

AWAKENING THE SOCIAL SELF: NOSTALGIA REGULATES LONELINESS BY
ENERGIZING APPROACH-RELATED SOCIAL MOTIVATION

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Andrew Allen Abeyta

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Awakening the Social Self: Nostalgia Regulates Loneliness by Energizing
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By

Andrew Allen Abeyta

The Supervisory Committee certifies that this *disquisition* complies with
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standards for the degree of

DOCTOR OF PHILOSOPHY

SUPERVISORY COMMITTEE:

Clay Routledge

Chair

Kevin McCaul

Jeffrey Johnson

Mark Meister

Approved:

4/07/2017

Date

Mark Nawrot

Department Chair

ABSTRACT

Chronic loneliness is predictive of poor health. Therefore, it is vital to identify psychological resources that combat loneliness and encourage social connection. However, loneliness is difficult to overcome, in part because it is associated with a maladaptive high avoidance and low approach motivation orientation that limits a person's ability to connect with others. I hypothesized that nostalgia, a positive emotional experience that involves reflecting on cherished memories that are typically social in nature, is a psychological resource that regulates the tendency for lonely people to be less oriented toward social approach goals and motivation. I tested this hypothesis across 3 studies. Studies 1 and 2 examined whether nostalgia mitigates the inverse relation between loneliness and approach-related social goals, intentions, and behaviors. Studies 2 and 3, explored whether nostalgia mitigates the inverse relation between nostalgia and general approach/avoidance motivation. The results provided mixed support for the hypothesis. Nonetheless, there was preliminary evidence that feelings of nostalgia may weaken the relationship between loneliness and deficits in approach-related goals and intentions.

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DEDICATION

This dissertation is dedicated to my wife and best friend Yvonne Abeyta. I love you more and more every day.

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INTRODUCTION

A number of theoretical perspectives propose that human beings have a need to belong (Baumeister & Leary, 1995; J. T. Cacioppo et al., 2006; Eisenberger & Lieberman, 2005; Maslow, 1954; Pickett & Gardner, 2005; Ryan & Deci, 2000). Further, these perspectives postulate that the need to belong is fundamental for adaptive functioning, so much so that thwarting the need to belong should have negative consequences for psychological and physical health (e.g., Baumeister & Leary, 1995; J. T. Cacioppo et al., 2002). Indeed, research indicates that chronic loneliness is associated with low psychological well-being and psychopathology (Akerlind & Hörnquist, 1992; J. T. Cacioppo et al., 2006; Joiner, 2005; Kearns, Whitley, Tannahill, & Ellaway, 2015). Moreover, loneliness has been found to be associated with poor physical health and reduced longevity (for a review, see J. T. Cacioppo & S. Cacioppo, 2014). People suffering from chronic loneliness would like nothing more than to establish positive social connections (Gardener, Pickett, Jefferies, & Knowles, 2005). However, research indicates that loneliness is associated with a maladaptive motivation orientation aimed at preventing or avoiding further social loss as opposed to a motivation orientation aimed at establishing and growing social bonds (Molden, Lucas, Gardener, Dean, & Knowles, 2009; Park & Baumeister, 2015). Ultimately, this motivation orientation makes successful social connections unlikely (e.g., Gable, 2006).

Given the significance of social belonging and the detrimental effects of chronic loneliness, it is important to uncover psychological tools that promote sociality. I propose that nostalgic reflection is one such psychological tool. Nostalgic reflection is a way of re-experiencing meaningful social relationships which reassures people that they are connected with and valued by others (Abeyta, Routledge, & Juhl, 2015; Abeyta, Routledge, Roylance,

Wildschut, & Sedikides, 2015; Routledge, 2015; Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015; Wildschut, Sedikides, Arndt, & Routledge, 2006) and gives them the confidence and motivation to pursue social goals (Abeyta, Routledge, & Juhl, 2015). Thus, nostalgia should regulate loneliness by promoting a positive approach-oriented social motivation. To begin, I define nostalgia and review evidence supporting nostalgia as a resource for well-being in general and for social belonging in particular. Then I review evidence that nostalgia regulates loneliness by fostering social connectedness. Finally, I propose nostalgia should also combat loneliness by instigating approach-related motivation, goals, and intentions.

Nostalgia

Definitions and Content

Even though nostalgia was once considered a disease or mental illness (for a reviews on the history of nostalgia, see Batcho, 2013; Routledge, 2015; Sedikides Wildschut, Routledge, Arndt, Hepper, et al., 2015), contemporary treatments of this construct are in agreement that nostalgia is a normative and mostly positive experience with elements of loss and sadness. For example, dictionaries define nostalgia as “a sentimental longing or wistful affection for the past” (Pearsal, 1998, p. 1266) and the “pleasure and sadness that is caused by remembering something from the past and wishing that you could experience it again” (Nostalgia; Merriam-Webster online dictionary, n. d.). Lay persons consider nostalgia to be a mostly positive experience with elements of loss and the desire to relive or return to the past, as well as a revisiting of fond and personally significant memories that are primarily focused on childhood and/or social relationships (Hepper, Ritchie, Sedikides, & Wildschut, 2012; Hepper et al., 2014).

Research exploring the content of nostalgic memories is consistent with dictionary and lay persons’ definitions of nostalgia. This evidence indicates that even though nostalgia is an

ambivalent emotional experience, containing references to both positive and negative emotional states, references to positive states far outweigh references to negative states (Abeyta, Routledge, Roylance, et al., 2015; Hart et al., 2011; Wildschut et al., 2006). Moreover, when nostalgic memories do contain negative experiences, they tend to follow a redemptive narrative sequence, whereby negative experiences give way to positive personal outcomes (Wildschut et al., 2006). Content analyses of nostalgic reflections indicate that nostalgia is self-focused and that nostalgic memories feature cherished events, experiences, and achievements (Abeyta, Routledge, Roylance et al., 2015; Wildschut et al., 2006). Even though nostalgic memories are self-focused (i.e., the self plays the role of protagonist), they are typically social in nature; referencing feelings of love/belonging and featuring meaningful social relationships and events (Abeyta, Routledge, Roylance et al., 2015; Wildschut et al., 2006).

Triggers and Functions

Nostalgia is an experience that children (Zhou, Sedikides, Wildschut, & Gao, 2008) and adults of all ages (Hepper, Robertson, Wildschut, Sedikides, & Routledge, 2015) from countries around the world (Hepper et al., 2014) are very familiar with and engage in regularly (i.e., multiple times a week; Wildschut et al., 2006). Although pleasant sensory inputs, such as familiar scents (Reid, Green, Wildschut, & Sedikides, 2015) or music (Abeyta, Routledge, & Juhl, 2015; Barret et al., 2010; Cheung et al., 2010; Routledge et al., 2011) have been found to induce nostalgia, people most often turn to nostalgia in distressing or threatening contexts. For example, research indicates that negative mood inductions (Wildschut et al., 2006), threats to the self (Sedikides, Wildschut, Routledge, & Arndt, 2015; Vess, Arndt, Routledge, Sedikides, & Wildschut, 2012), and challenges to a sense of meaning in life (Routledge et al., 2011) bring on line nostalgia. Most relevant to the current paper, loneliness and lack of social belonging have

been found to be a potent triggers of nostalgia (Wildschut et al., 2006). Specifically, research indicates that loneliness is the most frequently self-reported trigger of nostalgia (Wildschut et al., 2006), trait loneliness is positively associated with the propensity to engage in nostalgic reverie (i.e., nostalgia proneness; Wildschut et al., 2006; Zhou et al., 2008), and experimentally manipulated loneliness increases state nostalgia (Wildschut et al., 2006; Zhou et al., 2008). Moreover, research indicates that people generally turn to nostalgic reverie when the need to belong, defined as the desire for frequent and satisfying social contact or interaction (Baumeister & Leary, 1995), is pressing (Abeyta, Routledge, & Juhl, 2015; Seehusen et al., 2013).

The tendency for people to turn to nostalgic reverie is functional for maintaining psychological equanimity. Specifically, a wealth of research indicates that engaging in nostalgic reverie has a number of psychological benefits (e.g., Routledge, 2015; Routledge, Wildschut, Sedikides, & Juhl, 2013; Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015). First, nostalgia has affective benefits. As a mostly positive emotional experience (Abeyta, Routledge, Roylance, et al., 2015; Wildschut et al., 2006), nostalgia increases positive, but not negative affect (Baldwin & Landau, 2014; Cheung et al., 2013; Stephan, Sedikides, & Wildschut, 2012; Wildschut et al., 2006; Wildschut, Sedikides, Routledge, Arndt, & Cordaro, 2010). Second, nostalgia has self-related benefits. Since nostalgic memories typically contain themes of agency and self-growth and focus on personal accomplishments (Abeyta, Routledge, Roylance, et al., 2015; Hart et al., 2011; Wildschut et al., 2006), engaging in nostalgia increases the cognitive accessibility of positive self attributes (Vess et al., 2012), promotes authenticity (Baldwin, Biernat, & Landau, 2015; Stephan et al., 2012), fosters continuity between the past and present self (Sedikides, Wildschut, Gaetner, Routledge, & Arndt, 2008; Sedikides, Wildschut, Routledge, & Arndt, 2015; Sedikides et al., 2016), and bolsters self-esteem (Cheung et al., 2013;

Hepper et al., 2012; Reid et al., 2014; Stephan et al., 2015; Wildschut et al., 2006). Third, nostalgia has existential benefits (for a review, see Abeyta & Routledge, in press). As a revisiting of life's most meaningful events (Abeyta, Routledge, Roylance, et al., 2015; Routledge et al., 2011; Wildschut et al., 2006), nostalgia bolsters a sense of meaning in life (Routledge et al., 2011; Routledge, Wildschut, Sedikides, Juhl, & Arndt, 2012), reduces the search for meaning in life (Routledge et al., 2012), and buffers a variety of existential threats (Juhl, Routledge, Arndt, Sedikides, & Wildschut, 2010; Routledge, Arndt, Sedikides, & Wildschut, 2008; Routledge et al., 2011; Routledge et al., 2012; Routledge, Juhl, Abeyta, & Roylance, 2014). Fourth and most relevant to the current work, nostalgia has social benefits. As an inherently social reflective experience that places the self in a social context (Hepper et al., 2012; Hepper et al., 2014; Wildschut et al., 2006) and features strong themes of belonging (Abeyta, Routledge, Roylance, et al., 2015), nostalgia bolsters a sense of social connectedness (i.e., a sense of acceptance, belongingness, and support; Cheung et al., 2013; Juhl, Sand, & Routledge, 2012; Reid et al., 2015; Routledge et al., 2011; Wildschut et al., 2006; Wildschut et al., 2010) and increases feelings of social competence (Abeyta, Routledge, & Juhl, 2015; Wildschut et al., 2006). Finally, nostalgia's social benefits are central to nostalgia's ability to promote psychological equanimity. Specifically, social connectedness mediates nostalgia's effect on self-esteem (Cheung et al., 2013) and meaning in life (Routledge et al., 2011).

The Social Regulatory Benefits of Nostalgia

Nostalgia Reduces Loneliness via Social Support

Being that nostalgia is an experience that is triggered by loneliness and bolsters a sense of social connectedness, it should regulate loneliness. Indeed, research has provided evidence that nostalgia helps combat loneliness by fostering feelings of social support. Specifically, a series of

studies by Zhou and colleagues (2008) evidenced that nostalgia lessens the inverse relation between loneliness and feelings of social support. One study found that loneliness was associated with a greater propensity to engage in nostalgic reflection, and the propensity to engage in nostalgic reflection was, in turn, associated with greater feelings of social support. Critically, nostalgia suppressed the relation between loneliness and social support; when statistically controlling for propensity to engage in nostalgia, the association between loneliness and perceived social support became more strongly negative. Another study further tested nostalgia's ability to restore a sense of social support experimentally, by manipulating loneliness instead of measuring it. Once again, loneliness had a significant indirect effect on social support through feelings of nostalgia, such that loneliness increased nostalgia, which in turn corresponded with more positive perceptions of social support. Conceptually replicating the non-experimental study, the effect of the loneliness manipulation on social support was more strongly negative when feelings of nostalgia were statistically controlled for. Taken together, nostalgia appears to weaken the association between loneliness and perceived lack of social support, because engaging in nostalgic reflection increases a sense of social support.

Loneliness and Maladaptive Motivation

In addition to feeling a lack of social belonging/support, lonely individuals possess an avoidance or prevention focused motivation orientation that limits the likelihood and quality of social interactions (Molden et al., 2009; Park & Baumeister, 2015). A number of converging theoretical perspectives make a distinction between two independent yet opposing motivations; approach and avoidance (e.g., Carver, 2006; Elliot & Church, 1997; Higgins, 1997; Miller, 1944). Approach motivation energizes appetitive behaviors toward promoting positive end states, whereas avoidance motivation energizes aversive behaviors achieved by preventing negative end

states. Research broadly indicates that a lack of social belongingness is associated with increased avoidance motivation. For example, manipulations of social exclusion and ostracism increase prevention focused motivation, and lead to more conservative goal strategies (Park & Baumeister, 2015). Moreover, when experiencing social rejection people are more likely to withdraw from and/or avoid social contact to prevent further social harm and are less likely to reengage in social contact (Molden et al., 2009; Ren, Wesselman, & Williams, 2016). Finally, loneliness is positively associated with the motivation to prevent loss and inversely associated with an approach-oriented motivational focus of promoting gains (Park & Baumeister, 2015).

The link between loneliness and more avoidance oriented/less approach oriented motivation has negative consequences for a person's ability to establish/maintain meaningful social bonds. For example, a lack of social belonging has been linked with reduced motivation to exert self-control (e.g., Baumeister, DeWall, Ciarocco, & Twenge, 2005; J. T. Cacioppo et al., 2000; Oaten, Williams, Jones, & Zadro, 2008; Twenge, Catanese, & Baumeister, 2003), a capacity that is important when establishing new connections or cooperating with strangers (e.g., Dalton, Chartrand, & Finkel, 2010; Finkel et al., 2006). Moreover, people with the motivational tendency to fear interpersonal loss are less likely to pursue social goals, such as intimacy, that lead to relationship satisfaction (Elliot, Gable, & Mapes, 2006; Gable, 2006; Nurmi & Salmela-Aro, 1997). Finally, neuroimaging research evidences that loneliness is associated with less activity in brain regions associated with mentalizing/perspective taking in the context of socially threatening situations (Powers, Wagner, Norris, & Heatherton, 2013; J. T. Cacioppo, Norris, Decety, Monteleone, & Nusbaum, 2008), a pattern of avoidance that limits an individual's ability to effectively cope with interpersonal conflict (Gordon & Chen, 2016).

Nostalgia Mitigates Loneliness via Approach-Related Goals/Motivation

There is reason to believe that nostalgia regulates loneliness by promoting a more approach focused and less avoidance focused motivation orientation. Even though historical treatments paint nostalgia as an experience that keeps people trapped in their past, unable to focus on what is going on around them and/or incapable of planning for the future (for reviews of the historical treatment of nostalgia see, Batcho, 2013; Routledge, 2015; Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015), recent research reveals that nostalgia is a future orienting experience (for a review see, Sedikides & Wildschut, in press). For example, studies have evidenced that nostalgia encourages optimism (Abeyta & Routledge, 2016; Cheung et al., 2013), promotes exploration (Baldwin & Landau, 2014), sparks creativity (van Tilburg, Sedikides, & Wildschut, 2015), and evokes inspiration (Stephan et al., 2015). Most relevant to current research, evidence suggests that nostalgia regulates avoidance-related motivation and increases approach-related motivation (Stephan et al., 2014; Tullett, Wildschut, Sedikides, & Inzlicht, 2015). Moreover, a number of studies demonstrate that nostalgia more specifically energizes approach-oriented social motivation. For example, nostalgia has been found to promote prosocial intentions and behaviors (Zhou, Wildschut, Sedikides, Shi, & Feng, 2012; Stephan et al., 2014) and increase positive intergroup attitudes (Turner, Wildschut, & Sedikides, 2012; Turner, Wildschut, Sedikides, & Gheorghiu, 2013). Nostalgia has also been found to increase affiliation and bonding. Specifically, nostalgia encourages approach-related behaviors (e.g., sitting closer to a prospective conversation partner; Stephan et al., 2014), and energizes goals of establishing, deepening, and repairing social bonds (Abeyta, Routledge, & Juhl, 2015).

The Current Research

As a psychological resource that regulates avoidance-related motivation and encourages social approach, nostalgia should combat loneliness by energizing adaptive approach-related social motivations, goals, and tendencies, thereby mitigating the maladaptive motivational orientation of high avoidance/low approach that is typical of lonely individuals. To date no research has examined whether nostalgia regulates loneliness in this manner. I tested this proposal in three studies by examining whether nostalgia regulates the inverse relation between loneliness and approach-oriented goals and motivation. Studies 1 and 2 examined the effects of loneliness and nostalgia on self-report indicators of approach-related social goals, intentions, and behaviors. Additionally, Study 2 examined the effects of loneliness and nostalgia and generalized approach-related motivation. I hypothesized that nostalgia would mitigate the inverse relation between loneliness and approach-related social goals, approach-related social intentions, and generalized approach-related motivation. Study 3 examined the effects of loneliness and nostalgia on a well-established neurocognitive indicator of approach/avoidance motivation, the line bisection task (Nash, McGregor, & Inzlicht, 2010). Once again, I hypothesized that nostalgia would mitigate the relation between loneliness and deficits in approach motivation.

STUDY 1

The purpose of Study 1 was to investigate whether nostalgia regulates the inverse relation between loneliness and approach-related social goals/intentions. Loneliness was measured using a self-report trait measure (Russell, 1996). The effect of nostalgia was examined at the state and trait level. At the state level, nostalgia was manipulated by having participants bring to mind and write about a nostalgic memory (relative to an ordinary memory) and was also measured using a self-report measure of state nostalgia (Batcho, 1995). At the trait level, the propensity to engage in nostalgia was assessed with a self-report measure (Routledge et al., 2008). Finally, approach-related goals, intentions, and behaviors were assessed with a variety of self-report measures. I hypothesized that state nostalgia would mitigate the inverse relation between loneliness and approach-oriented social goals/intentions. Specifically, I expected that the association between loneliness and reduced approach related goal commitment, intentions, and behaviors would be reduced when people feel more nostalgic. Further, I hypothesized that loneliness would be associated with a greater propensity to engage in nostalgic reverie and that the propensity to engage in nostalgic reverie would in turn be associated with stronger approach related social motivation. Thus, engaging in nostalgia at the trait level should suppress the tendency for lonely people to be lower in approach-related social goals/intentions.

Method

Participants, Procedure, and Materials

Participants consisted of 200 Amazon Mechanical Turk (AMT) workers residing in the United States (98 females). Participants ages ranged from 18 to 66 years old ($M = 35.50$, $SD = 10.67$) and were compensated \$1 for completing a 20 minute online questionnaire. AMT is a valid and reliable source for psychological research (Burhmester, Kwang, & Gosling, 2011;

Paolacci, Chandler, & Ipeirotis, 2010; Shapiro, Chandler, & Mueller, 2013). AMT samples are comparable to traditional samples (e.g., college, community, and clinical samples) on demographic measures (Paolacci et al., 2010), personality characteristics (Burhmester et al., 2011), cognitive biases (Paolacci et al., 2010), and mental health measures (Shapiro et al., 2013). The questionnaire was presented in the order below. Full-text of the materials can be found in the Appendix.

Loneliness. Participants completed the 10-item UCLA loneliness questionnaire (Russell, 1996). Specifically, participants indicated the extent to which they feel deprived of companionship, feel isolated, and generally lack support from those around them using a 4-point response scale (e.g., “How often do you feel like people are around you but not with you?”; 1 = *never*, 4 = *always*). Responses to the scale formed a reliable index and were therefore averaged to create loneliness scores ($\alpha = .93$; $M = 2.17$, $SD = 0.65$).

Filler questionnaires. Next, participants completed two filler questionnaires: the Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006) a 10-item measure of the presence of meaning in life (e.g., “I understand my life’s meaning”; 1 = *absolutely untrue*, 7 = *mostly true*; $\alpha = .95$; $M = 4.94$, $SD = 1.58$) and the search for meaning in life (e.g., “I am searching for meaning in life”; 1 = *absolutely untrue*, 7 = *mostly true*; $\alpha = .97$; $M = 4.26$, $SD = 1.79$), and the 10-item Need for Existential Meaning scale (Abeyta & Routledge, 2017; e.g., “I want to feel meaningful”; 1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .82$; $M = 3.81$, $SD = 0.88$). The purpose of the fillers questionnaires was to distract the participants and prevent them from drawing connections between their responses to the loneliness measures, the nostalgia or control manipulation, and the social approach outcome measures.

Experimental manipulation. Participants were randomly assigned to a nostalgia or control condition with a frequently used event reflection task (e.g., Abeyta, Routledge, Juhl, 2015; Wildcshut et al., 2006). In the nostalgia condition ($n = 100$) participants are presented with a dictionary definition of nostalgia (i.e., “*According to the Oxford Dictionary, ‘nostalgia’ is defined as ‘a sentimental longing for the past’*”) and instructed to bring to mind and write down four keywords summarizing a memory of an event that makes them feel nostalgic. After reflecting on and providing keywords, participants are instructed to describe the memory in writing. In the control condition ($n = 100$), participants are instructed to reflect on, generate keywords for, and write about an ordinary memory.

Social-efficacy. Next participants completed a social-efficacy measure (Abeyta, Routledge, & Juhl, 2015), that was included to explore the possibility that social efficacy mediates nostalgia’s effect on social approach. This measure was modeled after similar domain-specific self-efficacy scales (Bandura, 2006). Specifically, participants read the following stem, “Rate your confidence in your ability to...” and then responded to the following six items: “...establish successful social relationships”, “...maintain social relationships”, “...resolve conflicts in relationships”, “...communicate effectively in social relationships”, “...open up to others in social relationships”, and “...approach people I don’t know and strike up a conversation” (1 = *cannot do at all*, 10 = *highly certain can do*; $\alpha = .95$; $M = 7.26$, $SD = 2.19$).

Social goal/intention outcomes. After completing the social-efficacy measure, participants completed a series of measures meant to assess social goals, intentions, and behaviors.

First, participants completed a state version of the Elliot and colleagues’ (2006) 4-item friendship-approach goal scale (e.g., “I feel that I want to move toward growth and development

in my friendships”; 1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .92$; $M = 4.31$, $SD = 1.13$).

Previous research indicates that nostalgia increases friendship-approach, but not avoidance goals (Abeyta, Routledge, & Juhl, 2015).

Second, participants completed a measure of how optimistic they feel about accomplishing their goals of connecting with others. This measure was created by altering the wording of the 6-item Revised Life Orientations Test (Scheier, Carver, & Bridges, 1994), to capture participants’ current feelings of optimism in the interpersonal domain (e.g., “I’m feeling optimistic about my future interpersonal relationships”; 1 = *strongly disagree*, 5 = *strongly agree*; $\alpha = .88$; $M = 3.66$, $SD = 0.90$).

Third, participants completed a friendship conflict task to assess the extent to which they are driven to overcome interpersonal setbacks (Abeyta, Routledge, & Juhl, 2015). The friendship conflict task instructs participants to think about their best friend and then read the following:

Now imagine that you and your close friend got into a disagreement. You and your friend have tried to resolve this conflict, but things just are not the same.

You have noticed that since the disagreement you hang out less often. When you do see your friend he/she seems a bit cold and distant. Sure, your friend is nice enough and you get along, but it is clear that this disagreement has driven a wedge between you.

After imagining the conflict, participants responded to three items measuring how optimistic they feel that the conflict would be resolved (e.g., “I would feel optimistic that my close friend and I could completely resolve this conflict”; 1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .82$; $M = 4.36$, $SD = 1.24$) and three items on their intentions to be proactive about resolving the

conflict (e.g., “I would dedicate myself to solving this conflict”; 1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .91$; $M = 4.65$, $SD = 1.16$).

Fourth, participants completed a state version of the Elliot and colleagues’ (2006) 4-item friendship-avoidance goal scale (e.g., “I want to avoid disagreements and conflicts with my friends”; 1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .88$; $M = 4.67$, $SD = 1.04$).

Finally, participants completed a study participation task meant as a more behavioral measure of approach-related goal striving. In this task, participants are told that one of the purposes of the study is to gauge their interest in, and to promote, future research studies (Abeyta, Routledge, Juhl, 2015). Next, participants read a description of two studies in which they could participate in. One of the research study is social in nature, whereas the other research study is not. The social research is titled “Study 1: Personality and Social Interaction” and involves meeting and getting to know a new person. In contrast, the non-social research study titled “Study 2: Cognitive Problem Solving” makes no mention of working with or meeting others, as it describes studies where individuals work alone to complete the study. Participants indicated (1) how interested they would be to participate in the study (1 = *not interested*, 7 = *very interested*), (2) whether or not they would like to learn more information about the study (1 = *definitely no*, 7 = *definitely yes*), and (3) whether or not they would like to participate in the study (1 = *definitely no*, 7 = *definitely yes*). Scores were computed for willingness to participate in the social research study ($\alpha = .95$; $M = 5.70$, $SD = 1.76$) and willingness to participate in the non-social research study ($\alpha = .96$; $M = 6.14$, $SD = 1.45$), respectively.

State nostalgia. The Nostalgia Inventory (Batcho, 1995) was used as a measure of state nostalgia. This scale was included as a manipulation check and to further explore whether state nostalgia mitigates the inverse relation between loneliness and approach related social

motivation. Participants self-report how nostalgic they are currently feeling about 20 different aspects (e.g., “family,” “vacations,” “places”) of their past (1 = *not at all nostalgic*, 7 = *very nostalgic*; $\alpha = .92$; $M = 4.17$, $SD = 1.29$).

Trait nostalgia. The 5-item nostalgia proneness scale was used as a measure of trait nostalgia (Routledge et al., 2008). The nostalgia proneness scale is a self-report measure that presents a dictionary definition of nostalgia (i.e., “According to the Oxford Dictionary, ‘nostalgia’ is defined as a ‘sentimental longing for the past’”) and instructs respondents to answer questions that are meant to assess how frequently they become nostalgic, as well as how important they view nostalgic reflection (e.g., “How often do you experience nostalgia?”; 1 = *very rarely*, 7 = *very frequently*; $\alpha = .92$; $M = 4.75$, $SD = 1.46$). This scale was included to explore the relation between loneliness, trait nostalgia, and approach-related social motivation.

At the end of the experiment participants completed a brief demographics questionnaire including age and gender items.

Results

Preliminary Analyses

An independent t-test revealed no significant difference between the nostalgia condition ($M = 4.18$, $SD = 0.12$) and the control condition ($M = 4.16$, $SD = 0.14$) on state nostalgia, $t(198) = 0.11$, $p = .92$, 95% CI [0.38, 0.34]. The null finding suggests that the nostalgia manipulation was not successful in increasing nostalgic feelings.

I conducted correlations between all measured variables. In general, loneliness was inversely associated with social goals/intentions. Loneliness was also inversely associated with state nostalgia, but not significantly associated with nostalgia proneness. Trait and state nostalgia

were generally positively associated with social goals/intentions. See *Table 1* for a complete correlation matrix.

Table 1
Zero-order correlations in Study 1

Measure	1	2	3	4	5	6	7	8	9	10	11	
1 Loneliness	—											
2 State Nostalgia	-.15*	—										
3 Nostalgia Proneness	-.09	.56**	—									
4 Social-Efficacy	-.69**	.18*	.20*	—								
5 Social Approach Goals	-.56**	.33**	.26**	.65**	—							
6 Social Goal Optimism	-.66**	.10	.14	.72**	.53**	—						
7 Conflict Optimism	-.41**	.20*	.17*	.41**	.31**	.39**	—					
8 Conflict Proactive Intentions	-.43**	.27**	.25**	.46**	.52**	.39**	.67**	—				
9 Social Avoidance Goals	-.04	.27**	.38**	.12	.26**	.09	.27**	.39**	—			
10 Social Research Intentions	-.26**	.20*	.20**	.33**	.27**	.15*	.04	.16*	.08	—		
11 Non-Social Research Intentions	-.10	.10	.07	.24*	.12	.10	.08	.12	.17*	.55*	—	
	<i>M</i>	2.17	4.17	4.75	7.26	4.31	3.66	4.36	4.65	4.67	5.70	6.14
	<i>SD</i>	0.65	1.29	1.46	2.19	1.13	0.90	1.24	1.16	1.04	1.76	1.45

Note. * $p < .05$. ** $p < .001$.

Manipulated Nostalgia

A series of hierarchical linear regression analyses were conducted to determine the effects of loneliness and manipulated nostalgia on social goals/intentions. Specifically, I regressed the social goal/intention outcomes on loneliness (centered), the experimental manipulation (dummy coded), and the loneliness x experimental manipulation interaction.

Approach-oriented social goals. A regression analysis revealed a significant main effect of loneliness on approach-oriented social goals, such that greater loneliness tended to be associated with lower levels of social approach, $b = -0.97$, $SE = .10$, $t = -9.51$, $p < .001$, $sr^2 = .31$, 95% CI [-1.17, -0.77]. The main effect of manipulated nostalgia did not reach statistical significance, $b = 0.04$, $SE = .13$, $t = 0.29$, $p = .78$, $sr^2 = .0003$, 95% CI [-0.22, 0.30]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = -0.19$, $SE = .21$, $t = -0.90$, $p = .37$, $sr^2 = .003$, 95% CI [-0.59, 0.22]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and social approach was not supported.

Social goal optimism. A regression analysis revealed a significant main effect of loneliness on social goal optimism, such that greater loneliness tended to be associated with lower levels of social goal optimism, $b = -0.91$, $SE = .07$, $t = -12.36$, $p < .001$, $sr^2 = .43$, 95% CI [-1.05, -0.76]. The main effect of manipulated nostalgia did not reach statistical significance, $b = 0.05$, $SE = .10$, $t = 0.48$, $p = .63$, $sr^2 = .0007$, 95% CI [-0.14, 0.23]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.08$, $SE = .15$, $t = 0.52$, $p = .61$, $sr^2 = .008$, 95% CI [-0.22, 0.37]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and social goal optimism was not supported.

Friendship conflict task. A regression analysis revealed a significant main effect of loneliness on optimism about resolving the conflict, such that greater loneliness tended to be associated with lower levels of optimism about resolving the friendship conflict, $b = -0.78$, $SE = .12$, $t = -6.43$, $p < .001$, $sr^2 = .17$, 95% CI [-1.03, -0.54]. There was also a significant main effect of manipulated nostalgia on optimism about resolving the conflict, such that participants in the nostalgia condition reported lower levels of optimism than participants in the control condition, b

= -0.35, $SE = .16$, $t = -2.19$, $p = .03$, $sr^2 = .02$, 95% CI [-0.66, -0.04]. The loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.17$, $SE = .25$, $t = 0.68$, $p = .50$, $sr^2 = .002$, 95% CI [-0.32, 0.65]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and optimism about resolving social conflicts was not supported.

The regression analysis revealed a significant main effect of loneliness on proactive intentions about resolving the conflict, such that greater loneliness tended to be associated with being less proactive to resolve the friendship conflict, $b = -0.78$, $SE = .11$, $t = -6.81$, $p < .001$, $sr^2 = .19$, 95% CI [-1.00, -0.55]. The main effect of manipulated nostalgia on proactive intentions to resolve the conflict did not reach statistical significance, $b = -0.22$, $SE = .15$, $t = -1.50$, $p = .14$, $sr^2 = .009$, 95% CI [-0.51, 0.07]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = -0.07$, $SE = .23$, $t = -0.30$, $p = .77$, $sr^2 = .004$, 95% CI [-0.52, 0.39]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and proactive social intentions for resolving a friendship conflict was not supported.

Avoidance-oriented social goals. The regression analyses revealed that the main effect of loneliness on social avoidance did not reach statistical significance, $b = -0.07$, $SE = .11$, $t = -0.61$, $p = .55$, $sr^2 = .002$, 95% CI [-0.61, 0.55]. Similarly, the main effect of manipulated nostalgia did not reach statistical significance, $b = 0.01$, $SE = .15$, $t = 0.05$, $p = .96$, $sr^2 = .00001$, 95% CI [-0.28, 0.30]. The loneliness x manipulated nostalgia interaction was not statistically significant, $b = -0.39$, $SE = .23$, $t = -1.70$, $p = .09$, $sr^2 = .01$, 95% CI [-0.83, 0.06].

Participation in social and non-social research studies. The regression analysis revealed a significant main effect of loneliness on willingness to participate in the social research study, such that loneliness was associated with less willingness to participate in a social research

study, $b = -0.70$, $SE = .19$, $t = -3.77$, $p < .001$, $sr^2 = .07$, 95% CI [-1.06, -0.33]. The main effect of manipulated nostalgia did not reach statistical significance, $b = -0.21$, $SE = .24$, $t = -0.88$, $p = .38$, $sr^2 = .004$, 95% CI [-0.69, 0.26]. The loneliness x manipulated nostalgia interaction was not statistically significant, $b = -0.01$, $SE = .37$, $t = -0.04$, $p = .97$, $sr^2 = .00001$, 95% CI [-0.75, 0.722]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and willingness to participate in social interactions was not supported.

The regression analysis revealed that the main effect of loneliness on willingness to participate in the non-social research study did not reach statistical significance, $b = -0.23$, $SE = .16$, $t = -1.49$, $p = .14$, $sr^2 = .01$, 95% CI [-0.54, 0.76]. The main effect of manipulated nostalgia did not reach statistical significance, $b = -0.12$, $SE = .20$, $t = -0.56$, $p = .57$, $sr^2 = .002$, 95% CI [-0.52, 0.29]. The loneliness x manipulated nostalgia interaction was not statistically significant, $b = 0.21$, $SE = .32$, $t = 0.66$, $p = .51$, $sr^2 = .002$, 95% CI [-0.42, 0.83].

Social-Efficacy as a Mediator

Past research found that perceptions of social-efficacy mediated nostalgia's effect on social approach (Abeyta, Routledge, & Juhl, 2015). Building from this research, I conducted a conditional process analysis (Hayes, 2013) to determine whether social-efficacy mediated the combined effect of manipulated nostalgia and loneliness on each of the social motivational outcomes. *Figure 1* represents the generalized conceptual model that was tested. This analysis involves three steps. First, a linear regression regressing social-efficacy on loneliness, manipulated nostalgia, and the nostalgia x loneliness interaction. Second linear regressions regressing each of the social goal/intention outcomes on manipulated nostalgia, loneliness, social-efficacy, and the nostalgia x loneliness interaction. Finally, estimating and testing the significance of indirect pathways linking nostalgia to the social motivation outcomes through

social efficacy at high (+1 *SD* from the mean), moderate (at the mean), and low (-1 *SD* from the mean) levels of loneliness using a resampling bootstrap methodology with 95% confidence intervals (1,000 bootstrap samples; Hayes, 2013).

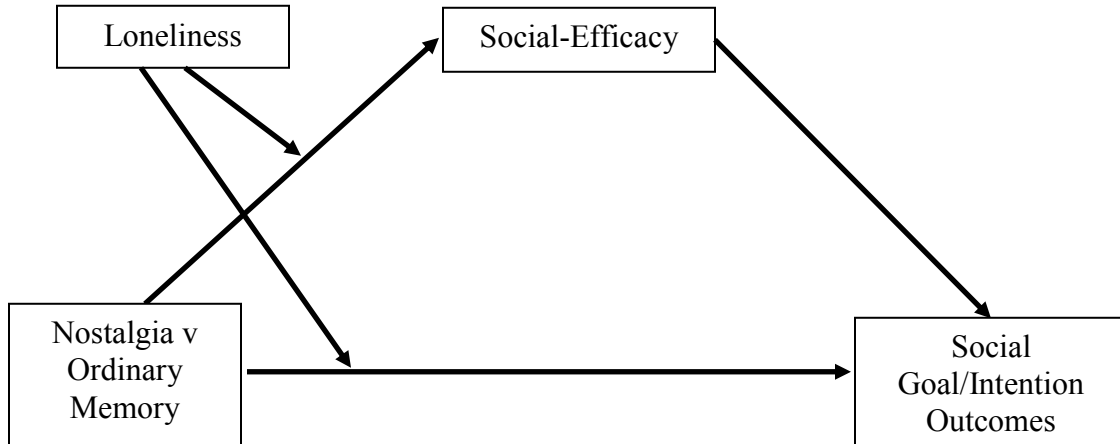


Figure 1. The generalized model testing whether social-efficacy mediates the combined effect of manipulated nostalgia and loneliness on the social goal/intention outcomes from Study 1.

The first regression revealed a significant main effect of loneliness on social-efficacy, such that loneliness was associated with lower levels of social-efficacy, $b = -2.32$, $SE = .17$, $t = -13.57$, $p < .001$, $sr^2 = .48$, 95% CI [-2.65, -1.98]. However, the main effect of manipulated nostalgia, $b = 0.03$, $SE = .22$, $t = 0.15$, $p = .88$, $sr^2 = .0001$, 95% CI [-0.41, 0.48], and the nostalgia x loneliness interaction, $b = -0.19$, $SE = .34$, $t = -0.55$, $p = .58$, $sr^2 = .001$, 95% CI [-0.87, 0.49], did not reach statistical significance. Thus, the exploratory hypothesis that social-efficacy would mediate the combined effect of nostalgia and loneliness on the social motivational outcomes was not supported because nostalgia and loneliness did not have a significant combined effect on social-efficacy.

Measured State Nostalgia

To further explore nostalgia’s potential to mitigate the inverse association between loneliness and approach-related social goals and intentions, I conducted a series of hierarchical

linear regression analyses regressing each of the social goal/intention outcomes on state nostalgia (centered), loneliness (centered), and the state nostalgia x loneliness interaction.

Approach-oriented social goals. A regression analysis revealed a significant main effect of loneliness on social approach, such that greater loneliness tended to be associated with lower levels of social approach, $b = -0.90$, $SE = .10$, $t = -9.17$, $p < .001$, $sr^2 = .27$, 95% CI [-1.10, -0.71]. There was also a significant main effect of state nostalgia, such that feelings of nostalgia were associated with greater social approach, $b = 0.22$, $SE = .05$, $t = 4.42$, $p < .001$, $sr^2 = .06$, 95% CI [0.12, 0.32]. These main effects were qualified by a significant loneliness x state nostalgia interaction, $b = 0.25$, $SE = .06$, $t = 4.07$, $p < .001$, $sr^2 = .05$, 95% CI [0.13, 0.37].

The Johnson and Neyman (1936) technique was used to probe the interaction. This technique was used to identify the regions in the range of nostalgia scores where the association between loneliness and social approach is statistically significant (Hayes & Matthes, 2009). Consistent with the hypothesis that nostalgia mitigates the tendency for lonely people to be lower in approach-related social goals/intentions, the inverse association between loneliness and social approach was significant at lower levels of nostalgia, but weakened as a function of increased nostalgia, becoming non-significant at high levels (greater than 6.17) of state nostalgia (see *Figure 2*). Looking at the association between state nostalgia and social approach as a function of loneliness, the positive relation between nostalgia and social approach was significant at all but very low levels of loneliness (less than 1.75).

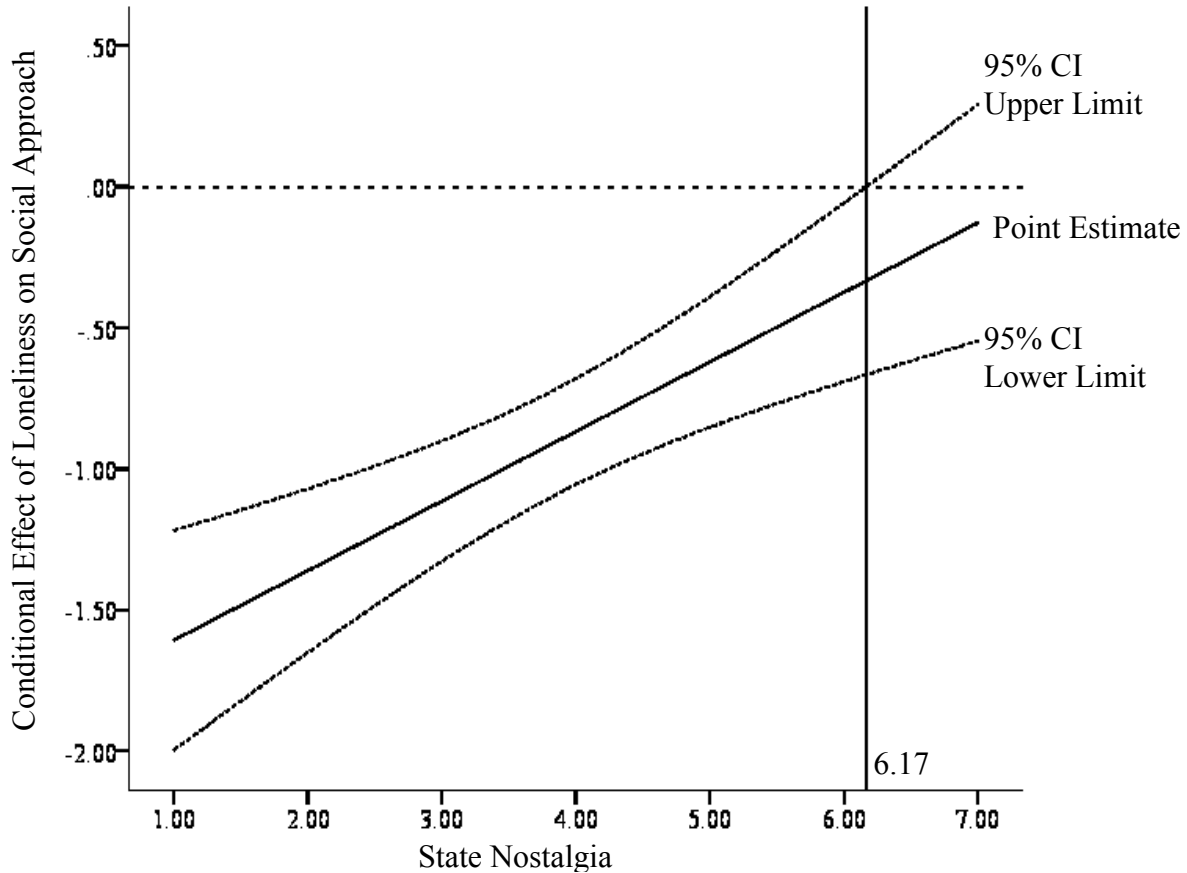


Figure 2. The effect of loneliness on approach-related social goal intentions as a function of state nostalgia in Study 1. The solid vertical line labeled 6.17 represents the level of state nostalgia where the relation between loneliness and approach-related social goal intentions becomes non-significant.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and social approach at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) was also conducted. Loneliness was significantly associated with less social approach at low levels of nostalgia, $b = -1.14$, $SE = .11$, $t = -10.24$, $p < .001$, 95% CI [-1.36, -0.92], and at high levels of nostalgia, even though the effect was weaker at high nostalgia, $b = -0.51$, $SE = .14$, $t = -3.74$, $p < .001$, 95% CI [-0.77, -0.24]. A simple slopes analysis looking at the relation between state nostalgia and social approach at high and low levels of loneliness revealed that nostalgia was not significantly associated with social approach at low loneliness, $b = 0.06$, $SE =$

.06, $t = 1.08$, $p = .28$, 95% CI [-0.05, 0.19], but was significantly associated with greater social approach at high loneliness, $b = 0.39$, $SE = .06$, $t = 6.13$, $p < .001$, 95% CI [0.26, 0.51]. For a plot of the simple slopes analysis see *Figure 3*. Taken together, these results suggest that nostalgia mitigates the inverse relation between loneliness and social approach, because the association weakened as a function on increased state nostalgia. Moreover, the results suggest that nostalgia mitigates this relation by promoting social approach among lonely people, because stronger feelings of nostalgia were found to be predictive of social approach at higher levels of loneliness.

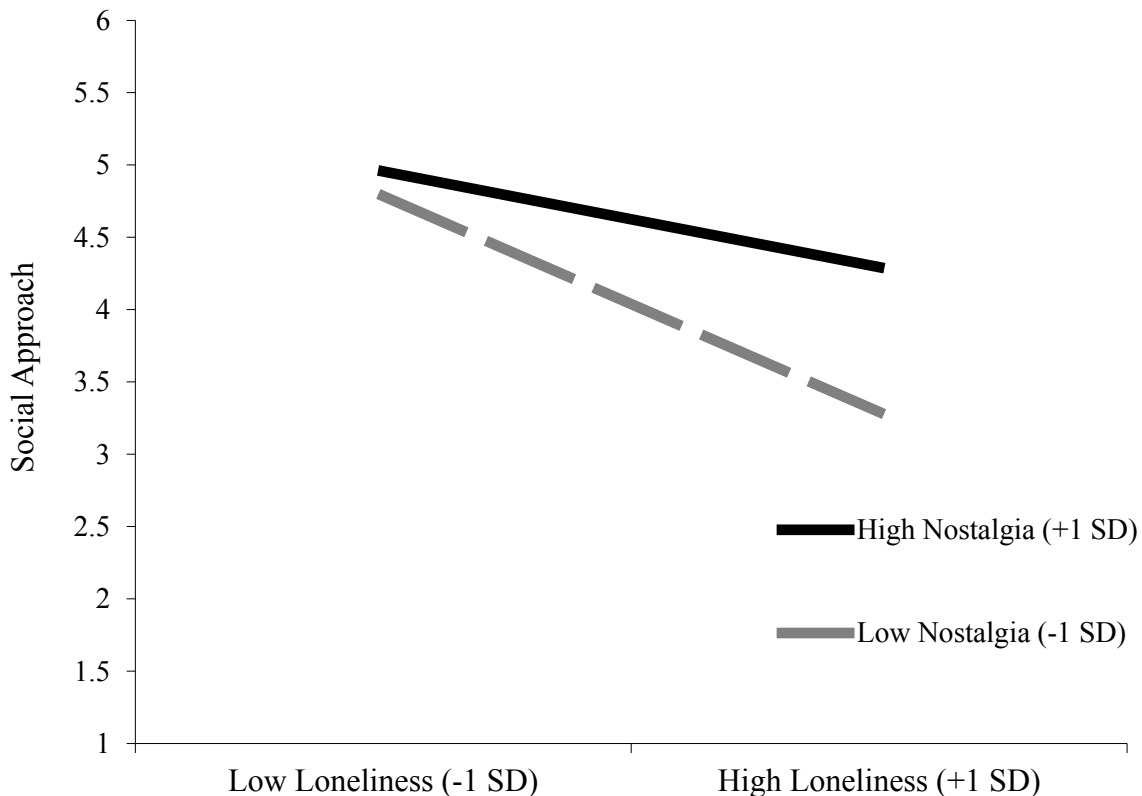


Figure 3. The effect of loneliness and state nostalgia on approach-related social goal intentions in Study 1.

Social goal optimism. A regression analysis revealed a significant main effect of loneliness on social goal optimism, such that greater loneliness tended to be associated with lower levels of social goal optimism, $b = -0.91$, $SE = .08$, $t = -12.19$, $p < .001$, $sr^2 = .42$, 95% CI

[-1.06, -0.76]. The main effect of state nostalgia, $b = -0.01$, $SE = .04$, $t = -0.20$, $p = .84$, $sr^2 = .0001$, 95% CI [-0.08, 0.06], and the loneliness x state nostalgia interaction, $b = 0.01$, $SE = .05$, $t = 0.25$, $p = .80$, $sr^2 = .0002$, 95% CI [-0.08, 0.10], did not reach statistical significance.

Social conflict task. A regression analysis revealed a significant main effect of loneliness on optimism about resolving a social conflict, such that greater loneliness tended to be associated with lower levels of optimism, $b = -0.72$, $SE = .12$, $t = -5.81$, $p < .001$, $sr^2 = .14$, 95% CI [-0.97, -0.48]. There was also a significant main effect of state nostalgia, such that state nostalgia was associated with more optimism about resolving the conflict, $b = 0.12$, $SE = .06$, $t = 2.02$, $p = .045$, $sr^2 = .02$, 95% CI [0.003, 0.24]. The loneliness x state nostalgia interaction did not reach statistical significance, $b = .05$, $SE = .08$, $t = 0.67$, $p = .50$, $sr^2 = .002$, 95% CI [-0.10, 0.21].

A regression analysis revealed a significant main effect of loneliness on proactive intentions for resolving a social conflict, such that greater loneliness tended to be associated with lower levels of proactive intentions, $b = -0.70$, $SE = .11$, $t = -6.13$, $p < .001$, $sr^2 = .15$, 95% CI [-0.92, -0.47]. There was also a significant main effect of state nostalgia, such that feelings of nostalgia were associated with more proactive intentions for resolving a social conflict, $b = 0.18$, $SE = .06$, $t = 3.29$, $p = .001$, $sr^2 = .04$, 95% CI [0.07, 0.29]. These main effects were qualified by a significant loneliness x state nostalgia interaction, $b = 0.23$, $SE = .07$, $t = 3.35$, $p = .001$, $sr^2 = .04$, 95% CI [0.10, 0.37].

Follow-up tests using the Johnson and Neyman (1936) technique revealed that, consistent with the hypothesis, the inverse association between loneliness and proactive intentions for resolving a social conflict was significant at lower levels of nostalgia, but weakened as a function of increased nostalgia becoming non-significant at higher levels (greater than 5.51) of state nostalgia (see *Figure 4*). Looking at the association between state nostalgia and proactive

intentions for resolving a friendship conflict as a function of loneliness, the positive relation between nostalgia and proactive intentions was significant at all but very low levels of loneliness (less than 1.83).

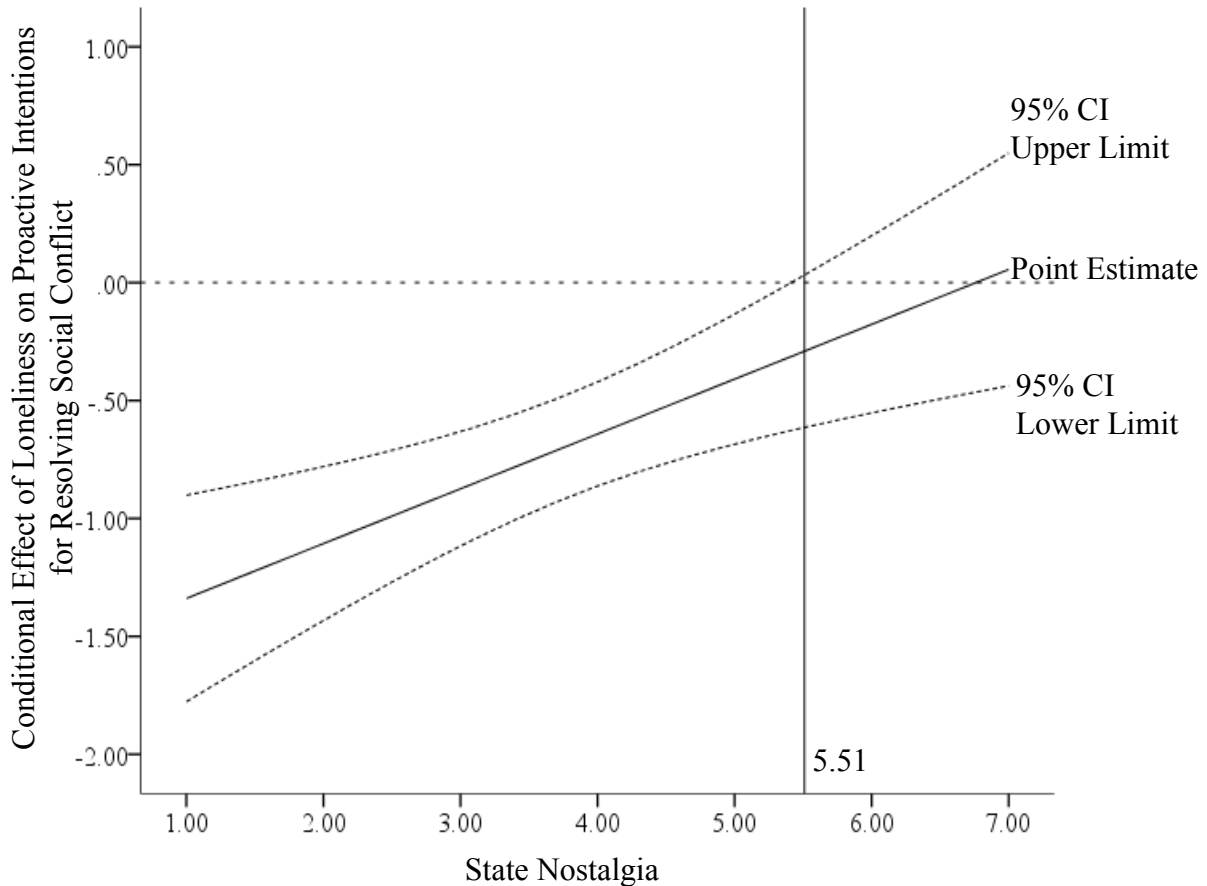


Figure 4. The effect of loneliness on proactive intentions for resolving the friendship conflict as a function of state nostalgia in Study 1. The solid vertical line labeled 5.51 represents the level of state nostalgia where the relation between loneliness and proactive intentions becomes non-significant.

Loneliness was significantly associated with lower proactive intentions for resolving the social conflict at low levels of nostalgia ($-1\ SD$), $b = -0.94$, $SE = .13$, $t = -7.26$, $p < .001$, 95% CI $[-1.19, -0.68]$, and at high levels of nostalgia, even though the effect was weaker at high nostalgia, $b = -0.33$, $SE = .16$, $t = -2.09$, $p = .04$, 95% CI $[-0.64, -0.02]$. Looked at differently, nostalgia was not significantly associated with intentions for resolving the social conflict at low

loneliness, $b = 0.04$, $SE = .07$, $t = 0.63$, $p = .53$, 95% CI [-0.09, 0.18], but was significantly associated with greater intentions for resolving the social conflict at high loneliness, $b = 0.35$, $SE = .07$, $t = 4.83$, $p < .001$, 95% CI [0.21, 0.50]. For a plot of the simple slopes analysis see *Figure 5*. Taken together, these results suggest that nostalgia mitigates the inverse relation between loneliness and proactive intentions for resolving a social conflict, because stronger feelings of nostalgia are associated with stronger intention for proactive intentions, especially at higher levels of loneliness.

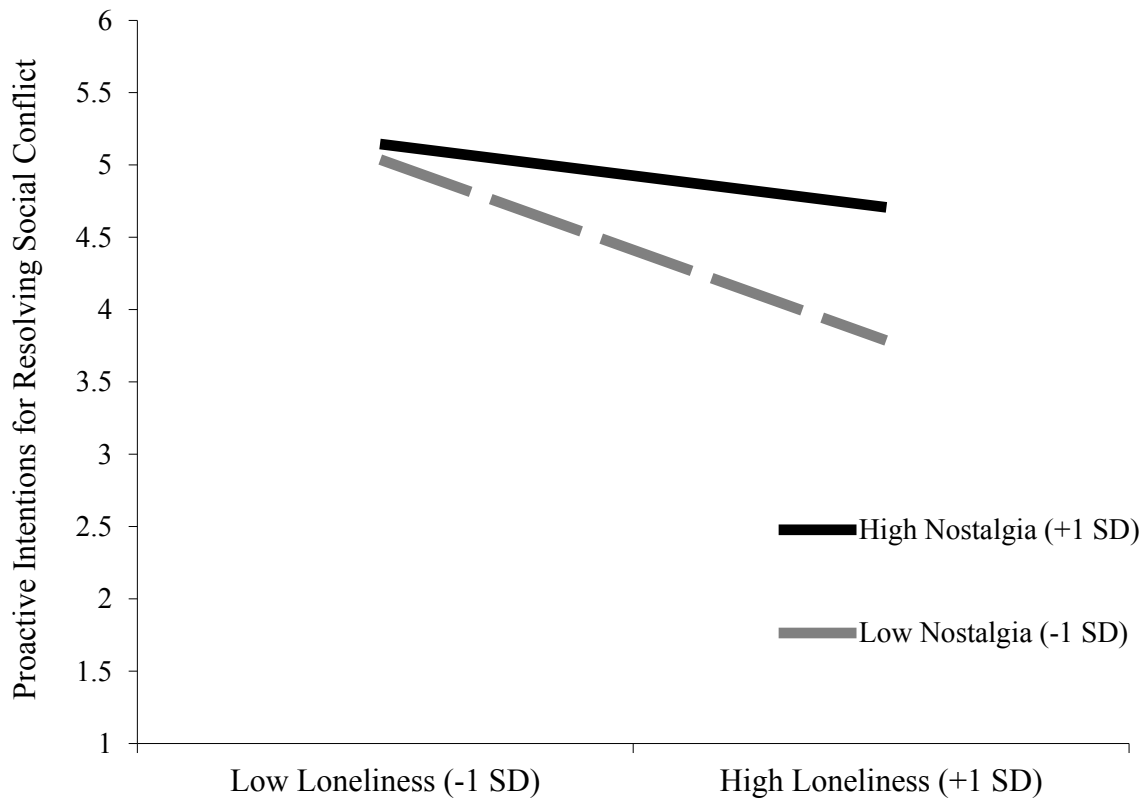


Figure 5. The effect of loneliness and state nostalgia on proactive intentions for resolving a social conflict in Study 1.

Avoidance-oriented social goals. A regression analysis revealed that the main effect of loneliness on avoidance-oriented social goals did not reach statistical significance, $b = -0.01$, $SE = .11$, $t = -0.05$, $p = .96$, $sr^2 = .00001$, 95% CI [-0.22, 0.21]. There was a significant main effect

of state nostalgia, such that nostalgia was associated with greater social avoidance goal pursuit, $b = 0.22$, $SE = .06$, $t = 3.87$, $p < .001$, $sr^2 = .07$, 95% CI [0.11, 0.33]. The loneliness x state nostalgia interaction, $b = 0.11$, $SE = .07$, $t = 1.50$, $p = .14$, $sr^2 = .01$, 95% CI [-0.03, 0.24], did not reach statistical significance.

Research study participation. A regression analysis revealed a significant main effect of loneliness on willingness to participate in the social research study, such that greater loneliness tended to be associated with less of willingness to participate in the social research study, $b = -0.63$, $SE = .19$, $t = -3.39$, $p = .001$, $sr^2 = .05$, 95% CI [-0.99, -0.26]. There was also a significant main effect of state nostalgia, such that nostalgia was associated with greater willingness to participate in the social research study, $b = 0.22$, $SE = .09$, $t = 2.36$, $p = .02$, $sr^2 = .03$, 95% CI [0.04, 0.41]. The loneliness x state nostalgia interaction, $b = -0.03$, $SE = .12$, $t = 0.80$, $p = .80$, $sr^2 = .0003$, 95% CI [-0.26, 0.20], did not reach statistical significance.

A regression analyses revealed that the main effects of loneliness, $b = -0.20$, $SE = .16$, $t = -1.27$, $p = .20$, $sr^2 = .008$, 95% CI [-0.51, 0.11], and nostalgia, $b = 0.10$, $SE = .08$, $t = 1.23$, $p = .22$, $sr^2 = .008$, 95% CI [-0.06, 0.26], on willingness to participate in the non-social research study did not reach statistical significance. Additionally, the loneliness x state nostalgia interaction, $b = -0.06$, $SE = .10$, $t = 0.56$, $p = .58$, $sr^2 = .002$, 95% CI [-0.26, 0.14], did not reach statistical significance.

Trait Nostalgia Mediation

Previous research found that trait nostalgia suppressed the relation between loneliness and social support, such that loneliness was associated with greater nostalgia proneness and nostalgia proneness was in turn associated with greater social support. Moreover, when nostalgia proneness was statistically controlled for the inverse relation between loneliness and social

support became stronger (Zhou et al., 2008). Consistent with this research, I examined whether nostalgia proneness suppresses the relation between loneliness and the social goal/intention outcomes. See *Figure 6* for a visual of the generalized model. Specifically, the analysis plan involved four steps. First, conducting linear regressions examining the zero-order relation between loneliness and each of the social goal/intention outcomes. Second, conducting a linear regression testing for the relation between loneliness and nostalgia proneness. Third, conducting a linear regression to determine the relation between loneliness and each social goal/intention outcome controlling for the relation between nostalgia proneness and each outcome. Fourth, using the PROCESS macro for SPSS (Hayes, 2013, model 4) to test for the significance of an indirect pathway linking loneliness to each of the social goal/intention outcomes using a resampling bootstrap methodology (1,000 bootstrap samples) with 95% confidence intervals.

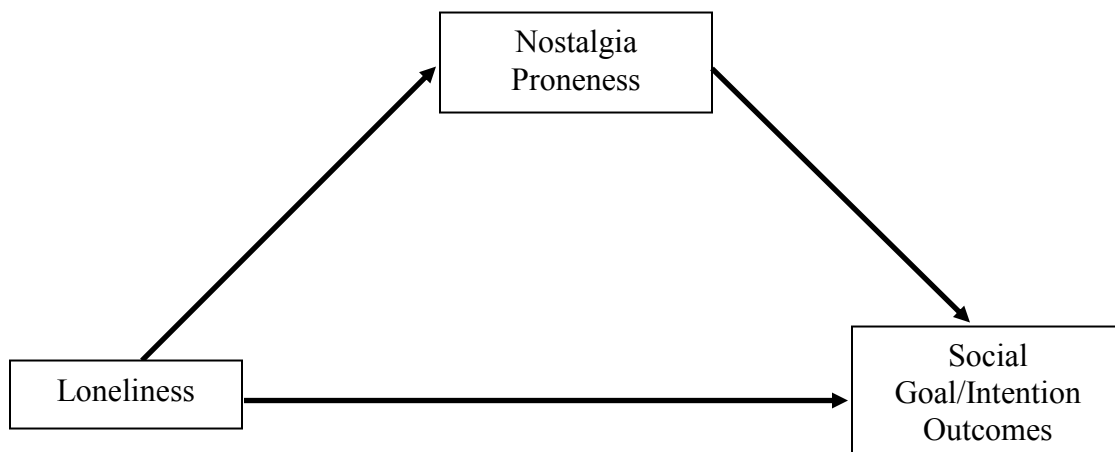


Figure 6. The generalized model testing an indirect pathway linking loneliness to the social goal/intention outcomes through nostalgia proneness from Study 1.

Loneliness was significantly and negatively associated with approach-related social goals, $b = -0.97$, $SE = .10$, $t = -9.55$, $p < .001$, $sr^2 = .31$, 95% CI [-1.17, -0.77], social goal optimism, $b = -0.91$, $SE = .07$, $t = -12.41$, $p < .001$, $sr^2 = .44$, 95% CI [-1.05, -0.76], optimism for resolving a social conflict, $b = -0.78$, $SE = .12$, $t = -6.30$, $p < .001$, $sr^2 = .17$, 95% CI [-1.02, -

0.53], proactive intentions for resolving a social conflict, $b = -0.77$, $SE = .11$, $t = -6.74$, $p < .001$, $sr^2 = .19$, 95% CI [-0.99, -0.54], and willingness to participate in the social research study, $b = -0.69$, $SE = .19$, $t = -3.74$, $p < .001$, $sr^2 = .07$, 95% CI [-1.06, -0.33]. Loneliness was not significantly associated with avoidance-related social goals, $b = -0.07$, $SE = .11$, $t = -0.61$, $p = .54$, $sr^2 = .002$, 95% CI [-0.29, 0.15], and willingness to participate in the non-social research study, $b = -0.23$, $SE = .16$, $t = -1.47$, $p = .14$, $sr^2 = .01$, 95% CI [-0.54, 0.08]. Nostalgia proneness did not mediate these relations because loneliness was not significantly associated with nostalgia proneness, $b = -0.19$, $SE = .16$, $t = -1.21$, $p = .23$, $sr^2 = .007$, 95% CI [-0.50, 0.12].

Trait Nostalgia Moderation

Since loneliness and nostalgia proneness were not significantly associated I next conducted exploratory analyses to determine whether trait nostalgia moderated the associations between loneliness and social goals/intentions. Specifically, I conducted a series of hierarchical linear regression analyses regressing each of the social goal/intention outcomes on trait nostalgia (centered), loneliness (centered), and the loneliness x trait nostalgia interaction.

Approach-oriented social goals. A regression analysis revealed a significant main effect of loneliness on social approach, such that greater loneliness tended to be associated with lower levels of social approach, $b = -0.94$, $SE = .10$, $t = -9.46$, $p < .001$, $sr^2 = .29$, 95% CI [-1.13, -0.74]. There was also a significant main effect of trait nostalgia, such that nostalgia proneness was associated with greater social approach, $b = 0.17$, $SE = .04$, $t = 3.74$, $p < .001$, $sr^2 = .05$, 95% CI [0.08, 0.25]. These main effects were qualified by a significant loneliness x trait nostalgia interaction, $b = 0.11$, $SE = .06$, $t = 1.99$, $p = .048$, $sr^2 = .01$, 95% CI [0.001, 0.22].

The Johnson and Neyman (1936) technique was used to probe the interaction. This technique revealed that the inverse association between loneliness and social approach was

significant at all levels of trait nostalgia. However, looking at the association between trait nostalgia and social approach as a function of loneliness, the positive relation between nostalgia proneness and social approach was significant at all but very low levels of loneliness (less than 1.72).

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and social approach at high (1 *SD* above the mean) and low (1 *SD* below the mean) nostalgia proneness was also conducted. Similar to the Johnson and Neyman (1936) technique, loneliness was significantly associated with less social approach at low levels of nostalgia proneness, $b = -1.07$, $SE = .12$, $t = -9.01$, $p < .001$, 95% CI [-1.30, -0.83], and at high levels of nostalgia, $b = -0.74$, $SE = .14$, $t = -5.43$, $p < .001$, 95% CI [-1.01, -0.47]. A simple slopes analyses looking at the relation between trait nostalgia and social approach at high and low levels of loneliness revealed that nostalgia proneness was not significantly associated with social approach at low loneliness, $b = 0.08$, $SE = .06$, $t = 1.36$, $p = .17$, 95% CI [-0.04, 0.20], but was significant associated with greater social approach at high loneliness, $b = 0.23$, $SE = .05$, $t = 4.23$, $p < .001$, 95% CI [0.12, 0.33]. Replicating the pattern found with state nostalgia, these results suggest that greater nostalgia is predictive of social approach particularly at higher levels of loneliness.

Social goal optimism. A regression analysis revealed a significant main effect of loneliness on social goal optimism, such that greater loneliness tended to be associated with lower levels of social goal optimism, $b = -0.90$, $SE = .07$, $t = -12.26$, $p < .001$, $sr^2 = .43$, 95% CI [-1.04, -0.75]. The main effect of trait nostalgia, $b = 0.05$, $SE = .03$, $t = 1.53$, $p = .13$, $sr^2 = .007$, 95% CI [-0.02, 0.12], and the loneliness x state nostalgia interaction, $b = 0.02$, $SE = .04$, $t = 0.53$, $p = .59$, $sr^2 = .008$, 95% CI [-0.06, 0.10], did not reach statistical significance.

Social conflict task. A regression analysis revealed a significant main effect of loneliness on optimism about resolving a social conflict, such that greater loneliness tended to be associated with lower levels of optimism, $b = -0.75$, $SE = .12$, $t = -3.10$, $p < .001$, $sr^2 = .15$, 95% CI [-0.99, -0.51]. There was also a significant main effect of trait nostalgia, such that nostalgia proneness was associated with more optimism about resolving the conflict, $b = 0.12$, $SE = .06$, $t = 2.14$, $p = .03$, $sr^2 = .02$, 95% CI [0.009, 0.23]. The loneliness x trait nostalgia interaction did not reach statistical significance, $b = -.06$, $SE = .07$, $t = -0.82$, $p = .42$, $sr^2 = .003$, 95% CI [-0.19, 0.08].

A regression analysis revealed a significant main effect of loneliness on proactive intentions for resolving a social conflict, such that greater loneliness tended to be associated with lower levels of proactive intentions, $b = -0.73$, $SE = .11$, $t = -6.55$, $p < .001$, $sr^2 = .17$, 95% CI [-0.95, -0.51]. There was also a significant main effect of trait nostalgia, such that nostalgia proneness was associated with more proactive intentions for resolving a social conflict, $b = 0.17$, $SE = .05$, $t = 3.34$, $p = .001$, $sr^2 = .04$, 95% CI [0.07, 0.27]. The loneliness x trait nostalgia interaction did not reach statistical significance, $b = 0.10$, $SE = .06$, $t = 1.57$, $p = .12$, $sr^2 = .01$, 95% CI [-0.03, 0.22].

Avoidance-oriented social goals. A regression analysis revealed that the main effect of loneliness on avoidance-oriented social goals did not reach statistical significance, $b = -0.02$, $SE = .11$, $t = -0.16$, $p = .87$, $sr^2 = .00001$, 95% CI [-0.22, .019]. There was a significant main effect of trait nostalgia, such that nostalgia proneness was associated with greater social avoidance goal commitment, $b = 0.27$, $SE = .05$, $t = 5.73$, $p < .001$, $sr^2 = .14$, 95% CI [0.18, 0.36]. The loneliness x trait nostalgia interaction, $b = 0.003$, $SE = .06$, $t = 0.05$, $p = .96$, $sr^2 = .00001$, 95% CI [-0.11, 0.12], did not reach statistical significance.

Research study participation. A regression analysis revealed a significant main effect of loneliness on willingness to participate in the social research study, such that greater loneliness tended to be associated with less of willingness to participate in the social research study, $b = -0.65$, $SE = .18$, $t = -3.56$, $p < .001$, $sr^2 = .03$, 95% CI [-1.01, -0.29]. There was also a significant main effect of trait nostalgia, such that nostalgia proneness was associated with greater willingness to participate in the social research study, $b = 0.21$, $SE = .08$, $t = 2.62$, $p = .009$, $sr^2 = .03$, 95% CI [0.05, 0.38]. The loneliness x state nostalgia interaction, $b = 0.06$, $SE = .10$, $t = 0.56$, $p = .56$, $sr^2 = .001$, 95% CI [-0.15, 0.26], did not reach statistical significance.

A regression analyses revealed that the main effects of loneliness, $b = -0.22$, $SE = .16$, $t = -1.39$, $p = .17$, $sr^2 = .01$, 95% CI [-0.53, 0.09], and trait nostalgia, $b = 0.06$, $SE = .07$, $t = 0.89$, $p = .38$, $sr^2 = .004$, 95% CI [-0.08, 0.20], on willingness to participate in the non-social research study did not reach statistical significance. Additionally, the loneliness x trait nostalgia interaction, $b = 0.02$, $SE = .09$, $t = 0.24$, $p = .81$, $sr^2 = .0003$, 95% CI [-0.15, 0.20], did not reach statistical significance.

Discussion

Taken together, Study 1 demonstrated mixed support for the hypothesis that nostalgia regulates the tendency for lonely people to be lower in approach-related social motivation. Specifically, there was no evidence that manipulated nostalgia mitigated the relation between loneliness and reduced approach-related social goals, intentions, and behaviors. This may be explained by the lack of effectiveness of the nostalgia manipulation. Even though past studies have demonstrated the effectiveness of the nostalgia event reflection writing task used (e.g., Wildschut et al., 2006), the task did not lead to increased state nostalgia in the current sample. Even though AMT has been established as a high quality source of data for psychological

research (Burhmester et al., 2011; Paolacci et al., 2010; Shapiro et al., 2013), the experience of the internet sample may have reduced the effectiveness of the nostalgia manipulation.

Specifically, research indicates that AMT participants are less naïve than student and community samples, because the typical user has a lot of experience participating in psychological research. This lack of naïveté which has been found to reduce the effectiveness of common experimental manipulations (Chandler, Mueller, & Paolacci, 2014). However, the extent to which experience impacted the current results cannot be determined with the current data. Moreover, the descriptive statistics and patterns of correlations are very consistent across the three studies presented (see *Table 1, 2, & 3*). Thus, it is unlikely that low quality data contributed to the null experimental effects in Study 1.

Despite the ineffectiveness of the nostalgia manipulation, there was some evidence suggesting that feelings of nostalgia reduce the tendency for lonely people to be less oriented toward social approach. Specifically, the association between loneliness and less social approach goal commitment was strongest at low levels of state nostalgia, but was found to be weaker at higher levels of state nostalgia, becoming non-significant at very high levels of state nostalgia. Similarly, the association between loneliness and a reduced desire to be proactive in resolving a friendship conflict was also found to be weaker as a function of increases in state nostalgia.

Finally, Study 1 did not provide any evidence that nostalgia regulates loneliness at the trait level. Loneliness was not significantly associated with nostalgia proneness. However, nostalgia proneness did moderate the relation between loneliness and approach-related social goal commitment, such that at high levels of loneliness the propensity to engage in nostalgia was associated with social approach.

STUDY 2

The purpose of Study 2 was to replicate and extend the findings of Study 1. Specifically, Study 2 provides another opportunity to test whether manipulated nostalgia regulates the inverse association between loneliness and approach-oriented social goals/intentions and to replicate the significant state nostalgia effects from Study 1. Additionally, I sought to extend the Study 1 findings by testing whether nostalgia regulates the relation between loneliness and more generalized motivation tendencies, not specific to the social domain. Once again, loneliness was measured (Russell, 1996) and the effect of nostalgia was examined at the state and trait level in the same manner as Study 1. Finally, approach related social goals/intentions (Elliot et al., 2006) and general approach and avoidance motivational tendencies (Carver & White, 1994) were assessed with self-report measures. I expected that the association between loneliness and reduced approach goals/intentions would be weaker when people feel more nostalgic. I also hypothesized that the association between loneliness and lower approach/higher avoidance motivation would be reduced when people feel more nostalgic. Finally, I hypothesized that loneliness would be associated with a greater propensity to engage in nostalgic reverie and that the propensity to engage in nostalgic reverie would in turn be associated with stronger approach related social goals/intentions and stronger generalized approach motivation. Thus, regularly engaging in nostalgia should suppress the tendency for lonely people to be lower in approach related social and generalized motivation.

Method

Participants, Procedure, and Materials

Participants consisted of 181 North Dakota State University undergraduate students (79 females). Participants ages ranged from 18 to 35 years old ($M = 19.08$, $SD = 1.91$) and were

compensated with course credit. The questionnaire was presented on computers in private cubicles in the order below. Full-text of the materials can be found in the Appendix.

Loneliness. As in Study 1, participants completed the 10-item UCLA loneliness questionnaire (Russell, 1996; $\alpha = .90$; $M = 2.11$, $SD = 0.56$).

Filler questionnaires. Next, participants completed the two filler questionnaires used in Study 1: The presence of meaning in life ($\alpha = .87$; $M = 5.14$, $SD = 1.12$) and the search for meaning in life ($\alpha = .87$; $M = 5.01$, $SD = 1.12$) subscales of the MLQ (Steger et al., 2006), and the 10-item Need for Existential Meaning scale (Abeyta & Routledge, 2017; $\alpha = .78$; $M = 3.98$, $SD = 0.71$).

Experimental manipulation. Participants were randomly assigned to the nostalgia ($n = 90$) or control ($n = 91$) event reflection and writing task used in Study 1 (Wildschut et al., 2006).

Social-efficacy. Next participants completed the social-efficacy measure (Abeyta, Routledge, & Juhl, 2015) used in Study 1 ($\alpha = .88$; $M = 7.71$, $SD = 1.54$).

Approach-oriented social goals. After completing the social-efficacy measure, participants completed the state version of the Elliot and colleagues' (2006) 4-item friendship-approach goal scale used in Study 1 except the scale used a 7-point response scale (1 = *strongly disagree*, 7 = *strongly agree*; $\alpha = .86$; $M = 5.38$, $SD = 1.05$).

Approach/avoidance motivation. Next, the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS; Carver & White, 1994) scale was used to measure generalized motivational orientations. The BIS/BAS scale is a 24-item self-report measure that consists of four subscales: the BIS subscale, BAS Reward Responsiveness, BAS drive, and BAS fun seeking. Avoidance motivation is assessed by the 7-item BIS subscale (e.g., "I worry about making mistakes"; 1 = *very false*, 4 = *very true*; $\alpha = .71$; $M = 3.79$, $SD = 0.51$), whereas the 5-

item BAS Reward Responsiveness subscale (e.g., “When I get something I want, I feel excited and energized”; 1 = *very false*, 4 = *very true*; $\alpha = .62$; $M = 3.48$, $SD = 0.35$), the 4-item BAS drive subscale (e.g., “When I want something, I usually go all-out to get it”; 1 = *very false*, 4 = *very true*; $\alpha = .71$; $M = 2.87$, $SD = 0.53$), and the 4-item BAS fun seeking subscale (e.g., “I crave excitement and new sensations”; 1 = *very false*, 4 = *very true*; $\alpha = .65$; $M = 3.22$, $SD = 0.48$) reflect approach motivation.

Avoidance-oriented social goals. Next, participants completed a state version of the Elliot and colleagues’ (2006) 4-item friendship-avoidance goal scale used in Study 1 ($\alpha = .85$; $M = 5.18$, $SD = 1.27$).

Participation in social and non-social research studies. After the social avoidance goal measure, participants completed the study participation task (Abeyta, Routledge, Juhl, 2015) used in Study 1. Once again, this task assessed participants willingness to participate in a social research study ($\alpha = .95$; $M = 4.91$, $SD = 1.59$) and a non-social research study ($\alpha = .96$; $M = 4.81$, $SD = 1.79$), respectively.

State nostalgia. Next participants completed The Nostalgia Inventory (Batcho, 1995), the state nostalgia measure used in Study 1 ($\alpha = .88$; $M = 4.86$, $SD = 0.95$).

Trait nostalgia. Finally, participants completed the 5-item nostalgia proneness scale (Routledge et al., 2008) used in Study 1 as a measure of trait nostalgia ($\alpha = .92$; $M = 4.71$, $SD = 1.31$).

At the end of the experiment, participants completed a brief demographics questionnaire including age and gender items.

Results

Preliminary Analyses

An independent t-test revealed no significant difference between the nostalgia condition ($M = 4.84, SD = 0.94$) and the control condition ($M = 4.89, SD = 0.97$) on state nostalgia, $t(179) = 0.31, p = .75, 95\% CI [-0.24, 0.33]$. This null effect suggests that the nostalgia manipulation was not successful in increasing nostalgic feelings.

I conducted correlations between all measured variables. In general, loneliness was inversely associated with approach-oriented social goals and motivation, and positively associated with avoidance-oriented social goals and motivation. Loneliness was not significantly associated with state nostalgia or nostalgia proneness. Trait and state nostalgia were generally positively associated with approach-oriented goals and motivation. See *Table 2* for a complete correlation matrix.

Table 2
Zero-order correlations in Study 2

Measure	1	2	3	4	5	6	7	8	9	10	11	12	
1 Loneliness	—												
2 State Nostalgia	.01	—											
3 Nostalgia Proneness	.13	.60**	—										
4 Social-Efficacy	-.55**	.22*	.11	—									
5 Social Approach Goals	-.27**	.27**	.22*	.42**	—								
6 BIS	.28**	.06	.18*	-.24*	.02	—							
7 BAS Reward Responsiveness	-.18*	.16*	.18*	.32**	.29**	.24*	—						
8 BAS Drive	-.21*	.05	.05	.37**	.25*	.04	.49**	—					
9 BAS Fun Seeking	-.20*	.24**	.21*	.33**	.31**	.002	.50**	.42**	—				
10 Social Avoidance Goals	.19*	.01	.03	-.06	.20*	.15*	.10	-.06	.05	—			
11 Social Research Intentions	-.06	.08	.14	.34**	.23*	-.10	.26**	.10	.22**	-.05	—		
12 Non-Social Research Intentions	.12	.15*	.05	.10	.02	-.05	-.06	-.05	-.02	.11	.13	—	
	<i>M</i>	2.11	4.86	4.71	7.71	5.38	3.79	3.48	2.87	3.22	5.18	4.91	4.81
	<i>SD</i>	0.56	0.95	1.31	1.54	1.05	0.51	0.35	0.53	0.48	1.27	1.59	1.79

Note. * $p < .05$. ** $p < .001$.

Manipulated Nostalgia

Approach-oriented social goals. A regression analysis revealed a significant main effect of loneliness on approach-oriented social goals, such that greater loneliness tended to be associated with lower levels of social approach, $b = -0.50$, $SE = .13$, $t = -3.74$, $p < .001$, $sr^2 = .07$, 95% CI [-0.77, -0.24]. The main effect of manipulated nostalgia did not reach statistical significance, $b = -0.08$, $SE = .15$, $t = -0.55$, $p = .58$, $sr^2 = .002$, 95% CI [-0.38, 0.21].

Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.06$, $SE = .27$, $t = 0.21$, $p = .84$, $sr^2 = .0002$, 95% CI [-0.48, 0.59]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and social approach was not supported.

BIS subscale. A regression analysis revealed a significant main effect of loneliness on BIS scores, such that greater loneliness tended to be associated with greater avoidance motivation, $b = 0.25$, $SE = .06$, $t = 3.90$, $p < .001$, $sr^2 = .08$, 95% CI [0.12, 0.38]. The main effect of manipulated nostalgia did not reach statistical significance, $b = -0.07$, $SE = .07$, $t = -0.91$, $p = .36$, $sr^2 = .004$, 95% CI [-0.21, 0.08]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.11$, $SE = .13$, $t = 0.82$, $p = .41$, $sr^2 = .003$, 95% CI [-0.15, 0.36]. Thus, the hypothesis that nostalgia mitigates the positive association between loneliness and avoidance motivation was not supported.

BAS reward responsiveness subscale. A regression analysis revealed a significant main effect of loneliness on BAS reward responsiveness scores, such that greater loneliness tended to be associated with less BAS reward responsiveness, $b = -0.12$, $SE = .05$, $t = -2.39$, $p = .02$, $sr^2 = .03$, 95% CI [-0.20, -0.02]. The main effect of manipulated nostalgia did not reach statistical significance, $b = 0.03$, $SE = .05$, $t = 0.60$, $p = .55$, $sr^2 = .002$, 95% CI [-0.07, 0.13]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.05$, $SE = .09$, $t = 0.58$, $p = .56$, $sr^2 = .002$, 95% CI [-0.13, 0.24]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

BAS drive subscale. A regression analysis revealed a significant main effect of loneliness on BAS drive scores, such that greater loneliness tended to be associated with less BAS drive, $b = -0.19$, $SE = .07$, $t = -2.75$, $p = .006$, $sr^2 = .04$, 95% CI [-0.33, -0.05]. The main

effect of manipulated nostalgia did not reach statistical significance, $b = 0.09$, $SE = .08$, $t = 1.11$, $p = .27$, $sr^2 = .007$, 95% CI [-0.07, 0.24]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.02$, $SE = .14$, $t = 0.12$, $p = .91$, $sr^2 = .0001$, 95% CI [-0.26, 0.29]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

BAS fun seeking subscale. A regression analysis revealed a significant main effect of loneliness on BAS fun seeking scores, such that loneliness tended to be associated with less BAS fun seeking, $b = -0.17$, $SE = .06$, $t = -2.67$, $p = .008$, $sr^2 = .04$, 95% CI [-0.29, -0.04]. The main effect of manipulated nostalgia did not reach statistical significance, $b = 0.07$, $SE = .07$, $t = 0.98$, $p = .33$, $sr^2 = .005$, 95% CI [-0.07, 0.21]. Additionally, the loneliness x manipulated nostalgia interaction did not reach statistical significance, $b = 0.02$, $SE = .13$, $t = 0.17$, $p = .87$, $sr^2 = .0001$, 95% CI [-0.23, 0.27]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

Avoidance-oriented social goals. The regression analysis revealed a significant main effect of loneliness on social avoidance, such that loneliness tended to be associated with stronger commitment to avoidance-oriented social goals, $b = 0.41$, $SE = .16$, $t = 2.50$, $p = .01$, $sr^2 = .03$, 95% CI [-0.09, 0.73]. There was a marginally significant main effect of manipulated nostalgia, such that nostalgia, relative to control, decreases commitment to avoidance oriented goals, $b = -0.36$, $SE = .18$, $t = -1.94$, $p = .05$, $sr^2 = .02$, 95% CI [-0.72, 0.01]. The loneliness x manipulated nostalgia interaction was not statistically significant, $b = 0.24$, $SE = .33$, $t = 0.73$, $p = .47$, $sr^2 = .003$, 95% CI [-0.41, 0.89]. Thus, the hypothesis that nostalgia mitigates the positive association between loneliness and social avoidance was not supported.

Participation in social and non-social research studies. A regression analysis revealed that the main effects of loneliness, $b = -0.15$, $SE = .21$, $t = -0.73$, $p = .47$, $sr^2 = .003$, 95% CI [-0.57, 0.26], and nostalgia, $b = 0.14$, $SE = .24$, $t = 0.57$, $p = .57$, $sr^2 = .002$, 95% CI [-0.33, 0.60], on willingness to participate in the social research study did not reach statistical significance. Additionally, the loneliness x state nostalgia interaction, $b = 0.38$, $SE = .43$, $t = 0.90$, $p = .37$, $sr^2 = .004$, 95% CI [-0.46, 1.22], did not reach statistical significance. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and willingness to participate in social interactions was not supported.

A regression analysis revealed that the main effects of loneliness, $b = 0.36$, $SE = .24$, $t = 1.54$, $p = .13$, $sr^2 = .01$, 95% CI [-0.10, 0.83], and nostalgia, $b = -0.25$, $SE = .27$, $t = -0.93$, $p = .35$, $sr^2 = .005$, 95% CI [-0.77, 0.28], on willingness to participate in the non-social research study did not reach statistical significance. Additionally, the loneliness x state nostalgia interaction, $b = 0.29$, $SE = .48$, $t = 0.60$, $p = .55$, $sr^2 = .002$, 95% CI [-0.66, 1.23], did not reach statistical significance.

Social-Efficacy as a Mediator

The same statistical procedure as in Study 1 was used to determine whether social-efficacy mediated the combined effect of manipulated nostalgia and loneliness on each of the social goal and motivational outcomes (Hayes, 2013). The first regression revealed a significant main effect of loneliness on social-efficacy, such that loneliness was associated with lower levels of social-efficacy, $b = -1.49$, $SE = .17$, $t = -8.77$, $p < .001$, $sr^2 = .30$, 95% CI [-1.83, -1.16]. However, the main effect of manipulated nostalgia, $b = 0.26$, $SE = .19$, $t = 1.36$, $p = .18$, $sr^2 = .007$, 95% CI [-0.12, 0.64], and the nostalgia x loneliness interaction, $b = .34$, $SE = .34$, $t = 0.98$, $p = .33$, $sr^2 = .004$, 95% CI [-0.34, 1.01], did not reach statistical significance. Thus, the

exploratory hypothesis that social-efficacy would mediate the combined effect of nostalgia and loneliness was not supported, because nostalgia and loneliness did not have a significant combined effect on social-efficacy.

Measured State Nostalgia

As in Study 1, I conducted a series of hierarchical linear regression analyses regressing each of the social goal/intention and general motivation outcomes on state nostalgia (centered), loneliness (centered), and the state nostalgia x loneliness interaction.

Approach-oriented social goals. A regression analysis revealed a significant main effect of loneliness on approach-oriented social goals, such that greater loneliness tended to be associated with lower levels of social approach, $b = -0.50$, $SE = .13$, $t = -3.92$, $p < .001$, $sr^2 = .07$, 95% CI [-0.76, -0.25]. There was also a significant main effect of state nostalgia, such that feelings of nostalgia were associated with greater social approach, $b = 0.30$, $SE = .08$, $t = 3.96$, $p < .001$, $sr^2 = .08$, 95% CI [0.15, 0.45]. These main effects were qualified by a significant loneliness x state nostalgia interaction, $b = 0.39$, $SE = .14$, $t = 2.86$, $p = .005$, $sr^2 = .04$, 95% CI [0.12, 0.66].

The Johnson and Neyman (1936) technique was used to probe the interaction. The inverse association between loneliness and social approach was significant at lower levels of nostalgia, but weakened as a function of increased nostalgia becoming non-significant at high levels (greater than 5.50) of state nostalgia (see *Figure 7*). Looking at the association between state nostalgia and social approach as a function of loneliness, the positive relation between nostalgia and social approach was significant at all but low levels of loneliness (less than 1.68).

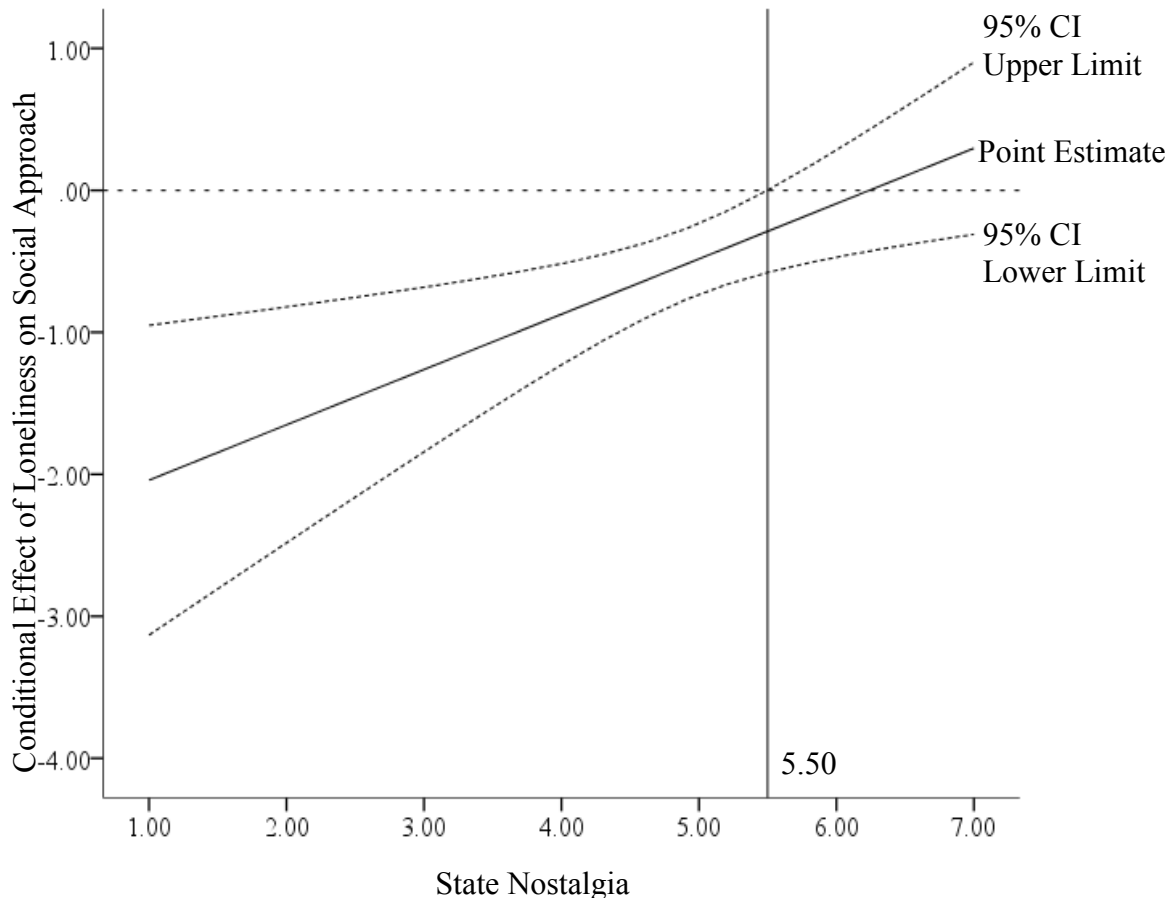


Figure 7. The effect of loneliness on approach-related social goal intentions as a function of state nostalgia in Study 2. The solid vertical line labeled 5.50 represents the level of state nostalgia where the relation between loneliness and approach-related social goal intentions becomes non-significant.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and social approach at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) was also conducted. Loneliness was significantly associated with less social approach at low levels of nostalgia, $b = -0.91$, $SE = .19$, $t = -4.79$, $p < .001$, 95% CI [-1.28, -0.53], but not at high levels of nostalgia, $b = -0.16$, $SE = .17$, $t = -0.95$, $p = .34$, 95% CI [-0.51, 0.18]. A simple slopes analyses looking at the relation between state nostalgia and social approach at high and low levels of loneliness revealed that nostalgia was not significantly associated with social approach at low loneliness, $b = 0.12$, $SE = .10$, $t = 1.22$, $p = .22$, 95% CI [-

0.07, 0.31], but was significantly associated with greater social approach at high loneliness, $b = 0.56$, $SE = .12$, $t = 4.77$, $p < .001$, 95% CI [0.33, 0.79]. For a plot of the simple slopes analysis see *Figure 8*. Replicating the Study 1 finding, these results suggest that nostalgia mitigates the inverse relation between loneliness and social approach, because stronger feelings of nostalgia are predictive of social approach particularly at higher levels of loneliness.

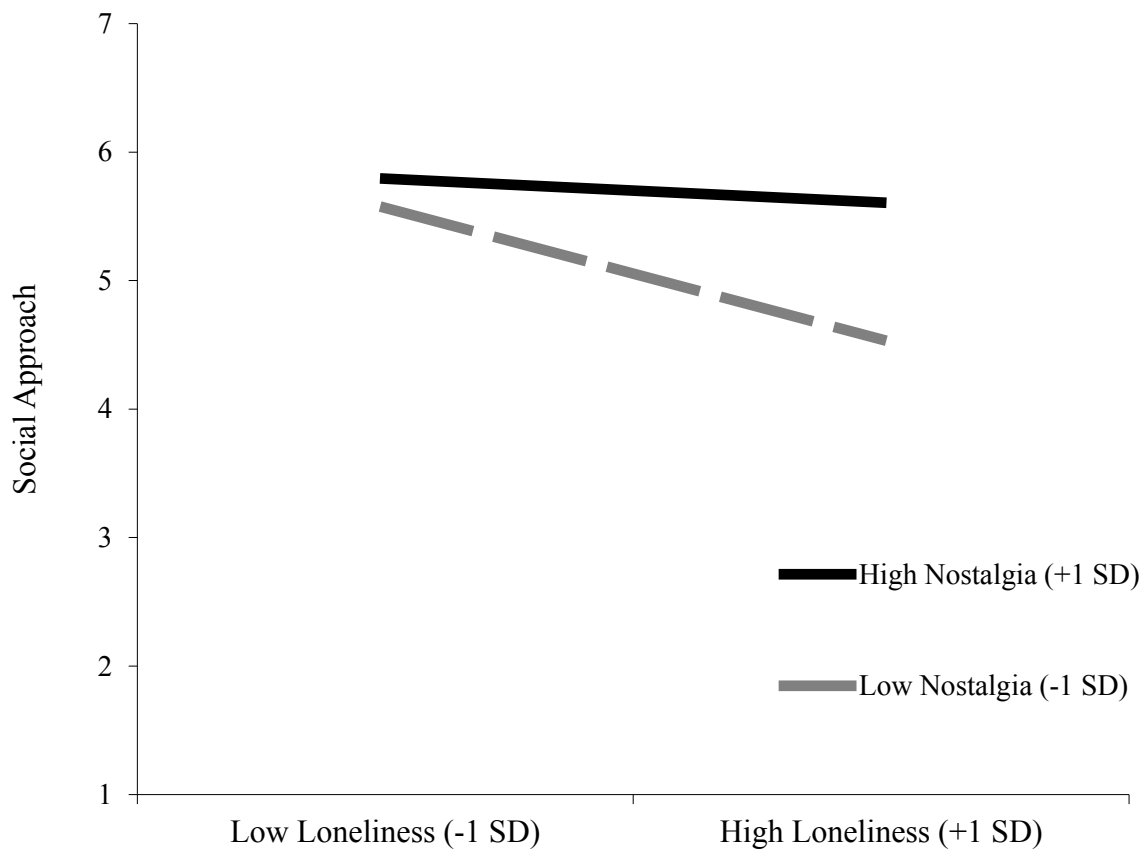


Figure 8. The effect of loneliness and state nostalgia on approach-related social goal intentions in Study 2.

BIS subscale. A regression analysis revealed a significant main effect of loneliness on BIS scores, such that greater loneliness tended to be associated with greater avoidance motivation, $b = 0.25$, $SE = .06$, $t = 3.93$, $p < .001$, $sr^2 = .08$, 95% CI [0.13, 0.38]. The main effect of state nostalgia did not reach statistical significance, $b = .03$, $SE = .04$, $t = 0.72$, $p = .47$, $sr^2 =$

.003, 95% CI [-0.05, 0.10]. The loneliness x state nostalgia interaction was marginally significant, $b = 0.13$, $SE = .07$, $t = 1.83$, $p = .07$, $sr^2 = .02$, 95% CI [-0.01, 0.26].

Despite being marginally significant, I probed the interaction using the Johnson and Neyman (1936) technique and simple slopes analyses (Aiken & West, 1991). The Johnson and Neyman (1936) revealed that loneliness was associated with greater BIS at higher but not lower levels of state nostalgia, becoming significant at nostalgia scores of 4.22. Looking at the association between state nostalgia and BIS as a function of loneliness revealed no significant nostalgia and BIS relation across levels of loneliness.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and BIS at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) was also conducted. Loneliness was not significantly associated with less BIS at low levels of nostalgia, $b = 0.12$, $SE = .10$, $t = 1.26$, $p = .21$, 95% CI [-0.07, 0.31], but was positively associated with BIS at high levels of nostalgia, $b = 0.36$, $SE = .09$, $t = 4.14$, $p < .001$, 95% CI [0.19, 0.54]. A simple slopes analyses looking at the relation between state nostalgia and BIS at high and low levels of loneliness revealed that nostalgia was not significantly associated with BIS at low loneliness, $b = -0.03$, $SE = .05$, $t = -0.63$, $p = .53$, 95% CI [-0.13, 0.07], but the positive association between nostalgia and BIS was marginally significant at high loneliness, $b = 0.11$, $SE = .06$, $t = 1.88$, $p = .06$, 95% CI [-0.01, 0.23]. For a plot of the simple slopes analysis see *Figure 9*. In contrast to the hypothesis that nostalgia promotes approach oriented motivation, these results, though not statistically significant, suggest that loneliness is predictive of greater BIS at high levels of nostalgia, and that nostalgia may promote BIS at high levels of loneliness.

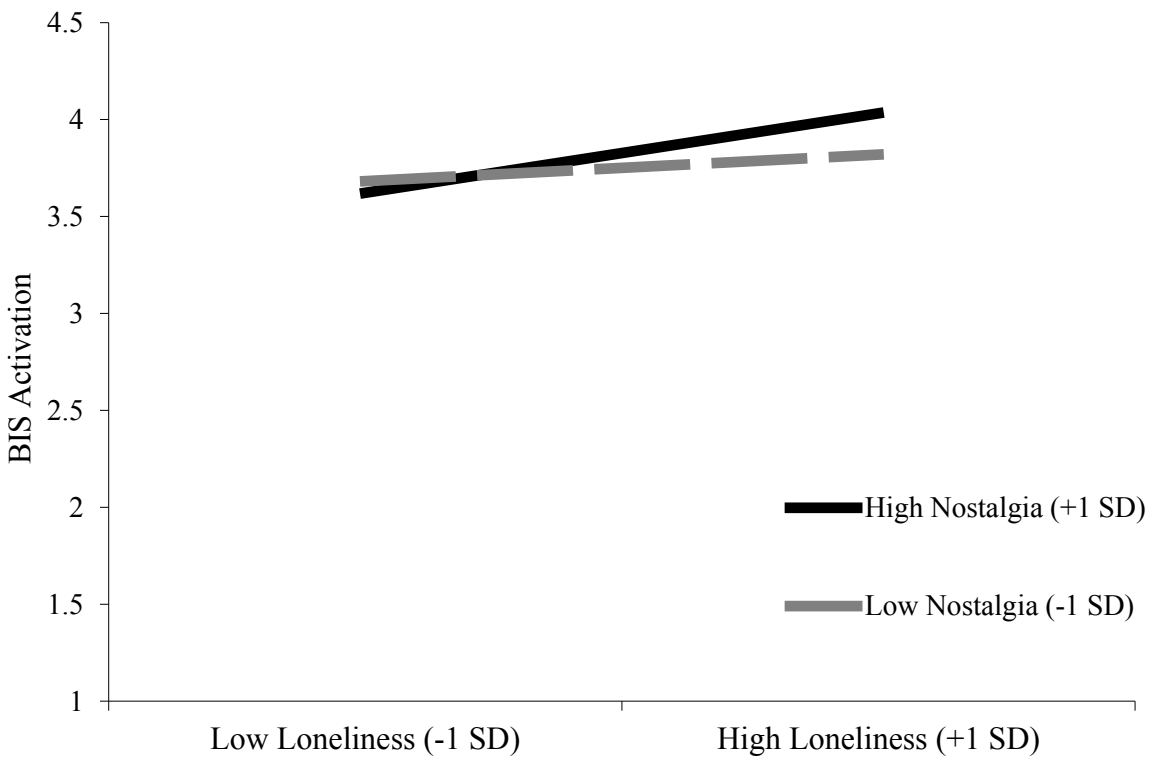


Figure 9. The effect of loneliness and state nostalgia on BIS scores in Study 2. Higher BIS corresponds to stronger avoidance motivation.

BAS reward responsiveness subscale. A regression analysis revealed a significant main effect of loneliness on BAS reward responsiveness scores, such that greater loneliness tended to be associated with less BAS reward responsiveness, $b = -0.11$, $SE = .05$, $t = -2.47$, $p = .01$, $sr^2 = .03$, 95% CI [-0.20, -0.02]. There was also a significant main effect of state nostalgia, such that nostalgia was associated with greater BAS reward responsiveness, $b = 0.06$, $SE = .03$, $t = 2.16$, $p = .03$, $sr^2 = .02$, 95% CI [0.01, 0.11]. The loneliness x state nostalgia interaction did not reach statistical significance, $b = 0.06$, $SE = .05$, $t = 1.27$, $p = .21$, $sr^2 = .008$, 95% CI [-0.03, 0.16]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

BAS drive subscale. A regression analysis revealed a significant main effect of loneliness on BAS drive scores, such that greater loneliness tended to be associated with less BAS drive, $b = -0.20$, $SE = .07$, $t = -2.81$, $p = .006$, $sr^2 = .04$, 95% CI [-0.33, -0.06]. The main effect of state nostalgia did not reach statistical significance, $b = 0.03$, $SE = .04$, $t = 0.76$, $p = .45$, $sr^2 = .003$, 95% CI [-0.08, 0.22]. Additionally, the loneliness x state nostalgia interaction did not reach statistical significance, $b = 0.07$, $SE = .08$, $t = 0.94$, $p = .35$, $sr^2 = .005$, 95% CI [-0.08, 0.22]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

BAS fun seeking subscale. A regression analysis revealed a significant main effect of loneliness on BAS fun seeking scores, such that loneliness tended to be associated with less BAS fun seeking, $b = -0.17$, $SE = .06$, $t = -2.82$, $p = .005$, $sr^2 = .04$, 95% CI [-0.29, -0.05]. There was also a main effect of state nostalgia, such that state nostalgia was associated with greater BAS fun seeking, $b = 0.12$, $SE = .04$, $t = 3.32$, $p = .001$, $sr^2 = .06$, 95% CI [0.05, 0.19]. The loneliness x state nostalgia interaction did not reach statistical significance, $b = -0.02$, $SE = .07$, $t = -0.30$, $p = .77$, $sr^2 = .0004$, 95% CI [-0.15, 0.11]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

Avoidance-oriented social goals. The regression analyses revealed a significant main effect of loneliness on avoidance-oriented social goals, such that loneliness tended to be associated with stronger commitment to avoidance related social goals, $b = 0.42$, $SE = .17$, $t = 2.55$, $p = .01$, $sr^2 = .03$, 95% CI [0.10, 0.75]. The main effect of nostalgia, $b = 0.009$, $SE = .10$, $t = 0.09$, $p = .93$, $sr^2 = .00004$, 95% CI [-0.18, 0.20], and the loneliness x state nostalgia interaction were not statistically significant, $b = 0.18$, $SE = .18$, $t = 1.00$, $p = .32$, $sr^2 = .005$, 95%

CI [-0.18, 0.53]. Thus, the hypothesis that nostalgia mitigates the positive association between loneliness and social avoidance was not supported.

Participation in social and non-social research studies. A regression analyses revealed that the main effects of loneliness, $b = -0.16$, $SE = .21$, $t = -0.77$, $p = .44$, $sr^2 = .003$, 95% CI [-0.58, 0.25], and nostalgia, $b = 0.13$, $SE = .12$, $t = 1.03$, $p = .31$, $sr^2 = .006$, 95% CI [-0.12, 0.37], on willingness to participate in the social research study did not reach statistical significance. However, the loneliness x state nostalgia interaction was statistically significant, $b = 0.57$, $SE = .22$, $t = 2.55$, $p = .01$, $sr^2 = .03$, 95% CI [0.13, 1.01].

The Johnson and Neyman (1936) technique revealed that the inverse association between loneliness and willingness to participate in social research was significant at lower levels of nostalgia, but weakened as a function of increased nostalgia, becoming non-significant at high levels (greater than 4.40) of state nostalgia (see *Figure 10*). Looking at the association between nostalgia and willingness to participate in social research as a function of loneliness revealed that the positive relation was significant at higher levels of loneliness (greater than 2.25).

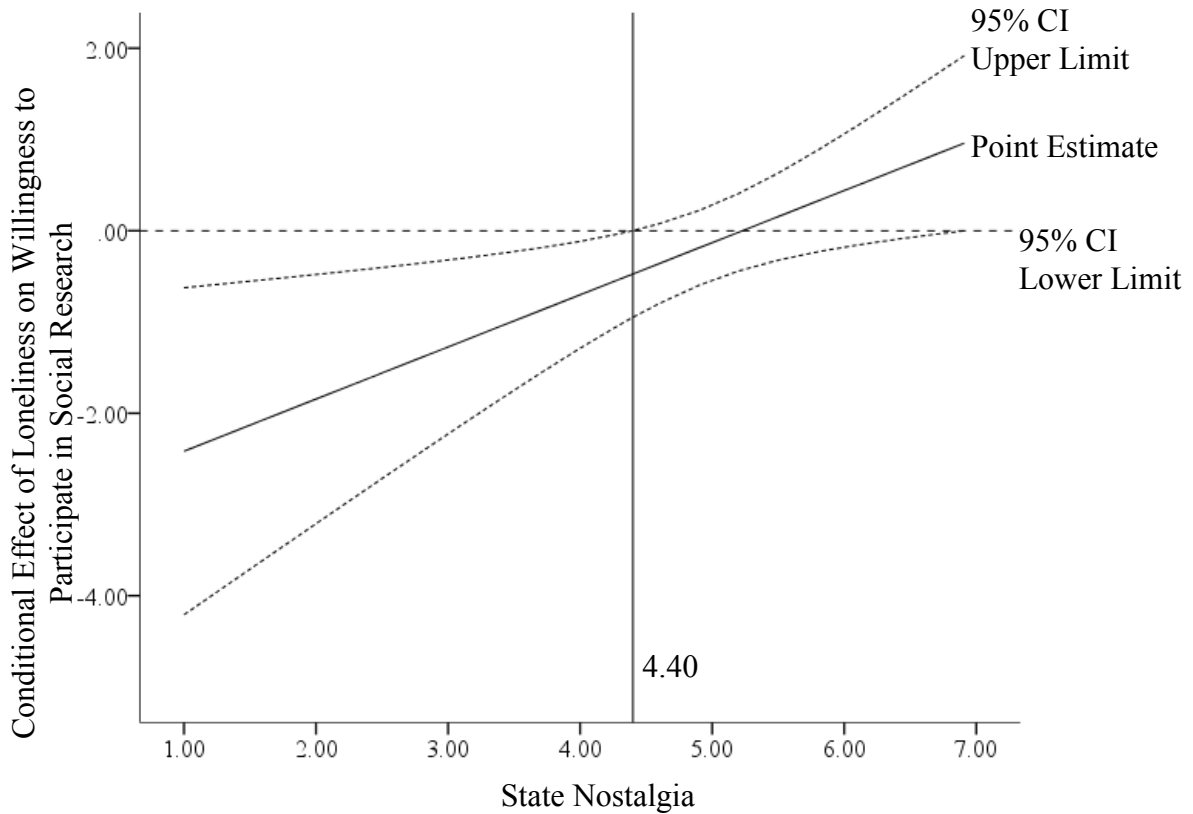


Figure 10. The effect of loneliness on willingness to participate in the social research study as a function of state nostalgia in Study 2. The solid vertical line labeled 4.40 represents the level of state nostalgia where the relation between loneliness and approach-related social goal intentions becomes non-significant.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and willingness to participate in the social research study at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) was also conducted. Loneliness was significantly associated with greater willingness to participate in the social research study at low levels of nostalgia, $b = -0.75$, $SE = .31$, $t = -2.42$, $p = .02$, 95% CI [-1.37, -0.14], but not at high levels of nostalgia, $b = 0.34$, $SE = .28$, $t = 1.18$, $p = .24$, 95% CI [-0.23, 0.90]. A simple slopes analyses looking at the relation between state nostalgia and social approach at high and low levels of loneliness revealed that nostalgia was not significantly associated with willingness to participate in social research at low loneliness, $b = -0.14$, $SE = .16$, $t = -0.86$, $p = .39$, 95% CI [-

0.46, 0.18], but was significant associated with greater social approach at high loneliness, $b = 0.51$, $SE = .19$, $t = 2.63$, $p = .009$, 95% CI [0.13, 0.89]. For a plot of the simple slopes analysis see *Figure 11*. Taken together, these results suggest that nostalgia mitigates the inverse relation between loneliness and willingness to participate in social research, because stronger feelings of nostalgia are predictive of willingness to participate in social research, particularly at higher levels of loneliness.

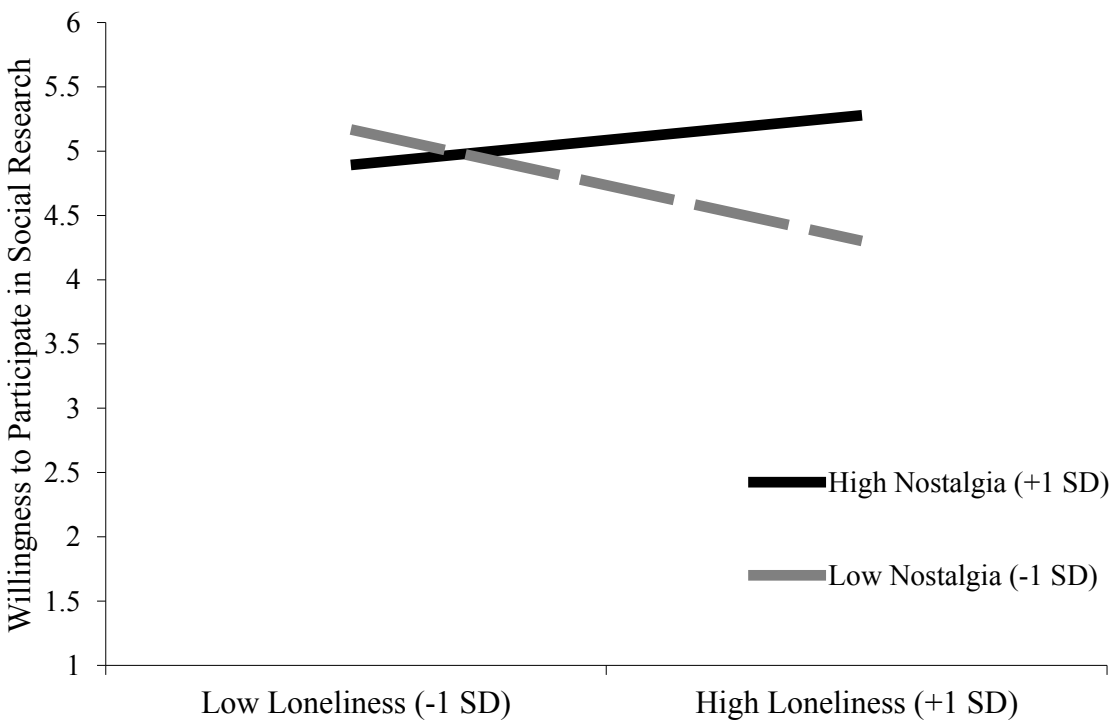


Figure 11. The effect of loneliness and state nostalgia on willingness to participate in the social research study in Study 2.

A regression analyses revealed that the main effect of loneliness on willingness to participate in non-social research was not statistically significant, $b = 0.37$, $SE = .23$, $t = 1.57$, $p = .12$, $sr^2 = .01$, 95% CI [-0.09, 0.83]. There was a significant main effect of state nostalgia, such that nostalgia was associated with greater willingness to participate in the non-social research study, $b = 0.28$, $SE = .14$, $t = 2.03$, $p = .04$, $sr^2 = .02$, 95% CI [0.008, 0.55]. The loneliness x state

nostalgia interaction, $b = -0.27$, $SE = .25$, $t = -1.09$, $p = .28$, $sr^2 = .006$, 95% CI [-0.77, 0.22], did not reach statistical significance.

Trait Nostalgia Mediation

I examined whether nostalgia proneness mediates the relation between loneliness and the social motivation outcomes using the same statistical procedure as Study 1. Loneliness was significantly and negatively associated with approach-related social goals, $b = -0.50$, $SE = .13$, $t = -3.72$, $p < .001$, $sr^2 = .07$, 95% CI [-0.76, -0.23], BAS reward responsiveness, $b = -0.11$, $SE = .05$, $t = -2.42$, $p = .02$, $sr^2 = .03$, 95% CI [-0.20, -0.02], BAS drive, $b = -0.20$, $SE = .07$, $t = -2.80$, $p = .006$, $sr^2 = .04$, 95% CI [-0.33, -0.06], and BAS fun seeking, $b = -0.17$, $SE = .06$, $t = -2.71$, $p = .007$, $sr^2 = .04$, 95% CI [-0.30, -0.05]. Loneliness was significantly and positively associated with avoidance-related social goals, $b = 0.42$, $SE = .17$, $t = 2.56$, $p = .01$, $sr^2 = .04$, 95% CI [0.10, 0.75], and BIS, $b = 0.25$, $SE = .06$, $t = 3.94$, $p < .001$, $sr^2 = .08$, 95% CI [0.13, 0.38]. Loneliness was not significantly associated with willingness to participate in the social research study, $b = -0.16$, $SE = .21$, $t = -0.76$, $p = .45$, $sr^2 = .003$, 95% CI [-0.58, 0.26], and willingness to participate in the non-social research study, $b = 0.37$, $SE = .24$, $t = 1.58$, $p = .12$, $sr^2 = .01$, 95% CI [-0.09, 0.84]. Nostalgia proneness did not mediate these relations because loneliness was not significantly associated with nostalgia proneness, $b = 0.31$, $SE = .17$, $t = 1.81$, $p = .07$, $sr^2 = .02$, 95% CI [-0.03, 0.65].

Trait Nostalgia Moderation

Since loneliness and nostalgia proneness were not significantly associated, I next conducted exploratory analyses to determine whether trait nostalgia moderated the associations between loneliness and social goals/general motivation. Specifically, I conducted a series of hierarchical linear regression analyses regressing each of the social goals/general motivation

outcomes on trait nostalgia (centered), loneliness (centered), and the loneliness x trait nostalgia interaction.

Approach-oriented social goals. A regression analysis revealed a significant main effect of loneliness on approach-oriented social goals, such that greater loneliness tended to be associated with lower levels of social approach, $b = -0.56$, $SE = .13$, $t = -4.33$, $p < .001$, $sr^2 = .09$, 95% CI [-0.82, -0.31]. There was also a significant main effect of trait nostalgia, such that nostalgia proneness was associated with greater social approach, $b = 0.21$, $SE = .06$, $t = 3.77$, $p < .001$, $sr^2 = .07$, 95% CI [0.10, 0.32]. These main effects were qualified by a significant loneliness x trait nostalgia interaction, $b = 0.43$, $SE = .09$, $t = 4.60$, $p < .001$, $sr^2 = .09$, 95% CI [0.24, 0.61].

The Johnson and Neyman (1936) technique was used to probe the interaction. The inverse association between loneliness and social approach was significant at lower levels of trait nostalgia, but weakened as a function of increased trait nostalgia, becoming non-significant at very high levels (greater than 5.68). Looking at the association between trait nostalgia and social approach as a function of loneliness, the positive relation between nostalgia proneness and social approach was significant at all but very low levels of loneliness (less than 1.84).

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and social approach at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) proneness was also conducted. Loneliness was significantly associated with less social approach at low levels of nostalgia proneness, $b = -1.24$, $SE = .19$, $t = -6.46$, $p < .001$, 95% CI [-1.62, -0.86], but not at high levels of nostalgia proneness, $b = -0.13$, $SE = .16$, $t = -0.81$, $p = .42$, 95% CI [-0.43, 0.18]. A simple slopes analyses looking at the relation between trait nostalgia and social approach at high and low levels of loneliness revealed that nostalgia proneness was not significantly associated with social approach at low loneliness, $b = -0.01$, $SE = .07$, $t = -0.17$, $p =$

.86, 95% CI [-0.15, 0.13], but was significantly associated with greater social approach at high loneliness, $b = 0.47$, $SE = .08$, $t = 3.07$, $p < .001$, 95% CI [0.31, 0.62]. Consistent with the state nostalgia findings, these results suggest that nostalgia moderates the inverse relation between loneliness and social approach, because greater nostalgia proneness is predictive of social approach particularly at higher levels of loneliness.

BIS subscale. A regression analysis revealed a significant main effect of loneliness on BIS scores, such that greater loneliness tended to be associated with greater avoidance motivation, $b = 0.24$, $SE = .06$, $t = 3.67$, $p < .001$, $sr^2 = .07$, 95% CI [0.11, 0.36]. The main effect of trait nostalgia was also significant, such that nostalgia proneness was associated with greater avoidance motivation, $b = .06$, $SE = .03$, $t = 2.02$, $p = .045$, $sr^2 = .02$, 95% CI [0.001, 0.11]. The loneliness x trait nostalgia interaction was marginally significant, $b = 0.09$, $SE = .05$, $t = 1.83$, $p = .07$, $sr^2 = .02$, 95% CI [-0.01, 0.18].

Despite being marginally significant, I probed the interaction using the Johnson and Neyman (1936) technique and simple slopes analyses (Aiken & West, 1991). The Johnson and Neyman (1936) technique revealed that loneliness was associated with greater BIS at higher but not lower levels of nostalgia proneness, becoming significant at nostalgia proneness scores of 4.06. Looking at the association between trait nostalgia and BIS as a function of loneliness revealed trait nostalgia was associated with greater BIS at higher, but not lower levels of nostalgia proneness, becoming significant at loneliness scores of 2.05.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and BIS at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) proneness was also conducted. Loneliness was not significantly associated with less BIS at low levels of nostalgia proneness, $b = 0.10$, $SE = .10$, $t = 0.97$, $p = .34$, 95% CI [-0.10, 0.29], but was

positively associated with BIS at high levels of nostalgia proneness, $b = 0.36$, $SE = .08$, $t = 4.04$, $p < .001$, 95% CI [0.17, 0.49]. A simple slopes analyses looking at the relation between nostalgia proneness and BIS at high and low levels of loneliness revealed that nostalgia was not significantly associated with BIS at low loneliness, $b = 0.01$, $SE = .04$, $t = 0.27$, $p = .79$, 95% CI [-0.06, 0.08], but the positive association between nostalgia and BIS was significant at high loneliness, $b = 0.11$, $SE = .04$, $t = 2.73$, $p = .007$, 95% CI [0.03, 0.19].

BAS reward responsiveness subscale. A regression analysis revealed a significant main effect of loneliness on BAS reward responsiveness scores, such that greater loneliness tended to be associated with less BAS reward responsiveness, $b = -0.13$, $SE = .05$, $t = -2.83$, $p = .005$, $sr^2 = .04$, 95% CI [-0.22, -0.04]. There was also a significant main effect of trait nostalgia, such that nostalgia proneness was associated with greater BAS reward responsiveness, $b = 0.06$, $SE = .02$, $t = 2.84$, $p = .005$, $sr^2 = .04$, 95% CI [0.02, 0.09]. The loneliness x trait nostalgia interaction did not reach statistical significance, $b = 0.06$, $SE = .03$, $t = 1.72$, $p = .09$, $sr^2 = .02$, 95% CI [-0.01, 0.13]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

BAS drive subscale. A regression analysis revealed a significant main effect of loneliness on BAS drive scores, such that greater loneliness tended to be associated with less BAS drive, $b = -0.21$, $SE = .07$, $t = -2.92$, $p = .004$, $sr^2 = .05$, 95% CI [-0.34, -0.07]. The main effect of trait nostalgia did not reach statistical significance, $b = 0.03$, $SE = .03$, $t = 1.09$, $p = .28$, $sr^2 = .006$, 95% CI [-0.03, 0.09]. Additionally, the loneliness x trait nostalgia interaction did not reach statistical significance, $b = 0.07$, $SE = .05$, $t = 1.43$, $p = .16$, $sr^2 = .01$, 95% CI [-0.03, 0.18]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

BAS fun seeking subscale. A regression analysis revealed a significant main effect of loneliness on BAS fun seeking scores, such that loneliness tended to be associated with less BAS fun seeking, $b = -0.20$, $SE = .06$, $t = -3.23$, $p = .001$, $sr^2 = .05$, 95% CI [-0.32, -0.08]. There was also a main effect of trait nostalgia, such that nostalgia proneness was associated with greater BAS fun seeking, $b = 0.09$, $SE = .03$, $t = 3.42$, $p = .001$, $sr^2 = .06$, 95% CI [0.04, 0.14]. The loneliness x trait nostalgia interaction did not reach statistical significance, $b = -0.02$, $SE = .05$, $t = -0.47$, $p = .64$, $sr^2 = .001$, 95% CI [-0.11, 0.07]. Thus, the hypothesis that nostalgia mitigates the inverse association between loneliness and approach motivation was not supported.

Avoidance-oriented social goals. A regression analysis revealed a significant main effect of loneliness on avoidance-oriented social goals, such that loneliness tended to be associated with stronger commitment to avoidance related social goals, $b = 0.42$, $SE = .17$, $t = 2.53$, $p = .01$, $sr^2 = .03$, 95% CI [0.09, 0.75]. The main effect of trait nostalgia, $b = 0.003$, $SE = .07$, $t = 0.04$, $p = .97$, $sr^2 = .00001$, 95% CI [-0.14, 0.14], was not statistically significant. However, the loneliness x trait nostalgia interaction was marginally significant, $b = 0.23$, $SE = .12$, $t = 1.82$, $p = .07$, $sr^2 = .02$, 95% CI [-0.02, 0.47].

Despite being marginally significant, I probed the interaction using the Johnson and Neyman (1936) technique and simple slopes analyses (Aiken & West, 1991). The Johnson and Neyman (1936) technique revealed that loneliness was associated with greater social avoidance at higher but not lower levels of nostalgia proneness, becoming significant at nostalgia proneness scores of 4.63. Looking at the association between trait nostalgia and social avoidance as a function of loneliness revealed trait nostalgia was associated with greater social avoidance at all levels of nostalgia proneness.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and avoidance-oriented social goals at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) proneness was also conducted. Loneliness was not significantly associated with social avoidance at low levels of nostalgia proneness, $b = 0.06$, $SE = .26$, $t = 0.81$, $p = .81$, 95% CI [-0.45, 0.57], but was significantly associated with greater social avoidance at high levels of nostalgia proneness, $b = 0.65$, $SE = .21$, $t = 3.12$, $p = .002$, 95% CI [0.24, 1.07]. A simple slopes analyses looking at the relation between nostalgia proneness and avoidance-oriented social goals at high and low levels of loneliness revealed that nostalgia was not significantly associated with social avoidance at low loneliness, $b = -0.12$, $SE = .10$, $t = -1.20$, $p = .23$, 95% CI [-0.31, 0.07], or at high loneliness, $b = 0.14$, $SE = .10$, $t = 1.34$, $p = .18$, 95% CI [-0.07, 0.34].

Participation in social and non-social research studies. A regression analysis revealed that the main effects of loneliness, $b = -0.22$, $SE = .21$, $t = -1.02$, $p = .31$, $sr^2 = .006$, 95% CI [-0.63, 0.20], and trait nostalgia, $b = 0.17$, $SE = .09$, $t = 1.95$, $p = .05$, $sr^2 = .02$, 95% CI [-0.002, 0.36], on willingness to participate in the social research study did not reach statistical significance. Moreover, the loneliness x trait nostalgia interaction was not statistically significant, $b = 0.21$, $SE = .16$, $t = 1.33$, $p = .19$, $sr^2 = .01$, 95% CI [-0.10, 0.52].

A regression analysis revealed that the main effect of loneliness on willingness to participate in non-social research, $b = 0.36$, $SE = .24$, $t = 1.50$, $p = .14$, $sr^2 = .01$, 95% CI [-0.11, 0.83], and the main effect of trait nostalgia, $b = 0.05$, $SE = .10$, $t = 0.45$, $p = .65$, $sr^2 = .001$, 95% CI [-0.16, 0.25], were not statistically significant. Additionally, the loneliness x trait nostalgia interaction, $b = 0.12$, $SE = .18$, $t = 0.66$, $p = .51$, $sr^2 = .002$, 95% CI [-0.23, 0.47], did not reach statistical significance.

Discussion

Study 2 provides mixed support for the notion that nostalgia regulates the tendency for lonely people to be lower in approach-oriented goals/intentions and generalized motivation. There was no evidence that manipulated nostalgia moderated the inverse relation between loneliness and social approach motivation or loneliness and general approach motivation. There was also no evidence that manipulated nostalgia moderated the positive relationship between loneliness and social avoidance, or loneliness and general avoidance motivation.

Replicating Study 1, Study 2 provided evidence suggesting that feelings of nostalgia mitigate the inverse relation between loneliness and social approach. Specifically, state nostalgia moderated the associations between loneliness and commitment to approach-oriented social goals, and loneliness and willingness to participate in social research. In both cases, the inverse relation between loneliness and social approach was weakened and became non-significant at higher levels of state nostalgia. Thus, feeling more nostalgic reduces the tendency for lonely people to be less inclined to pursue approach related goals like meeting new people and growing friendships. There was no evidence that state nostalgia moderated the relation between loneliness and general approach motivation. There was a marginally significant interaction between loneliness and state nostalgia on BIS scores. Counter to the hypothesis that nostalgia regulates loneliness by reducing avoidance motivation, follow-up tests revealed that the combination of high state nostalgia and high loneliness was associated with greater BIS activation. Because the interaction was only marginally significant, this effect should be interpreted with caution and future research should attempt to replicate it.

Finally, Study 2 did not provide evidence that nostalgia suppresses the inverse relation between loneliness and approach-oriented goals/motivation at the trait level. Loneliness was not

significantly associated with nostalgia proneness. However, the propensity to engage in nostalgia did moderate the relation between loneliness and social approach goals in much the same way that state nostalgia did; the inverse loneliness social approach goal relation was not significant at high levels of nostalgia proneness, because nostalgia proneness was predictive of greater approach goal commitment at high levels of loneliness.

STUDY 3

The purpose of Study 3 was to test the hypothesis that nostalgia regulates the tendency for lonely people to be lower in approach motivation/higher in avoidance motivation using a neurocognitive measure of approach/avoidance motivation, the line-bisection task (Jewell & McCourt, 2000; Nash, McGregor, Inzlicht, 2010). In the task, participants are asked to indicate whether a series of horizontal lines are transected to the right or left of the true midpoint. The number of right and left responses are compared and a response bias score is computed where positive scores indicate a rightward response bias and negative scores indicate a leftward response bias (Jewell & McCourt, 2000). Electroencephalography (EEG) research indicates that a greater rightward/less leftward response bias is associated with greater activity in the left (relative to right) prefrontal cortex, a pattern of brain activation that corresponds with approach behaviors and emotions (Nash et al., 2010). Thus, greater rightward/less leftward bias on the line bisection task indicates approach motivation. Compared to the self-report measures of social approach-oriented motivation used in Studies 1 and 2, the line-bisection task is less susceptible to demand characteristics (Jewell & McCourt, 2000).

The line-bisection task was completed before and after a nostalgia induction task to determine change in response bias. Like Studies 1 and 2, trait loneliness was measured and the effect of nostalgia was further examined using state and trait measures of nostalgia. Consistent with the notion that nostalgia instigates approach motivation, I hypothesized that the nostalgia induction, relative to the control induction, would lead to an increased rightward/decreased leftward response bias on the line bisection task. In increasing approach-related social motivation, nostalgia should reduce the inverse relation between loneliness and approach motivation.

Method

Participants, Procedure, and Materials

Participants consisted of 203 North Dakota State University undergraduate students (138 females). Participants ages ranged from 18 to 31 years old ($M = 18.97$, $SD = 2.06$) and were compensated with course credit. The questionnaire was presented on computers in private cubicles in the order below. Full-text of the questionnaires used can be found in the Appendix.

Line-bisection task. The line-bisection task is a measure of cortical asymmetry indicative of approach/avoidance motivation (Jewell & McCourt, 2000; Nash et al., 2010). The version of the task used in the study consists of a series of pretransected lines presented on a computer (McCourt & Jewell, 1999). Participants are presented with the pretransected lines for 150 ms. Once the line has disappeared, participants indicate whether the line has been transected to the right or the left of the midpoint. Participants are given unlimited time to respond. Responses are given by right clicking the mouse (i.e., indicating that the respondent believes the line has been transected to the right of the midpoint) or left clicking the mouse (i.e., indicating that the respondent believes the line has been transected to the left of the midpoint). Participants completed 210 trials of the task. These trials consisted of 21 transector locations, each location was presented 10 times and appeared in a random order. Specifically, trials consist of lines transected at the midpoint, lines transected at 10 different locations to the right of the midpoint, and lines transected at 10 different locations to the left of the midpoint. An example of the stimuli can be seen in *Figure 12*.

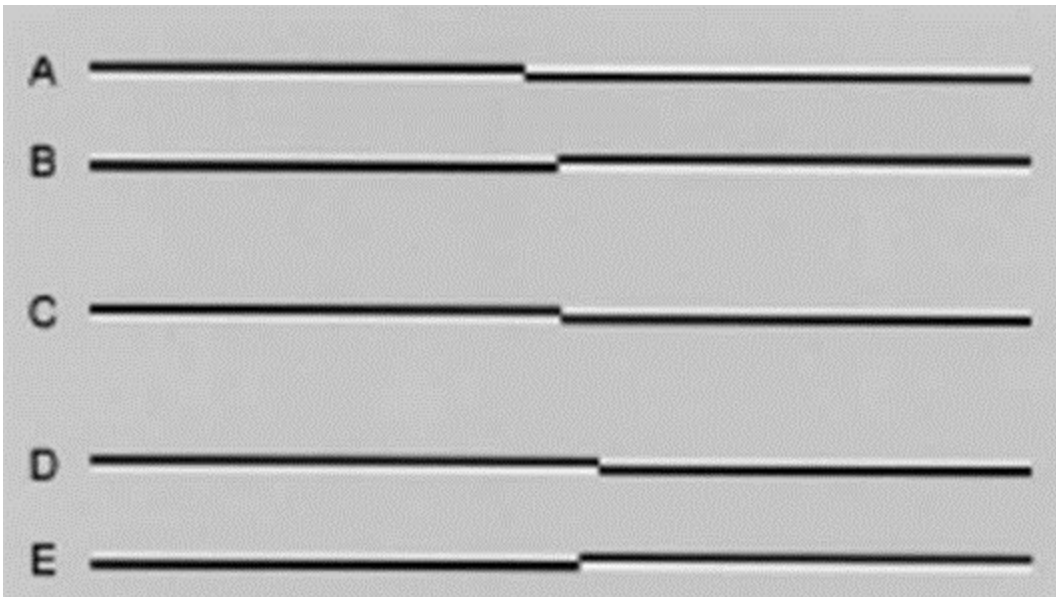


Figure 12. Example of pretransected lines from the line bisection task described in Study 3. Lines A and B are examples of lines transected to the left of the midpoint, line C is transected at the midpoint, and lines D and E are transected to the right of the midpoint (McCourt & Jewell, 1999).

The line-bisection task is scored using a method described elsewhere (e.g., McCourt & Jewell, 1999). Essentially, line-bisection response scores represent the percent of trials on which participants indicate the transector was located to the left of the midpoint. Each participant's set of scores is fit to a Gaussian density function to determine their "point of subjective equality" (PSE). The PSE is the transector location for which left or right responses are equally frequent. Higher PSE scores indicate greater rightward/less leftward response bias. The line bisection task was administered twice, before the manipulation task and again after the manipulation task. Therefore, each participant has a pre-manipulation PSE score ($M = -3.32$, $SD = 4.84$), a post-manipulation PSE score ($M = -2.95$, $SD = 6.17$), and a PSE difference score (i.e., post-manipulation PSE – pre-manipulation PSE; $M = 0.37$, $SD = 4.83$).

Loneliness. Participants completed the 10-item UCLA loneliness questionnaire (Russell, 1996) described in Study 1 ($\alpha = .87$; $M = 2.06$, $SD = 0.49$).

Filler questionnaires. Next, participants completed filler questionnaires: The presence of meaning in life ($\alpha = .89$; $M = 5.00$, $SD = 1.21$) and the search for meaning in life ($\alpha = .88$; $M = 4.81$, $SD = 1.34$) subscales of the MLQ (Steger et al., 2006), and the Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003).

Experimental manipulation. Participants were randomly assigned to a nostalgia ($n = 101$) or control condition ($n = 102$). The same nostalgia or ordinary event reflection task described in Study 1 was used.

State nostalgia. Next participants completed The Nostalgia Inventory (Batcho, 1995), the state nostalgia used in Studies 1 and 2 ($\alpha = .83$; $M = 4.38$, $SD = 0.89$).

Trait nostalgia. Participants completed the 5-item nostalgia proneness scale (Routledge et al., 2008) used in Studies 1 and 2 to measure trait nostalgia ($\alpha = .90$; $M = 4.65$, $SD = 1.24$).

Handedness. Finally, handedness was assessed using the Edinburgh Handedness Inventory (Oldfield, 1971). Participants indicate whether they use their right hand, left hand, or both hands to complete 12 everyday activities (e.g., writing, throwing). A laterality quotient is computed for each participant (see Oldfield, 1971 for scoring details) that ranges from -100 (exclusively left-handed) to 100 (exclusively right-handed).

At the end of the experiment participants completed a brief demographics questionnaire containing age and gender items.

Results

Participants with poor fitting pre-manipulation or post-manipulation line bisection functions were excluded from analyses based on a visual inspection the data. Previous research indicates that left-handed participants tend to have a stronger left-ward response bias relative to right-handed participants (Jewell & McCourt, 2000). Therefore, left-hand dominant participants

(i.e., those with lateralization quotients less than -60; Hardie & Wright, 2014) were also excluded from analyses. The final sample included 162 participants.

Preliminary Analyses

An independent t-test revealed that participants in the nostalgia condition ($M = 4.51$, $SD = 0.80$) were more nostalgic than participants in the control condition ($M = 4.21$, $SD = 1.01$), $t(160) = 2.59$, $p = .001$, 95% CI [0.08, 0.60]. The nostalgia manipulation was successful.

I conducted correlations between all measured variables. Loneliness was positively associated with post-manipulation response bias and the response bias difference score. Loneliness was positively associated with state and trait nostalgia. Trait and state nostalgia were uncorrelated with line bisection response bias. See *Table 3* for a complete correlation matrix.

Table 3
Zero-order correlations in Study 3

Measure	1	2	3	4	5	6	7	
1 Loneliness	—							
2 State Nostalgia	.24*	—						
3 Nostalgia Proneness	.28**	.56**	—					
4 Pre-Manipulation Response Bias	.06	.09	-.04	—				
5 Post-Manipulation Responses Bias	.22*	.10	.07	.61**	—			
6 Line Bisection Difference	.21*	.03	.13	-.21*	.64**	—		
7 Handedness	-.03	.02	.05	.13	-.06	.05	—	
	<i>M</i>	2.06	4.38	4.65	-3.32	-2.95	0.37	57.59
	<i>SD</i>	0.49	0.89	1.24	4.84	6.17	4.83	48.72

Note. * $p < .05$. ** $p < .001$.

Manipulated Nostalgia

A series of hierarchical linear regression analyses were conducted to determine the effects of loneliness and manipulated nostalgia on line bisection response bias.

Post-manipulation PSE. There was a significant main effect of loneliness, such that loneliness was associated with a greater right-ward/less left-ward response bias, $b = 2.56$, $SE = .89$, $t = 2.86$, $p = .005$, $sr^2 = .05$, 95% CI [0.79, 4.32]. There was a significant main effect of manipulated nostalgia, such that nostalgia led to greater right-ward/less left-ward response bias, $b = 2.07$, $SE = .92$, $t = 2.25$, $p = .03$, $sr^2 = .03$, 95% CI [0.26, 3.89]. The loneliness x manipulated nostalgia interaction was marginally significant, $b = -3.41$, $SE = 1.80$, $t = -1.89$, $p = .06$, $sr^2 = .02$, 95% CI [-6.97, 0.15].

Despite being marginally significant, I probed the interaction using simple slopes analyses (Aiken & West, 1991). Loneliness was significantly associated with greater right-ward/less left-ward response bias in the control condition, $b = 3.95$, $SE = 1.15$, $t = 3.43$, $p < .001$, 95% CI [1.68, 6.23], but loneliness was not significantly associated with line bisection response bias in the nostalgia condition, $b = 0.54$, $SE = 1.38$, $t = 0.39$, $p = .69$, 95% CI [-2.19, 3.27]. Nostalgia mitigated this association by leading to significantly greater right-ward/less left-ward response bias at low levels of loneliness (-1 SD), $b = 3.83$, $SE = 1.30$, $t = -2.94$, $p = .004$, 95% CI [1.26, 6.39], but not at high levels of loneliness (+1 SD), $b = 0.31$, $SE = 1.30$, $t = 0.24$, $p = .81$, 95% CI [-2.25, 2.88]. See *Figure 13* for a visual of the interaction.

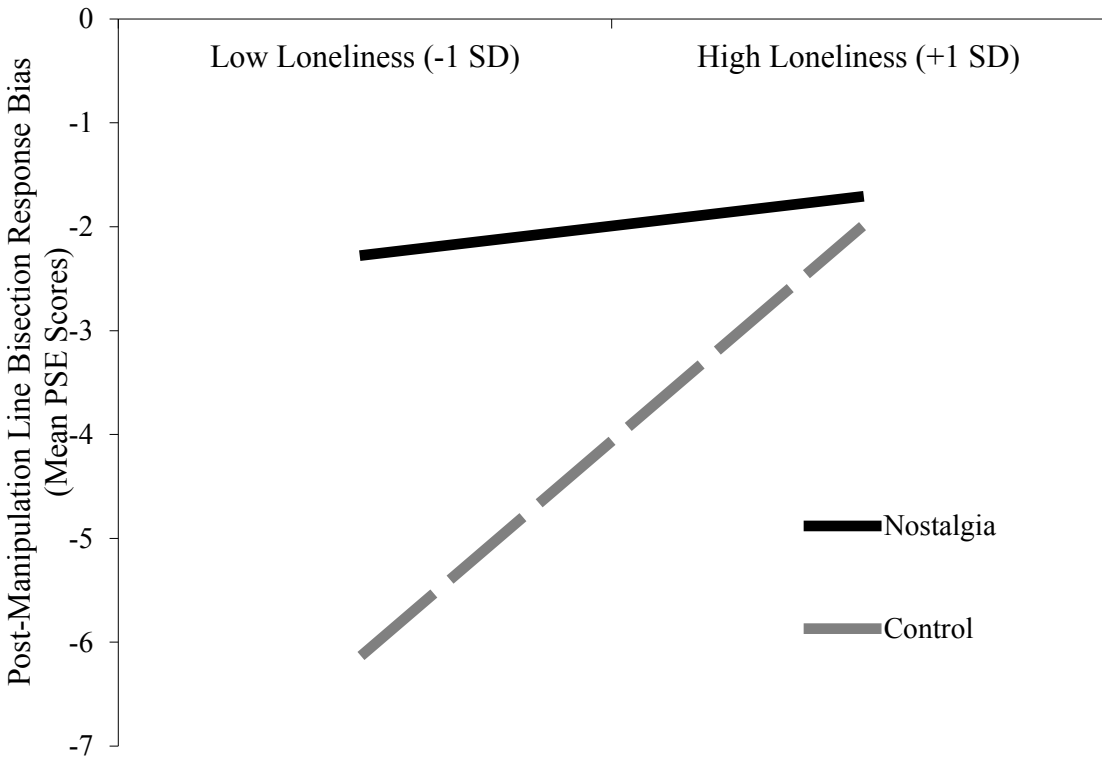


Figure 13. The effect of loneliness and manipulated nostalgia on post-manipulation line bisection response bias in Study 3. Positive line bisection PSE scores indicate a rightward response bias and negative values indicate a leftward bias.

Controlling for pre-manipulation PSE. Pre-manipulation PSE scores were positively and significantly associated with post-manipulation PSE scores, $b = 0.76$, $SE = .08$, $t = 9.44$, $p < .001$, $sr^2 = .33$, 95% CI [0.60, 0.91]. After controlling for pre-manipulation PSE scores, the main effect of loneliness remained significant, $b = 2.11$, $SE = .72$, $t = 2.94$, $p = .004$, $sr^2 = .03$, 95% CI [0.23, 0.18]. After controlling for pre-manipulation PSE scores, the main effect of manipulated nostalgia, $b = .53$, $SE = .75$, $t = 0.70$, $p = .48$, $sr^2 = .002$, 95% CI [-0.96, 3.53], and the loneliness x manipulated nostalgia interaction, $b = -1.18$, $SE = 1.48$, $t = -0.80$, $p = .43$, $sr^2 = .002$, 95% CI [-4.10, 1.74], became non-significant.

PSE difference scores. There was a significant main effect of loneliness, such that loneliness was associated with an increase in right-ward/less left-ward response bias from pre to

post manipulation, $b = 1.96$, $SE = .74$, $t = 2.67$, $p = .008$, $sr^2 = .04$, 95% CI [0.51, 3.41]. The main effect of manipulated nostalgia, $b = 0.03$, $SE = 0.76$, $t = 0.04$, $p = .97$, $sr^2 = .00001$, 95% CI [-1.46, 1.53], and the loneliness x manipulated nostalgia interaction, $b = -0.41$, $SE = 1.50$, $t = -0.27$, $p = .78$, $sr^2 = .004$, 95% CI [-3.37, 2.55], did not reach statistical significance.

Measured State Nostalgia

To further explore nostalgia's potential to mitigate the association between loneliness and approach motivation as measured by the line bisection task, pre-manipulation PSE scores were regressed on loneliness (centered), state nostalgia (centered), and the loneliness x state nostalgia interaction term. The main effects of loneliness, $b = 0.41$, $SE = 0.75$, $t = 0.55$, $p = .58$, $sr^2 = .002$, 95% CI [-1.06, 1.89], and state nostalgia, $b = 0.44$, $SE = 0.45$, $t = 0.99$, $p = .33$, $sr^2 = .006$, 95% CI [-0.44, 1.33], did not reach statistical significance. The loneliness x state nostalgia interaction did reach statistical significance, $b = -1.60$, $SE = 0.74$, $t = -2.17$, $p = .03$, $sr^2 = .03$, 95% CI [-3.07, -0.14].

The Johnson and Neyman (1936) technique was used to probe the interaction. Loneliness was significantly associated with greater right-ward/less left-ward response bias at lower levels of state nostalgia, but was not significantly associated with line bisection response bias at higher levels of state nostalgia (greater than 3.20; see *Figure 14*). Looking at the association between state nostalgia and line bisection response bias as a function of loneliness, nostalgia was associated with greater right-ward/less left-ward response bias at very low levels of loneliness, but was not significantly associated line bisection response bias at higher levels of loneliness (greater than 1.66).

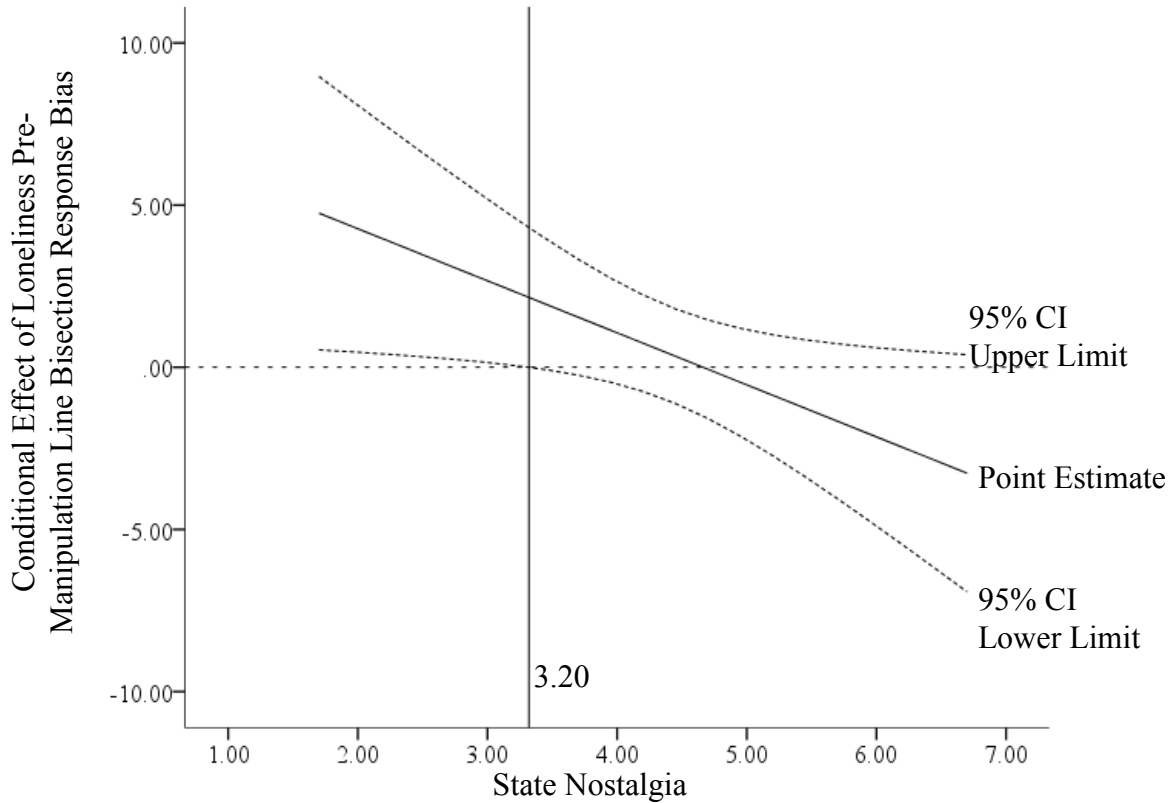


Figure 14. The effect of loneliness on pre-manipulation line bisection response bias in Study 3. The solid vertical line labeled 3.20 represents the level of state nostalgia where the relation between loneliness and line bisection response bias becomes non-significant.

A simple slopes analysis (Aiken & West, 1991) looking at the relation between loneliness and line bisection response bias at high nostalgia (1 *SD* above the mean) and low nostalgia (1 *SD* below the mean) was also conducted. Loneliness was associated with greater right-ward/less left-ward response bias at low levels of nostalgia, $b = 1.92$, $SE = 1.01$, $t = 1.89$, $p = .06$, 95% CI [-0.09, 3.92], but not at high levels of nostalgia, $b = -0.83$, $SE = .93$, $t = -0.89$, $p = .38$, 95% CI [-2.67, 1.02]. A simple slopes analyses looking at the relation between state nostalgia and line bisection response bias at high and low levels of loneliness revealed that nostalgia was significantly associated with greater right-ward/less left-ward response bias at low loneliness, $b = -1.19$, $SE = .56$, $t = 2.12$, $p = .04$, 95% CI [0.08, 2.30], but was not significantly associated with

line bisection response bias at high levels of loneliness, $b = -0.46$, $SE = .61$, $t = -0.76$, $p = .45$, 95% CI [-1.67, 0.74]. For a plot of the simple slopes analysis see *Figure 15*.

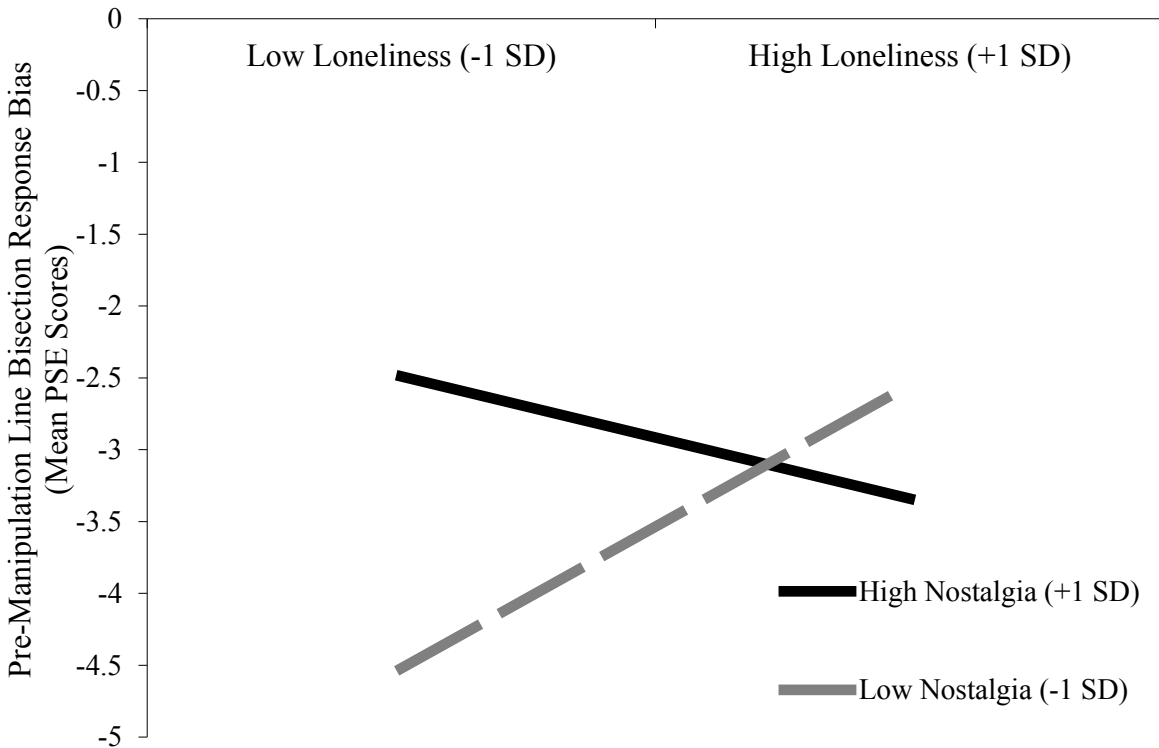


Figure 15. The effect of loneliness and state nostalgia on pre-manipulation line bisection response bias in Study 3. Positive line bisection PSE scores indicate a rightward response bias and negative values indicate a leftward bias.

Trait Nostalgia Mediation

I examined whether nostalgia proneness mediates the relation between loneliness and pre-manipulation line bisection response bias using the same statistical procedure as Study 1.

Loneliness was not significantly associated with line bisection response error, $b = 0.59$, $SE = .73$, $t = -0.81$, $p = .42$, $sr^2 = .004$, 95% CI [-0.84, 2.02]. Loneliness was significantly associated with higher levels of nostalgia proneness, $b = 0.65$, $SE = .18$, $t = 3.64$, $p < .001$, $sr^2 = .08$, 95% CI [0.30, 1.01]. However, nostalgia proneness was not significantly associated with pre-manipulation line bisection response bias in the zero-order, $b = -0.17$, $SE = .31$, $t = -0.54$, $p = .59$,

$sr^2 = .002$, 95% CI [-0.77, 0.44], or when controlling for loneliness, $b = -0.26$, $SE = .32$, $t = -0.80$, $p = .43$, $sr^2 = .004$, 95% CI [-0.80, 0.43]. Moreover, when controlling for nostalgia proneness the relation between loneliness and pre-manipulation line bisection response bias remained non-significant, $b = .75$, $SE = .76$, $t = 1.00$, $p = .32$, $sr^2 = .006$, 95% CI [-0.74, 2.25]. Thus, loneliness did not predict line bisection response bias indirectly through nostalgia proneness.

Trait Nostalgia Moderation

Next, I conducted exploratory analyses to determine whether trait nostalgia moderated the associations between loneliness and pre-manipulation line bisection response bias. Specifically, I regressed pre-manipulation PSE scores on trait nostalgia (centered), loneliness (centered), and the loneliness x trait nostalgia interaction. The main effects of loneliness, $b = 0.75$, $SE = 0.75$, $t = 1.00$, $p = .32$, $sr^2 = .006$, 95% CI [-0.74, 2.25], and trait nostalgia, $b = -0.26$, $SE = 0.32$, $t = -0.80$, $p = .43$, $sr^2 = .004$, 95% CI [-0.89, 0.38], did not reach statistical significance. Additionally, the loneliness x trait nostalgia interaction did not reach statistical significance, $b = -0.17$, $SE = 0.58$, $t = -0.29$, $p = .78$, $sr^2 = .0005$, 95% CI [-1.31, 0.98].

Discussion

To begin, Study 3 provided no evidence to support the well-established inverse relation between loneliness and approach motivation. Specifically, there was no significant zero-order relation between loneliness and pre-manipulation line bisection response bias. However, there was a significant main effect of loneliness on post-manipulation line bisection response error. However, this relation was the opposite of the expected direction. Specifically, loneliness was positively associated with line bisection response bias. Positive values on the line bisection task are indicative of greater rightward/less leftward response bias, which has been established in

previous research as a being associated with brain activity that corresponds with approach motivation (Nash et al., 2010). Thus, it can be said that loneliness was positively associated with approach motivation as measured by the line bisection task. However, because this unexpected relation was only found on the post-manipulation data and not the pre-manipulation data, this effect should be interpreted with caution. Moreover, it is difficult to say whether the unexpected relation is genuine or the result of measurement error, because no research has been conducted looking at the relation between loneliness and the frontal asymmetry that corresponds with motivational states.

There was a significant main effect of manipulated nostalgia in the predicted direction. Specifically, the results indicated that nostalgia led to greater rightward/less leftward response bias compared to the control condition. This is consistent with past research that nostalgia increases self-reported approach motivation and goals (Abeyta, Routledge, & Juhl, 2015; Stephan et al., 2014). However, this main effect became non-significant when pre-manipulation line bisection scores were controlled for. The extent to which nostalgia increases rightward/decreases leftward response bias was very small, so future research should try to replicate the effect observed here using a much larger sample.

Critically though, Study 3 did not provide any evidence that nostalgia regulated the tendency for lonely people to be less approach oriented. If anything the study provided some evidence that nostalgia increased approach motivation as measured by the line bisection task at low levels of loneliness, but not at high levels of loneliness. Specifically, manipulated nostalgia led to greater rightward/less leftward response bias and state nostalgia was associated with greater rightward/less leftward response bias at low, but not high levels of loneliness. As previously mentioned, it is theoretically unclear why loneliness would be associated with a

weaker leftward response bias, since strong leftward response biases are associated with deficits in approach motivation. Nonetheless it is interesting that nostalgia influenced line bisection response error at low but not high levels of loneliness. Might high loneliness be predictive of a pattern of frontal asymmetry that is more resistant to contextual factors like nostalgia? Future research should investigate this potential further.

GENERAL DISCUSSION

The proposed research was the first empirical investigation of nostalgia's potential to moderate the effect of loneliness on social and cognitive indicators of approach motivation. Overall, the studies provided mixed evidence that nostalgia regulates the inverse relation between loneliness and approach-oriented social goals and intentions. Specifically, Studies 1 and 2 failed to find evidence that manipulated nostalgia mitigated the relation between loneliness and deficits in approach-oriented social goals/intentions. This lack of finding is likely due to the ineffectiveness of the nostalgia manipulation. In both studies, the nostalgia manipulation failed to increase state nostalgia relative to the control manipulation. However, both studies did provide evidence that self-reported state nostalgia moderated the relation between loneliness and approach-related social goals and intentions. Specifically, the inverse relations between loneliness and commitment to approach-related friendship goals (Studies 1 and 2), loneliness and intentions to proactively resolve social conflict (Study 1), and loneliness and willingness to participate in social research (Study 2) respectively, weakened as a function of increases in state nostalgia. Thus, strong feelings of nostalgia appear to ameliorate the tendency for lonely people to be less likely to pursue growth in the social domain.

Based on this package of studies it is unclear if nostalgia regulates the relation between loneliness and more generalized motivational tendencies. Theory and research has drawn distinctions between motivation and goals. Specifically, the hierarchical model of approach avoidance motivation (Elliot, 2006; Elliot & Church, 1997) defines motivation as a dispositional action tendency that is either chronically accessible or brought online by contextual factors, whereas goals are specific cognitive representations of an anticipated object or outcome. Research supporting this model indicates that despite being distinct constructs, motivations and

goals are strongly related. Approach-oriented motivation is predictive of approach goals and avoidance-oriented motivation of avoidance goals (Elliot & Church, 1997; Gable, 2006).

Based on research that nostalgia triggers a generalized approach motivation orientation (Stephan et al., 2014), as well as the correspondence between generalized motivation and specific goals, I expected nostalgia to have a similar effect on generalized motivational tendencies. Specifically, I predicted that nostalgia would instigate approach tendencies for people high in loneliness, thereby regulating the tendency for lonely people to be less approach-oriented. However, there was no evidence to support this prediction. In Study 2, there was a marginally significant trend that stronger feelings of nostalgia were predictive of an avoidance motivation orientation, as assessed by the BIS subscale of the BIS/BAS scale (Carver & White, 1994), at high levels of loneliness. In Study 3, nostalgia did not affect motivation, as measured by the line bisection task, at high levels of loneliness, but at low levels of loneliness nostalgia was associated with response biases on the line bisection task indicative of a shift toward approach motivation. The common thread between these two very different findings is that nostalgia was not associated with the expected shift toward approach motivation among people high in loneliness. Nostalgia either had no effect at high levels of loneliness or an effect that is counter to the hypothesis. It is possible that motivation is trait-like and less resistant to change in the context of chronic loneliness. Indeed, the negative thought patterns, maladaptive motivation orientations, and negative affectivity associated with loneliness are thought to be difficult to overcome (S. Cacioppo, Grippo, London, Goosens, & J. T. Cacioppo, 2015). Instead, nostalgia might exert its strongest regulatory effects at the level of goals and not motivation. If so, nostalgia could lead to motivational changes through inspiring approach oriented goal pursuits. That is,

nostalgia inspires approach-related pursuits and outcomes, and success in these pursuits leads to shifts toward a chronic approach motivational orientation.

Limitations

The measures used to assess approach/avoidance motivation may have limited the ability to detect a shift toward approach motivation at high levels of loneliness. Even though past research has demonstrated that manipulated nostalgia increases BAS drive and BAS fun seeking (Stephan et al., 2014), the BIS/BAS scale was developed as a trait measure of motivation. Future research should use measures of motivation that are more state sensitive. Even though line bisection performance is a well-established measure of frontal asymmetry, it is an indirect measure of motivation. Future research should use techniques (e.g., EEG) that more directly assess the frontal asymmetry associated with approach/avoidance motivation. The line bisection task may also be sensitive to inattentive participants. Indeed, a number of participants had to be dropped from the analyses because of poor fitting line bisection data ($n = 30$) and a few others responded incorrectly (i.e., confusing the buttons for “left” and “right” responses) but were not dropped from analyses.

In addition to the measurement issues, there may have been methodological issues that contributed to the inability to find significant effects of manipulated nostalgia. For example, even though the event reflection task used to manipulate nostalgia in all three studies has been used extensively and has been found to reliably evoke nostalgia in past research (for a reviews on the use of the event reflection task see, Routledge, 2015; Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015), it failed to increase state nostalgia in Studies 1 and 2. Moreover, the current studies were unable to replicate the effect of manipulated nostalgia on social goals and intentions from past research (Abeyta, Routledge, & Juhl, 2015). One explanation for the ineffectiveness of

the event reflection task is that the order of the loneliness measure undermined the manipulation. Loneliness is an established trigger for nostalgia (e.g., Wildschut et al., 2006) and past research has used self-report loneliness scales to manipulate loneliness and increase nostalgia (e.g., Zhou et al., 2008). Completing the loneliness items first may have aroused concerns with lack of social belonging and in turn triggered nostalgia for all participants. To ensure that the loneliness scale does not interfere with the manipulation, future research should assess loneliness in a separate prescreen session.

Future research might also consider prescreening for loneliness and recruiting highly lonely participants. Across the three studies, mean loneliness was quite low and this restricted range may have limited my ability to find evidence that nostalgia regulates maladaptive motivational tendencies. A final methodological issue is that the nostalgia proneness measure came after the manipulation, which may have interfered with my ability to find trait-level evidence for nostalgia's potential to regulate the motivational deficits associated with loneliness. Future research should test the trait-level predictions in a separate study.

Implications

Despite the limitations, the current research provides preliminary evidence that nostalgia regulates the inverse relation between loneliness and social approach goals/intentions. Thus, the current findings broadly add to the understanding of the social benefits of nostalgia. As discussed in the introduction, nostalgia has a number of social benefits. In providing evidence that nostalgic feelings are predictive of approach-related goals and intentions, the current research compliments research that nostalgia mobilizes the social self (Abeyta, Routledge, & Juhl, 2015; Stephan et al., 2014; Turner et al., 2012; Turner et al., 2013; Zhou et al., 2012).

The current research also more specifically provides insight into the social regulatory function of nostalgia. As reviewed in the introduction, past research indicates that nostalgia regulates loneliness by promoting feelings of social support (Zhou et al., 2008). This effect is likely fleeting, since reminders of meaningful social relationships can only temporarily satisfy the need to belong (Gardner, Pickett, & Knowles, 2005). The current studies suggest that nostalgia may also regulate loneliness by inspiring approach-related goals and intentions, thereby promoting more lasting efforts to satisfy the need to belong.

Finally, the current research has implications for combatting chronic loneliness. Chronic loneliness is difficult to overcome because it is associated with deficits in social approach (J. T. Cacioppo et al., 2006; Molden et al., 2009; Park & Baumeister, 2015). This maladaptive social motivation orientation limits people's social successes, leads to low relationship satisfaction, and is predictive of further loneliness (e.g., Gable, 2006). As mentioned in the opening of the paper, it is important to uncover factors that combat loneliness, because loneliness is a risk factor for psychopathology (Akerlind & Hörnquist, 1992; J. T. Cacioppo et al., 2006; Joiner, 2005; Kearns et al., 2015) that is linked to poor and worsening physical health and disease (J. T. Cacioppo et al., 2002; Kiecolt-Glaser et al., 1984; Lauder, Mummery, Jones, & Caperchione, 2006; Luo, Hawkey, Waite, & J. T. Cacioppo, 2012; Pressman et al., 2005; Steptoe, Owen, Kunz-Ebrect, & Bryndon, 2004; Wilson et al., 2007). Meta-analyses of loneliness interventions indicate that interventions that target the maladaptive cognitions and motivations associated with loneliness tend to be more effective than interventions that seek to reduce loneliness by focusing on bolstering social support, teaching social skills, or increasing the availability of social interactions (S. Cacioppo et al., 2015; Masi, Chen, Hawkey, & J. T. Cacioppo, 2011). In mitigating the inverse relation between loneliness and approach-related goal pursuits, nostalgia

has potential as an effective part of loneliness interventions. Of course, more research is needed to fully understand the utility of nostalgia in loneliness interventions.

Conclusion

The current research provides evidence that nostalgia reduces the tendency for lonely people to be less oriented toward social approach. In this way, nostalgia's capacity to regulate loneliness may go beyond bolstering a sense of social support. Specifically, nostalgia may combat loneliness by energizing efforts to connect with others leading to more lasting ways of satisfying the need to belong.

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APPENDIX A. UCLA LONELINESS SCALE

Instructions: The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way described.

NEVER

RARELY

SOMETIMES

ALWAYS

1

2

3

4

1. How often do you feel that you lack companionship?
2. How often do you feel that you have a lot in common with the people around you?
3. How often do you feel close to people?
4. How often do you feel left out?
5. How often do you feel that no one really knows you well?
6. How often do you feel isolated from others?
7. How often do you feel that there are people who really understand you?
8. How often do you feel that people are around you but not with you?
9. How often do you feel that there are people you can talk to?
10. How often do you feel that there are people you can turn to?

APPENDIX B. PRESENCE OF MEANING AND SEARCH FOR MEANING SCALES

Please take a moment to think about what makes your life and existence feel important and significant to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according to the scale below:

1	2	3	4	5	6	7
Absolutely Untrue	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True

1. ___ I understand my life's meaning.
2. ___ I am looking for something that makes my life feel meaningful.
3. ___ I am always looking to find my life's purpose.
4. ___ My life has a clear sense of purpose.
5. ___ I have a good sense of what makes my life meaningful.
6. ___ I have discovered a satisfying life purpose.
7. ___ I am always searching for something that makes my life feel significant.
8. ___ I am seeking a purpose or mission for my life.
9. ___ My life has no clear purpose.
10. ___ I am searching for meaning in my life.

APPENDIX C. TEN ITEM PERSONALITY INVENTORY

Instructions: Here are a number of personality traits that may or may not be apply to you. Please indicate the extent to which you agree or disagree with each statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

1 = Strongly disagree

2 = Moderately disagree

3 = Slightly disagree

4 = Neither agree nor disagree

5 = Slightly agree

6 = Moderately agree

7 = Strongly agree

I see myself as...

1. ...extraverted, enthusiastic.
2. ...critical, quarrelsome.
3. ...dependable, self-disciplined.
4. ...anxious, easily upset.
5. ...open to new experiences, complex.
6. ...reserved, quiet.
7. ...sympathetic, warm.
8. ...disorganized, careless.
9. ...calm, emotionally stable.
10. ...conventional, uncreative.

APPENDIX D. NEED FOR MEANING SCALE

For each of the following statements, please indicate whether you agree or disagree by selecting the most applicable response.

1 = Strongly disagree

2 = Disagree

3 = Slightly disagree

4 = Slightly agree

5 = Agree

6 = Strongly agree

1. If I cannot see the meaning in my life I don't let it bother it.
2. I try hard not to do things that will make me feel like my life lacks meaning.
3. I seldom worry about the meaning of life.
4. I need to feel that life is full of meaning and purpose.
5. I want to feel meaningful.
6. I do not like to feel like my life has no real meaning.
7. Being no more significant than any other organism on the planet does not bother me.
8. I have a strong need to find a sense of meaning or purpose in life.
9. It bothers me a great deal when I feel like my life lacks meaning or purpose.
10. I am easily distressed by the thought that my life is insignificant.

APPENDIX E. EVENT REFLECTION TASK: NOSTALGIA CONDITION

According to the Oxford Dictionary, 'nostalgia' is defined as a 'sentimental longing for the past.' Please bring to mind a nostalgic memory from your past. That is, think of a fond memory from your past that stands out in your mind as truly nostalgic. Specifically, reflect on your feelings of sentiment and longing for this memory.

Please write four keywords relevant to this nostalgic memory (i.e., words that sum up the gist of this memory).

Using the space provided below, for the next few minutes, we would now like you to write about the nostalgic memory. Immerse yourself into the thoughts and feelings associated with this memory. Describe this nostalgic memory and how it makes you feel warm and sentimental. Be as thorough as possible in describing how you are feeling.

APPENDIX F. EVENT REFLECTION TASK: ORDINARY CONDITION

Please bring to mind an ordinary memory from your recent past - within the last week. That is, think about a regular recent event, an experience that you would describe as normal or typical. Specifically, reflect on your thoughts regarding this ordinary memory.

Please type four keywords relevant to this recent event (i.e., words that sum up the gist of the experience).

Using the space provided below, for the next few minutes, we would now like you to write about the ordinary recent event. Immerse yourself into this experience. Describe this recent event and what it makes you think about. Be as thorough as possible in describing what you are thinking.

APPENDIX G. SOCIAL-EFFICACY SCALE

Based on how you feeling right now, please rate how certain you are that that you can do the things described. Rate the degree of confidence by clicking a number from 1 to 10.

At this moment I feel confident that I can...

1= cannot do at all to 10 = highly certain can do

1. Establish successful social relationships.
2. Maintain social relationships.
3. Resolve conflicts in social relationships.
4. Communicate effectively in social relationships.
5. Open up to others in social relationship
6. Approach people I don't know and strike up a successful conversation.

APPENDIX H. FRIENDSHIP APPROACH AND AVOIDANCE ORIENTED GOALS

SCALES

Respond to the following statements based on how you are **currently feeling.**

Based on how I am feeling right now, I want to...

1 = strongly disagree 6 = strongly agree.

1. Try to deepen my relationships with my friends.
2. Try to move toward growth and development in my friendships.
3. Try to enhance the bonding and intimacy in my close relationships.
4. Try to share many fun and meaningful experiences with my friends.
5. Try to avoid disagreements and conflicts with my friends.
6. Try to stay away from situations that could harm my friendships.
7. Try to avoid getting embarrassed, betrayed, or hurt by any of my friendships.
8. Try to make sure that nothing bad happens to my close relationships.

APPENDIX I. SOCIAL GOAL OPTIMISM

Please respond to the following items based on your current feelings

1. I am currently feeling that I can expect the best from my future relationships.

1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

2. Right now I am feeling that if something can go wrong for my relationships, it will.

1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

3. I'm feeling optimistic about my future interpersonal relationships.

1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

4. Right now I feel like I can hardly expect future relationships to go my way.

1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

5. Right now I am feeling like I can't count on good things happening in my future relationships

1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

6. Right now I feel like I can expect more good things to happen to me than bad in my future relationships.

1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

APPENDIX J. BEHAVIORAL INHIBITION/ACTIVATION SYSTEM (BIS/BAS) SCALE

Please indicate how true the statement is for you based on how you are feeling RIGHT NOW.

1 = very false, 2 = somewhat false, 3 = somewhat true, 4 = very true

1. A person's family is the most important thing in life.
2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.
3. I go out of my way to get things I want.
4. When I'm doing well at something I love to keep at it.
5. I'm always willing to try something new if I think it will be fun.
6. How I dress is important to me.
7. When I get something I want, I feel excited and energized.
8. Criticism or scolding hurts me quite a bit.
9. When I want something I usually go all-out to get it.
10. I will often do things for no other reason than that they might be fun.
11. It's hard for me to find the time to do things such as get a haircut.
12. If I see a chance to get something I want I move on it right away.
13. I feel pretty worried or upset when I think or know somebody is angry at me.
14. When I see an opportunity for something I like I get excited right away.
15. I often act on the spur of the moment.
16. If I think something unpleasant is going to happen I usually get pretty "worked up".
17. I often wonder why people act the way they do.
18. When good things happen to me, it affects me strongly.
19. I feel worried when I think I have done poorly at something important.

20. I crave excitement and new sensations.
21. When I go after something I use a "no holds barred" approach.
22. I have very few fears compared to my friends.
23. It would excite me to win a contest.
24. I worry about making mistakes.

APPENDIX K. FRIENDSHIP CONFLICT TASK

Instructions: For this next task bring to mind a close friend of yours. This might be someone you would describe as your best friend, but if not should be someone you have a close relationship with and have known for a while.

Please type your friends name in the box below.

Now imagine that you and your close friend got into a disagreement. You and your friend have tried to resolve this conflict, but things just are not the same. You have noticed that since the disagreement you hangout less often. When you do see your friend he/she seems a bit cold and distant. Sure your friend is nice enough and you get along, but it is clear this disagreement has driven a wedge between you.

Consider how a disagreement between you and your close friend would make you feel and respond to each question. Please answer the following questions based on how you are feeling right now and not your general attitudes.

1. I would feel optimistic that my close friend and I could completely resolve the conflict.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

2. I would feel confident that things between my close friend and I would get back to normal.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

3. It does not seem likely that the conflict would be completely resolved.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

4. I would dedicate myself to solving this conflict.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

5. I would be proactive in solving this conflict.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

6. I would try to solve this conflict even if my friend did not seem concerned.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

APPENDIX L. RESEARCH STUDY PARTICIPATION TASK

Thank you for completing this study. We have a number of forthcoming studies available for you to participate in. Many of these studies are paid. Next you will see a description of a few studies. Indicate how interested you are in each study and whether or not you would be interested in participating.

Study 1: Personality and Social Interaction

This study investigates the process of meeting a new person. Research participants will be matched with and chat with another participants whom they do not know. The two participants will be given a number of topics to discuss. Some of these topics will delve into personal beliefs, opinions, and experiences. We are specifically interested in recruiting people with excellent social skills, who feel comfortable meeting new people and discussing various topics to participate in this study.

1. How interested would you be to participate in this study?

1	2	3	4	5	6	7
not interested						very interested

2. Would you be interested in learning more about this study?

1	2	3	4	5	6	7
definitely no						definitely yes

3. Would you like to participate in this study?

1	2	3	4	5	6	7
definitely no						definitely yes

Study 2: Cognitive Problem Solving

This study investigates how people solve problems, as well as ways to improve problem solving abilities. Participants will test out a new web application developed to assess peoples' ability to solve complex puzzles. The application is designed to give people feedback about their problem

solving skills, as well as help them improve their problem solving skills. We are specifically interested in recruiting people who are good at and enjoy puzzles and games.

1. How interested would you be to participate in this study?

1	2	3	4	5	6	7
not interested						very interested

2. Would you be interested in learning more about this study?

1	2	3	4	5	6	7
definitely no						definitely yes

3. Would you like to participate in this study?

1	2	3	4	5	6	7
definitely no						definitely yes

APPENDIX M. NOSTALGIA INVENTORY: STATE NOSTALGIA MEASURE

According to the Oxford Dictionary, 'nostalgia' is defined as a 'sentimental longing for the past.' This Questionnaire is designed to measure what you are feeling AT THIS MOMENT. Please indicate how nostalgic you feel about each of the 20 persons, situations, or events below. The best answer is what you feel AT THIS MOMENT.

1 = I am not very nostalgic about, 7 = I am very nostalgic about

- | | |
|-------------------------|-----------------------------------|
| 1) My family | 2) Feelings I had |
| 3) Vacations I went on | 4) My school |
| 5) Places | 6) Having someone to depend on |
| 7) Music | 8) Not having to worry |
| 9) Someone I loved | 10) The way society was |
| 11) My friends | 12) My pets |
| 13) Things I did | 14) No knowing sad or evil things |
| 15) My childhood toys | 16) TV shows, movies |
| 17) The way people were | 18) My family house |
| 19) My heroes/heroines | 20) My church/religion |

APPENDIX O. EDINBURGH HANDEDNESS INVENTORY

Instructions: Please indicate your preferences in the use of hands in the following activities by *putting + in the appropriate column*. Where the preferences is so strong that you would never try to use the other hand unless absolutely forced to, *put ++*. If in any case you are really indifferent *put + in both columns*.

Some of the activities require both hands. In these cases the part of the task, or object, for which hand preference is wanted is indicated in brackets.

Please try to answer all the questions, and only leave a blank if you have no experience at all of the object or task.

		LEFT	RIGHT
1	Writing		
2	Drawing		
3	Throwing		
4	Scissors		
5	Toothbrush		
6	Knife (without fork)		
7	Spoon		
8	Broom (upper hand)		
9	Striking Match (match)		
10	Opening box (lid)		
i	Which foot do you prefer to kick with?		
ii	Which eye do you use when only using one?		

APPENDIX P. DEMOGRAPHICS

Please indicate your gender. 1 = male, 2 = female

Please indicate your age_____

Please indicate what best describes you.

1 = Asian American

2 = African American

3 = Latino/Hispanic

4 = West Indian

5 = White/non-Hispanic

6 = Other

Do you have any thoughts or feelings about this study?

In your own words, what was the purpose of this experiment?

While you were completing these questionnaires, did you notice any connections between them?

If so, what were they?