salient. It is therefore important, in future research, to examine whether other avoidance inductions such as manipulations of arm extension versus flexion (Cacioppo, Priester, & Berntson, 1993) or avoidance versus approach performance goals (Elliot & Harackiewicz, 1996) also increase nostalgia. Second, we used only a single experimental induction of nostalgia, whereby participants were instructed to recall a nostalgic (compared to ordinary) autobiographical event. Future research would do well to assess whether alternative nostalgia inductions involving, for example, musical excerpts (Cheung et al., 2013), song lyrics (Routledge et al., 2011), or central versus peripheral features of the nostalgia prototype (Hepper et al., 2012), also increase approach motivation. Third, we tested approach behavior exclusively in interpersonal context. A promising direction for future research would be to study the effect of nostalgia on approach behavior in other life domains, such as academic achievement (Elliot & Friedman, 2007).

Moreover, the reported studies did not identify psychological mechanisms underlying the postulated role of nostalgia in motivation regulation. How does nostalgia increase approach motivation? We propose that self-efficacy and abstract mental construal are key mediators linking nostalgia to approach motivation. Nostalgia increases perceived self-efficacy. For example, participants who think about a nostalgic (vs. positive future) event evince heightened cognitive accessibility of positive self-attributes (Vess et al., 2012). Also, participants who think about a nostalgic (vs. ordinary autobiographical) event perceive themselves as more self-efficacious in interpersonal contexts (Wildschut et al., 2006, 2010) and report greater purpose in life (Routledge et al., 2011). These findings are consistent with the notion that nostalgia encompasses positive self-relevant information that shapes expectations for the present and future (Sedikides, Wildschut, Gaertner, et al., 2008; Sedikides et al., 2009). Self-efficacy, in turn, is a critical antecedent of approach motivation (Bandura, 1982). Studies with severe phobics (Bandura & Adams, 1977; Bandura et al., 1977; Bandura, Adams, Hardy, Howells, 1980) found that increased self-efficacy predicted approach behavior toward a threatening target. Within the social domain, perceived self-

efficacy in navigating complex interpersonal situations (e.g., disclosing intimate information about oneself to a new companion) predicts increased social-goal striving and attainment (Buhrmester, Furman, Wittenberg, & Reis, 1988; Herzberg et al., 1998). Examining the mediating role of self-efficacy would be a profitable research direction.

Future research should also explore the mediating role of abstract (vs. concrete) mental construal. Nostalgia involves psychological distancing or abstract construal (Stephan et al., 2012). Abstract construal allows individuals to transcend the particularities of the present situation and act according to their global concerns (Trope & Liberman, 2010). For example, abstract construal facilitates arguments in favor (rather than against) actions (Eyal, Liberman, Trope, & Walther, 2004). When individuals face a challenging situation (e.g., one that has self-evaluative implications), abstract construal facilitates consideration of long-term rewards present in the situation, thus activating goal representations likely to maximize the attainment of these rewards (Freitas, Gollwitzer, & Trope, 2004). Indeed, there is a positive link between abstract construal (i.e., global processing style) and promotion regulatory focus (associated with approach motivation; Higgins, 1997), and a positive link between concrete construal (i.e., local processing style) and prevention regulatory focus (associated with avoidance motivation; Förster & Higgins, 2005). Taken together, it is likely that abstract construal involved in nostalgic recollections (Stephan et al., 2012) elicits approach motivation.

We have obtained evidence in the current research that nostalgia is associated with, or fosters, approach motivation. This calls for empirical forays into the impact of nostalgia on various approach orientations. These include curiosity (Berlyne, 1960), exploration (Elliot & Reis, 2003), inspiration (Thrash & Elliot, 2003), and creativity (Kuschel, Förster, & Denzler, 2010). At the same time, it would be useful to examine boundaries of the obtained effect. For example, nostalgia may have a limited influence in inducing approach motivation among populations who are dispositionally high on it, such as narcissists (Foster & Trimm, 2008) and extraverts (Elliot & Thrash, 2002). However, nostalgia may have a drastic influence on approach motivation among populations who are dispositionally low on it such as neurotics, habitual worriers, or introverts (Elliot & Thrash, 2002; Verplanken, 2012). The search for

boundary conditions will also be aided by content analysis of individuals' nostalgic memories. To achieve this, participants could be instructed to provide detailed narrative descriptions of their memories (as opposed to a few keywords, as in Studies 3-5). Careful examination of these narratives would shed light on the important question of whether nostalgia increases approach motivation even when it contains prominent elements of loss and sadness, as it does for some persons (Hepper et al., 2012; Holak & Havlena, 1992, 1998; Wildschut et al., 2006). Mounting evidence for the psychological and health benefits of experiencing a mixture of positive and negative emotion, or "taking the good with the bad," suggests that negativity need not detract from nostalgia's effect on approach motivation (Adler & Hershfield, 2012; Hershfield, Scheibe, Sims, & Carstensen, 2013; Larsen, Hemenover, Norris, & Cacioppo, 2003).

Coda

The emotional experience of nostalgia has long been regarded as an unhealthy preoccupation with the past, symptomatic of brain or psychiatric disorders (for a review, see Sedikides et al., 2004). In contrast, our research has indicated that nostalgia is an ambivalent, but predominantly positive, emotion. Ambivalent emotions confer functional, health, and instrumental benefits (Larsen et al., 2003; Tamir, 2009), especially those emotions—like nostalgia—that are predominantly positive (Schwartz et al., 2002; Sedikides, Wildschut, Arndt, & Routledge, 2006). Crucially, our current research has provided evidence for another, coping function of nostalgia. Nostalgia has motivational implications. It regulates avoidance and approach strivings, thus balancing the motivational system. Nostalgia's contribution to adaptive human functioning may derive, at least in part, from its capacity to counteract avoidance motivation and increase approach motivation.

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Footnotes

¹ Females (compared to males) scored higher on the nostalgia composite, $F(1, 531) = 9.89, p = .002, d = 0.27$. This finding is in line with some of our previous research showing greater nostalgia proneness among females (Wildschut et al., 2010). We also replicated two gender differences documented by Carver and White (1994). Females (compared to males) scored higher on BIS, $F(1, 531) = 49.80, p < .001, d = 0.61$, and on Reward Responsiveness, $F(1, 531) = 11.79, p < .001, d = 0.30$. Age was negatively associated with Reward Responsiveness, $r(533) = -.17, p < .001$. Tests of the focal associations depicted in Figure 1 remained unchanged when we controlled for age and gender.

² A test of the indirect effect is mathematically equivalent to a test of the difference between the association of BIS with the BAS-related dimensions before (Table 2, column c) and after (Table 2, column c') controlling for nostalgia (MacKinnon & Fairchild, 2009). Hence, the difference between c and c' was significant for each BAS-related dimensions.

³ A series of Avoidance versus Control \times Gender Analyses of Variance (ANOVAs) revealed that females (compared to males) scored higher on Reward Responsiveness, $F(1, 298) = 12.09, p < .001, d = 0.40$ (replicating Study 1 and Carver & White, 1994), NA, $F(1, 298) = 5.65, p = .018, d = 0.28$, and nostalgia, $F(1, 298) = 5.09, p = .025, d = 0.26$ (replicating Study 1). Results also revealed a significant Avoidance \times Gender interaction effect on NA, $F(1, 298) = 4.63, p = .032, d = 0.25$. Avoidance motivation (compared to control) increased NA more for females than males, but the smaller effect for males was significant, $F(1, 298) = 138.14, p < .001, d = 1.36$. Age was negatively associated with state nostalgia, $r(302) = -.12, p = .038$, Fun Seeking, $r(302) = -.32, p < .001$, and Drive, $r(302) = -.17, p = .003$ (one participant did not report age). Tests of the focal associations, depicted in Figure 1, remained unchanged when we controlled for age and gender.

⁴ A series of Nostalgia versus Control \times Gender ANOVAs showed that females (compared to males) scored significantly higher on Reward Responsiveness, $F(1, 116) = 4.81, p = .030, d = 0.41$ (replicating Studies 1-2 and Carver & White, 1994). Participant age was not significantly correlated with any of the dependent variables.

⁵ In Studies 4-5, the nostalgia and control conditions did not differ significantly on PA (or NA). Whereas most prior research supports a positive effect of nostalgia on PA, the absence of such a significant effect in the present studies matches the results of three prior studies with Chinese samples (Zhou, Wildschut, Sedikides, Shi et al., 2012; Studies 2-4).

Table 1.

Descriptive Statistics, Cronbach's Alpha Reliability Coefficients (in Parentheses), and Zero-Order Correlations among Study Variables: Study 1 (N = 533).

	<i>M</i>	<i>SD</i>	Zero-order correlations					
			1	2	3	4	5	
1. BIS	2.69	0.54	(.83)					
2. Fun Seeking	2.65	0.51	-.08 [†]	(.65)				
3. Drive	2.24	0.58	-.07	.40**	(.73)			
4. Reward Responsiveness	2.97	0.48	.24**	.37**	.42**	(.66)		
5. Nostalgia composite	0.00	0.90	.18**	.09*	.15**	.22**	(.94)	
Big Five factors (<i>N</i> = 527)								
6. Extraversion	4.39	1.59	-.21**	.32**	.21**	.31**	.11*	
7. Agreeableness	4.75	1.27	.02	.13**	.10*	.01	.08 [†]	
8. Conscientiousness	5.09	1.48	-.02	-.26**	.05	.00	.08 [†]	
9. Neuroticism	3.47	1.54	.50**	-.15**	.01	-.11*	.11*	
10. Openness/Intellect	4.42	1.59	.09*	.11**	.06	-.05	.08 [†]	

Note. [†] $p < .10$; * $p < .05$; ** $p < .01$. Values in parentheses are Cronbach's alpha reliability coefficients. The reliability coefficient for the nostalgia composite was calculated following Nunnally and Bernstein's (1994) formula for the reliability of linear combinations of scale scores (Eq. 7-16, p. 269). Degrees of freedom for analyses involving the Big Five factors were reduced due to missing values.

Table 2.

Standardized Path Coefficients for Regulatory Models with a Direct Effect of BIS on BAS-Related Dimensions and an Indirect Effect of BIS on BAS-Related Dimensions via Nostalgia: Study 1 (N = 533).

Outcome variable	Standardized path coefficient				
	<i>a</i>	<i>b</i>	<i>b'</i>	<i>c</i>	<i>c'</i>
	.18**				
Fun Seeking		.09*	.11*	-.08 [†]	-.10*
Drive		.15**	.17**	-.07	-.10*
Reward Responsiveness		.22**	.18**	.24**	.21**

Note. [†] $p < .10$; * $p < .05$; ** $p < .01$. Coefficient *a* is the standardized beta for the association between BIS and nostalgia. Coefficient *b* is the standardized beta for the association between nostalgia and the BAS-related dimensions. Coefficient *b'* is the standardized beta for the association between nostalgia and the BAS-related dimensions, controlling for BIS.

Coefficient *c* is the standardized beta for the association between BIS and the BAS-related dimensions. Coefficient *c'* is the standardized beta for the association between BIS and the BAS-related dimensions, controlling for nostalgia. (Standardized betas in columns *a*, *b*, and *c* are identical to zero-order correlations.)

Table 3.

Bootstrap Tests of Indirect Effects of BIS on BAS-Related Dimensions via Nostalgia: Study 1 (N = 533).

Outcome variable	Indirect effect	SE	95% confidence interval	
			Lower limit	Upper limit
Fun Seeking	.018*	.012	.0008	.0469
Drive	.032*	.015	.0093	.0692
Reward Responsiveness	.029*	.013	.0084	.0599
Controlling for the Big Five factors (N = 527)				
Fun Seeking	.014*	.009	.0003	.0364
Drive	.028*	.013	.0088	.0660
Reward Responsiveness	.023*	.012	.0052	.0528

Note. * $p < .05$. Indirect effects are denoted as statistically significant ($p < .05$) if the 95% confidence interval does not include zero. Degrees of freedom for analyses involving the Big Five personality factors were reduced due to missing values.

Table 4.

Standardized Path Coefficients for Regulatory Models with a Direct Effect of Manipulated Avoidance Motivation (vs. Control) on BAS-Related Dimensions and an Indirect Effect of Manipulated Avoidance Motivation (vs. Control) on BAS-Related Dimensions via Nostalgia: Study 2 (N = 303).

Outcome variable	Standardized path coefficient				
	<i>a</i>	<i>b</i>	<i>b'</i>	<i>c</i>	<i>c'</i>
	.27**				
Fun Seeking		.22**	.27**	-.09	-.16**
Drive		.11 [†]	.14*	-.09	-.12*
Reward Responsiveness		.07	.07	.04	.03

Note. [†] $p < .10$; * $p < .05$; ** $p < .01$. Coefficient *a* is the standardized beta for the causal effect of manipulated avoidance motivation (vs. control) on nostalgia. Coefficient *b* is the standardized beta for the association between nostalgia and the BAS-related dimensions. Coefficient *b'* is the standardized beta for the association between nostalgia and the BAS-related dimensions, controlling for manipulated avoidance motivation (vs. control). Coefficient *c* is the standardized beta for the causal effect of manipulated avoidance motivation (vs. control) on the BAS-related dimensions. Coefficient *c'* is the standardized beta for the causal effect of manipulated avoidance motivation (vs. control) on the BAS-related dimensions, controlling for nostalgia. (Standardized betas in columns *a*, *b*, and *c* are identical to zero-order correlations.)

Table 5.

Bootstrap Tests of Indirect Effects of Manipulated Avoidance Motivation (vs. Control) on BAS-Related Dimensions via Nostalgia: Study 2 (N = 303).

Outcome variable	Indirect effect	SE	95% confidence interval	
			Lower limit	Upper limit
Fun Seeking	.086*	.023	.0468	.1387
Drive	.047*	.022	.0087	.0967
Reward Responsiveness	.015	.016	-.0144	.0482
Controlling for NA and PA				
Fun Seeking	.090*	.024	.0050	.1437
Drive	.050*	.022	.0132	.1037
Reward Responsiveness	.022	.016	-.0066	.0560
Controlling for anticipated probability and duration of imagined events				
Fun Seeking	.079*	.024	.0382	.1329
Drive	.038*	.023	.0003	.0968
Reward Responsiveness	.013	.016	-.0170	.0437

Note. * $p < .05$. Indirect effects are denoted as statistically significant ($p < .05$) if the 95% confidence interval does not include zero.

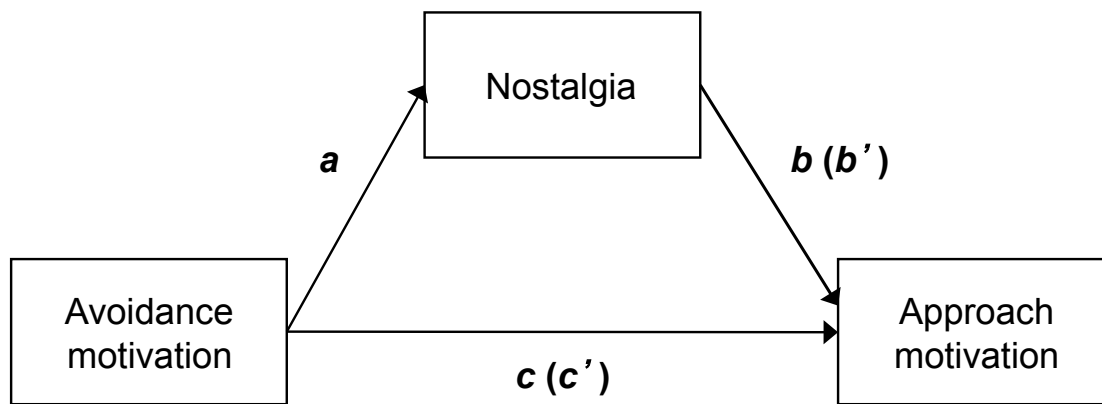


Figure 1. A schematic representation of the regulatory model. The model specifies a direct negative effect of avoidance motivation on approach motivation (path *c*) and a positive indirect effect of avoidance motivation on approach motivation via nostalgia (path *ab*). The indirect effect consists of a positive effect of avoidance motivation on nostalgia (path *a*) and a positive effect of nostalgia on approach motivation (path *b*). Paths *b'* and *c'* denote partial effects when avoidance motivation and nostalgia jointly predict approach motivation.