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The Restorative Power of Nostalgia: Thwarting Loneliness by Raising Happiness During the COVID-19 Pandemic

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Abstract

Lockdowns during the COVID-19 pandemic increased the risk for loneliness. We tested whether nostalgia counteracts loneliness via rises in happiness. We conducted surveys in China ($N = 1{,}546$), the United States ($N = 1{,}572$), and the United Kingdom ($N = 603$). Although feeling lonely was associated with unhappiness, it was also associated with nostalgia, which in turn conduced to increased happiness. We complemented these findings with three experiments testing MTurk workers (Study 4, $N = 209$; Study 5, $N = 196$; Study 6, $N = 190$), where we manipulated nostalgia and assessed happiness. Nostalgia increased happiness immediately after the manipulation (Studies 4–6) and, following an induction booster, up to 2 days later (Studies 4–5). Nostalgia is a psychological resource that can be harnessed to raise happiness and help combat loneliness.

Keywords

COVID-19, loneliness, nostalgia, happiness

Since the COVID-19 outbreak, billions of people have been in lockdown, prevented from socializing with their social network. The pandemic-imposed lockdowns have been linked to psychological distress (e.g., unhappiness, depression, and anxiety; Rettie & Daniels, 2020; Xin et al., 2020; Zacher & Rudolph, 2020). In addition, lockdowns are associated with loneliness (Armitage & Nellums, 2020; Enea et al., 2021). Loneliness (a) conduces to psychological distress (unhappiness, depression, and anxiety; Brodeur et al., 2020; Erzen & Çikrikci, 2018); (b) triggers cellular changes that result in chronic inflammation and weaken the immune system (Cole et al., 2015), rendering lonely individuals vulnerable to viral infections much like COVID-19; and (c) is linked to morbidity (Holt-Lunstad et al., 2015).

As the pandemic has spurned "an epidemic of loneliness" (*The Guardian*, 2020b), finding ways to alleviate loneliness is of essence. Researchers have attempted to do so by fostering friendships or encouraging support from social networks (Asher & Paquette, 2003; Bell, 1991). However, due to pandemic-necessitated lockdowns, such attempts are of limited range and value. Further, although virtual social networks may attenuate loneliness for some, they increase it for others (Phu & Gow, 2019; Primack et al., 2019) while risking incivility (Kim, 2020). Alternative strategies are needed that are easier to implement and more reliable. We propose such a strategy: drawing on one's reservoir of nostalgic memories.

Nostalgia entails sentimental longing for momentous events from one's past (e.g., birthdays, weddings, and graduations; Wildschut et al., 2006). Indeed, experiences that can later produce nostalgia are atypical, infrequent, and valued (van Tilburg et al., 2019). The emotion is self-relevant (van Tilburg et al., 2018), given that these events are personally meaningful (Sedikides & Wildschut, 2018). It is also social, as the self is surrounded by close others (Sedikides & Wildschut, 2019). Further, nostalgia is ambivalent but predominantly positive (Leunissen et al., 2021): In nostalgic reverie, the individual feels warm and contented but also longs for valued moments (Hepper et al., 2012). Nostalgia is experienced frequently (several times a week; Wildschut et al., 2006) and across ages (Madoglou et al., 2017) or cultures (Hepper et al., 2014).

Loneliness conduces to nostalgia. Lonelier participants were more nostalgic (Abeyta et al., 2020; Zhou et al., 2008), and participants who were induced to feel lonely became more nostalgic (Wildschut et al., 2006; Zhou et al., 2008). Moreover, nostalgia conduces to sociality. Nostalgia is positively associated with,

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and increases, social connectedness (sense of acceptance/belongingness; Sedikides & Wildschut, 2019; Wildschut et al., 2010). Relatedly, nostalgia is positively associated with, and augments, perceived social support (Turner et al., 2013; Zhou et al., 2008). Further, social support constitutes a key source of happiness (Chan & Lee, 2006; Siedlecki et al., 2014), and nostalgia contributes to happiness (Hepper et al., 2021; Sedikides et al., 2016).

Together, the evidence indicates that (a) loneliness is positively associated with, or elicits, nostalgia (Sedikides & Wildschut, 2019); (b) loneliness is negatively associated with, or decreases, happiness (Cacioppo et al., 2006; Satici et al., 2016); and (c) nostalgia is positively related or conduces to happiness (eudaimonic well-being; Hepper et al., 2021; Sedikides et al., 2016) and can increase happiness (satisfaction with life; Cox et al., 2015). We propose an intervening variable model, known as statistical suppression or inconsistent mediation (MacKinnon et al., 2000; Paulhus et al., 2004), to understand the relations among loneliness, nostalgia, and happiness. Here, the direct effect of a predictor is directionally opposite to its indirect effect via the intervening variable. When the indirect effect of the intervening variable is introduced in the model, the direct effect is strengthened (rather than weakened, as in consistent mediation models). In our case, the direct effect of loneliness on happiness will be negative: Loneliness will conduce to deficits in happiness. However, the indirect effect of loneliness on happiness via nostalgia will be positive: Loneliness will conduce to higher nostalgia, which will be associated with greater happiness.

We tested the model that nostalgia counteracts loneliness via increases in happiness in six studies conducted during the pandemic. In Studies 1–3, we examined the cross-sectional relations among loneliness, nostalgia, and happiness. We ran Study 1 in China when the number of new infections had leveled off. We conducted Studies 2 and 3 in the United States and United Kingdom, respectively, when infection cases were rising. We complemented these findings with three online experiments in Western countries when infections were rising. We examined the causal relation between nostalgia and happiness immediately and over a 2-day period (Studies 4–6). We summarized results with integrative data analyses (IDAs; Curran & Hussong, 2009), reporting them in Supplementary Material.

Our research makes several contributions to the literature. Studies 1–3 (which were part of larger surveys) are the first to include concurrently the measures of loneliness, nostalgia, and happiness and test for statistical suppression effects. Studies 4–6 provide experimental evidence for the nostalgia–happiness link, when prior experimental work has been concerned with the association between nostalgia and life satisfaction. Studies 4–6 test the effect of nostalgia on happiness. All studies were approved by the Institute of Psychology, Chinese Academy of Sciences's Institutional Review Board. The data and codes are available at OSF (https://osf.io/u5rjb/) and the research protocol in Supplementary Material.

Study 1

We examined the capacity of nostalgia to restore psychological homeostasis (Folkman, 2008) by surveying a Chinese sample from March 8 to 14, 2020, when the infection's number had stabilized.

Participants

As an initial study, we estimated a small effect ($r = .10$) for a two-tailed bivariate correlation test with power $(1 - \beta) = .95$ at $\alpha = .05$. We aimed for a minimum $N = 1{,}293$. We recruited 1,549 Chinese participants via the online platform credamo.com in a nationwide survey (across 30 of the 34 provinces). We excluded three participants who reported an age < 18 years, resulting in 1,546 valid cases (763 women and 783 men; $M_{years} = 28.43$ and $SD_{years} = 6.64$).[1]

Method

We indexed loneliness as social isolation (whether participants lived alone for more than a week during the pandemic). Social isolation refers to an objective lack of social interactions, whereas loneliness refers to the subjective perception that one lacks meaningful social interactions. Although they are conceptually distinguishable (Cornwell & Waite, 2009; Veazie et al., 2019), social isolation is a good proxy of loneliness (Savikko et al., 2005).

We assessed loneliness with the item "During the outbreak, have you been living alone for more than a week?" (0 = no, 1 = yes). We assessed happiness with two items ($r = .763$, $p < .001$; Spearman–Brown reliability coefficient = .866): "For the past week, how happy has your life been?" and "For the past week, how meaningful has your life been?" (1 = *not at all* and 7 = *very much*). We derived the first item from the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999) and added the second item to expand the constructs' scope to eudaimonic well-being (Ryff, 1989). We assessed nostalgia with an established (Hepper et al., 2012) three-item measure: "I feel quite nostalgic," "I have nostalgic feelings," and "I feel nostalgic" (1 = *not at all* and 7 = *very much*; $\alpha = .937$).

Results and Discussion

We found that (a) lonely participants ($M = 5.03$, 95% confidence interval [CI] [4.94, 5.12]) were less happy than nonlonely ones ($M = 5.17$, 95% CI [5.07, 5.28]), $F(1, 1544) = 4.18$, $p = .041$, $d = .106$; (b) lonely participants ($M = 4.59$, 95% CI [4.49, 4.69]) felt more nostalgic than nonlonely ones ($M = 4.22$, 95% CI [4.10, 4.34]), $F(1, 1544) = 21.66$, $p < .001$, $d = .242$; and (c) nostalgia was positively associated with happiness ($r = .157$, 95% CI [0.107, 0.206], $p < .001$; Table 1).

We proceeded to test our model with mediational analyses. When we regressed happiness onto both loneliness (0 = *nonlonely* and 1 = *lonely*) and nostalgia, loneliness

Table 1. Correlations Among Variables in Study 1 (Chinese Sample).

Variable	*M*	*SD*	Living Alone	Nostalgia	Happiness	Age
Living Alone	0.60	0.49				
Nostalgia	4.44	1.55	.118**			
Happiness	5.09	1.38	−.052*	.157**		
Age	28.43	6.64	−.011	−.039	.099**	
Gender	1.49	0.50	−.132**	−.080**	.005	.060*

Note. $N = 1{,}546$, We coded gender as a binary variable (1 = *man*, 2 = *woman*). *$p < .05$. **$p < .01$.

negatively predicted happiness, whereas nostalgia positively predicted happiness (Figure 1, Panel A). Importantly, loneliness more strongly predicted decreases in happiness after nostalgia had been controlled for (Paulhus et al., 2004). If it were not for nostalgia, loneliness would conduce more strongly to decreases in happiness. The indirect effect (denoted *ab*) of loneliness was supported by the bootstrapping method (Hayes, 2018; PROCESS Model 4; 5,000 bootstraps). The 95% CI for the indirect effect did not include 0 ($ab = .055$; 95% CI [0.028, 0.087]). Also, the 95% CI for the direct effect did not include 0 ($b = -.201$; 95% CI [−0.340, −0.062]).

Study 2

We tested the replicability of Study 1 findings by surveying an American sample between April 3 and 12, 2020, when the infection's number was rising. We assessed loneliness and happiness differently than in Study 1.

Participants

We estimated a small effect ($r = .10$) with power ($1 - \beta$) = .95 at $\alpha = .05$, aiming for a minimum $N = 1{,}293$. We recruited 1,572 MTurk workers across all 50 states (921 women, 646 men, and five nonbinary; $M_{years} = 41.06$ and $SD_{years} = 13.37$).[2,3]

Method

We assessed loneliness with two items ($r = .458$, $p < .001$; Spearman–Brown reliability coefficient = .628): "How isolated from the rest of the world did you feel in the past week?" (1 = *not at all* and 7 = *very much*) and "How lonely did you feel in the past week?" (1 = *not at all lonely* and 7 = *very lonely*). We adapted the first item from the Philadelphia Geriatric Center Morale Scale (Lawton, 1975) and the second item from a loneliness scale suited for large surveys (Hughes et al., 2004).

We assessed happiness with three items: "I consider myself as (1 = *not a very happy person*; 7 = *a very happy person*)," "Compared with my peers, I consider myself (1 = *much less happy*; 7 = *much more happy*)," and "I think my life is (1 = *not meaningful at all*; 7 = *very meaningful*)" at $\alpha = .879$. We derived the first item, and adapted the second item, from the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999), whereas we added the third item to expand the construct's scope to eudaimonic well-being. We assessed nostalgia as in Study 1 ($\alpha = .976$).

Results and Discussion

Loneliness was negatively associated with happiness ($r = -.184$, 95% CI [−0.232, −0.135], $p < .001$) but positively associated with nostalgia ($r = .186$, 95% CI [0.137, 0.234], $p < .001$). Nostalgia was positively associated with happiness ($r = .199$, 95% CI [0.150, 0.247], $p < .001$; Table 2).

When we regressed happiness onto both loneliness and nostalgia, loneliness negatively predicted happiness, whereas nostalgia positively predicted happiness (Figure 1, Panel B). Crucially, loneliness predicted stronger reductions in happiness after nostalgia had been statistically controlled for. If it were not for nostalgia, loneliness would have further reduced happiness. The indirect effect of loneliness was supported by bootstrapping (Hayes, 2018; PROCESS Model 4; 5,000 bootstraps). The 95% CI for the indirect effect did not include 0 ($ab = .035$; 95% CI [0.023, 0.049]) and neither did the 95% CI for the direct effect ($b = -.181$; 95% CI [−0.219, −0.143]). Study 1 results were replicated.

Study 3

As another replication, we surveyed a UK sample from April 20 to 21, 2020, when infections were ascendant.

Participants

Studies 1 and 2 demonstrated effect sizes among key variables between $r = .118$ and $r = .199$. We estimated a slightly larger effect ($r = .15$) and aimed for power ($1 - \beta$) = .95 at $\alpha = .05$, requiring $N = 571$. We recruited 603 participants via Prolific Academic (427 women, 174 man, and two nonbinary; $M_{years} = 34.00$ and $SD_{years} = 11.28$).[4]

Method

Participants completed the same measures of loneliness ($r = .400$, $p < .001$; Spearman–Brown reliability coefficient = .571), happiness ($\alpha = .838$), and nostalgia ($\alpha = .975$) as in Study 2.

Results and Discussion

Loneliness was negatively linked to happiness ($r = -.404$, 95% CI [−0.478, −0.331], $p < .001$) and positively linked to nostalgia ($r = .085$, 95% CI [0.006, 0.165], $p = .036$). Nostalgia was positively linked to happiness ($r = .119$, 95% CI [0.040, 0.199], $p = .003$; Table 3).

We regressed happiness onto both loneliness and nostalgia. Loneliness negatively predicted happiness, whereas nostalgia positively predicted happiness (Figure 1, Panel C). Further, loneliness predicted stronger reductions in happiness after nostalgia had been statistically controlled for. If it were not for nostalgia, loneliness would have decreased happiness to a

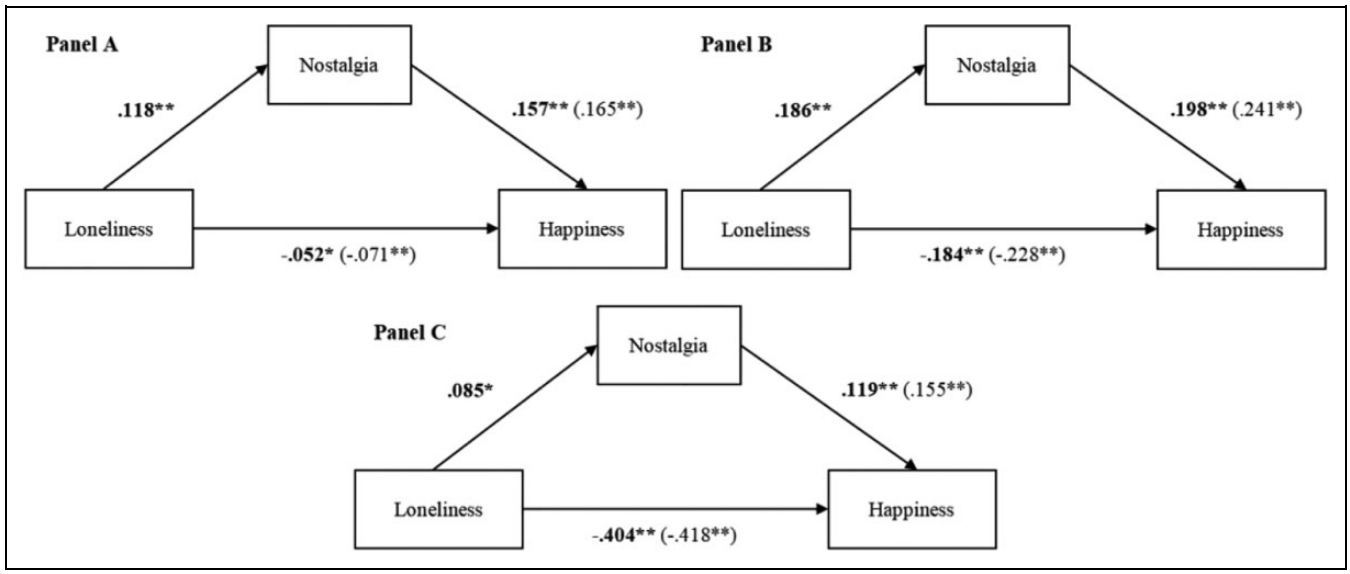

Figure 1. Associations among loneliness, nostalgia, and happiness in Study 1 (Panel A: $N = 1{,}546$), in Study 2 (Panel B: $N = 1{,}572$), and in Study 3 (Panel C: $N = 603$). *Note*. Coefficients in boldface are zero-order correlations. Coefficients in parentheses are standardized regression coefficients. Whereas the direct effect of loneliness on happiness was negative, its indirect effect via nostalgia was positive. Loneliness was related to higher nostalgia, which in turn counteracted loneliness-linked reductions in happiness. Asterisks indicate values significantly different from zero. *$p < .05$. **$p < .01$.

Table 2. Correlations Among Variables in Study 2 (U.S. Sample).

Variable	*M*	*SD*	Loneliness	Nostalgia	Happiness	Age
Loneliness	3.98	1.62				
Nostalgia	3.55	1.65	.186**			
Happiness	5.07	1.28	−.184**	.199**		
Age	41.06	13.37	−.174**	−.033	.116**	
Gender	1.59	0.49	.042	−.021	.020	.057*

Note. $N = 1{,}572$, We coded gender as a binary variable (1 = *man* and 2 = *woman*).
*$p < .05$. **$p < .01$.

Table 3. Correlations Among Variables in Study 3 (UK Sample).

Variable	*M*	*SD*	Loneliness	Nostalgia	Happiness	Age
Loneliness	4.12	1.50				
Nostalgia	3.52	1.67	.085*			
Happiness	4.56	1.18	−.404**	.119**		
Age	34.00	11.28	−.262**	−.064	.147**	
Gender	1.71	0.45	.002	−.022	.058	.046

Note. $N = 603$, We coded gender as a binary variable (1 = *man* and 2 = woman).
*$p < .05$. **$p < .01$.

greater extent. The indirect effect of loneliness was corroborated with the bootstrapping method (Hayes, 2018; PROCESS Model 4; 5,000 bootstraps). The 95% CI for the indirect effect did not include 0 ($ab = .010$; 95% CI [0.0002, 0.023]) and neither did the 95% CI for the direct effect ($b = -.329$; 95% CI [−0.386, −0.272]). The Study 1 and 2 results were replicated.

Study 4

The results of the three cross-sectional studies converged in supporting our model across cultures. Loneliness during the pandemic was associated negatively with happiness but positively with nostalgia, and nostalgia counteracted loneliness via rises in happiness. These conclusions were reinforced by an IDA (see Supplementary Material).

Experimental evidence is congruent with the assumed directionality. The logic of experimental-causal-chain designs (Spencer et al., 2005) dictates, and evidence indicates, that loneliness causes unhappiness (Cacioppo et al., 2006), and loneliness causes nostalgia (Wildschut et al., 2006). This logic also dictates that nostalgia causes happiness. However, experimental evidence for a causal connection between nostalgia and happiness is lacking, as the evidence is cross-sectional (Hepper et al., 2021; Sedikides et al., 2016), with a daily diary study producing conflicting results (Newman et al., 2020). An exception is an experiment (Cox et al., 2015; Study 1), where the researchers induced nostalgia—through an internet blog that hosts notes to persons one has loved—and assessed satisfaction with life (Diener et al., 1985; e.g., "So far I have gotten the important things I want in life").

We revisited the issue in Study 4. We asked whether nostalgia (induced differently than Cox et al., 2015) would lead to happiness (measured differently than Cox et al., 2015), especially in the time of a pandemic when national moods are tinged by stress, anxiety, and depression (Montemurro, 2020; Qiu et al., 2020; Wang et al., 2020). Further, we asked, for the first time, whether experimentally induced nostalgia has delayed effects—up to 2 days—on happiness; that is, we had two measurement points, Time 1 and Time 2. Finally, we

Table 4. Correlations Among Variables in Study 4.

Variable	*M*	*SD*	Happiness (Time 1)	Positive Affect (Time 1)	Negative Affect (Time 1)	Happiness (Time 2)	Positive Affect (Time 2)
Happiness (T1)	5.46	1.11					
Positive affect (T1)	5.25	1.15	.699**				
Negative affect (T1)	3.31	1.98	−.151*	.005			
Happiness (T2)	5.40	1.30	.773**	.766**	−.018		
Positive affect (T2)	5.00	1.30	.612**	.860**	.067	.725**	
Negative affect (T2)	2.70	1.85	−.188	.026	.909**	−.125	.028

Note. Time 1, $N = 209$; Time 2, $n = 83$.
*$p < .05$. **$p < .01$.

examined the impact of experimentally induced nostalgia on positive affect (PA) and negative affect (NA). Nostalgia typically increases PA but not necessarily NA (Leunissen et al., 2021; but see Frankenbach et al., 2020). However, no work has examined the influence of nostalgia on PA (and NA) over a 2-day period. PA and NA, along with happiness, are often regarded as indicators of a global construct, well-being (Martela & Sheldon, 2019). Happiness refers to a global appraisal of one's well-being, whereas PA refers to an affective appraisal of it (DeNeve & Cooper, 1998; Lü et al., 2014). We conducted Study 4 between April 19 and 24, 2020, when infections were rising in all of participants' countries.

Participants

To calculate power, we relied on Cox et al.'s (2015) effect of induced nostalgia on satisfaction with life and PA. Those effect sizes equaled $d = .57$ and $d = .58$, respectively, and were our "best guess" for sample size determination in Studies 4–6. We estimated a medium effect size ($d = .50$) and aimed for a minimum of $N = 176$ to achieve power $(1 - \beta) = .95$ at $\alpha = .05$ (G*Power 3.1; Faul et al., 2009). We recruited 209 MTurk workers (126 men and 83 women; $M_{years} = 36.06$ and $SD_{years} = 11.63$). Here, and in Studies 5 and 6, the manipulation had similar effects on happiness and PA/NA at Time 1 among participants who continued to Time 2 versus did not (see Supplementary Material).

Method

Time 1

We induced nostalgia with the Event Reflection Task (Sedikides et al., 2015), randomly assigning participants to conditions (nostalgia $n = 102$ and control $n = 107$). Experimental participants read a definition of nostalgia ("sentimental longing for the past"; Pearsall, 1988, p. 1266), brought to mind a typical nostalgic event from their lives, and immersed themselves in the experience. Next, they listed four event-relevant key words, were allotted 3 min to write about the event, and were required to write at least 50 words. Control participants followed the same protocol but for an ordinary event. Subsequently, all participants completed a manipulation check (Wildschut et al., 2006; e.g., "Right now, I am feeling quite nostalgic"; $\alpha = .917$).

Participants completed a state version ("Right now . . . ") of the same happiness measure as in Study 1 ($r = .716$, $p < .001$; Spearman–Brown reliability coefficient = .834). Further, they completed the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), which comprised 10 PA adjectives (e.g., enthusiastic, proud) and 10 NA adjectives (e.g., distressed, upset). We formed PA ($\alpha = .932$) and NA ($\alpha = .979$) scores.

Time 2

One or 2 days after the original assessment, we retested as many participants as possible after administering a nostalgia-induction booster ($n = 83$). Experimental participants ($n = 47$) read: "In our previous questionnaire, you were asked to recall a nostalgic event and write down a few keywords. Do you still remember the event? Please write it down in the blank space below." Control participants ($n = 36$) read equivalent instructions for the ordinary event. Afterward, all participants completed the same manipulation check ($\alpha = .970$), happiness measure ($r = .760$, $p < .001$; Spearman–Brown reliability coefficient = .864), and PA ($\alpha = .942$) and NA ($\alpha = .978$) measures as at Time 1 (Table 4).

Results and Discussion

Time 1

Manipulation check. The nostalgia induction was effective. Participants in the nostalgia condition ($M = 5.51$, 95% CI [5.29, 5.73]) reported feeling more nostalgic than controls ($M = 4.83$, 95% CI [4.52, 5.14]), $F(1, 207) = 12.55$, $p < .001$, $d = .493$.

Happiness and affect. We conducted separate analyses (Buserri & Sadava, 2011) for happiness and PA/NA. Nostalgic participants ($M = 5.64$; 95% CI [5.45, 5.82]) reported more happiness than controls ($M = 5.30$; 95% CI [5.06, 5.54]), $F(1, 207) = 4.94$, $p = .027$, $d = .309$ (Figure 2, left panel). However, nostalgic ($M = 5.35$, 95% CI [5.15, 5.56]) and control ($M = 5.14$, 95% CI [4.91, 5.38]) participants did not differ on PA, $F(1, 207) = 1.77$, $p = .185$, $d = .185$ (Figure 2, middle panel). Further, nostalgic ($M = 3.21$; 95% CI [2.81, 3.61]) and

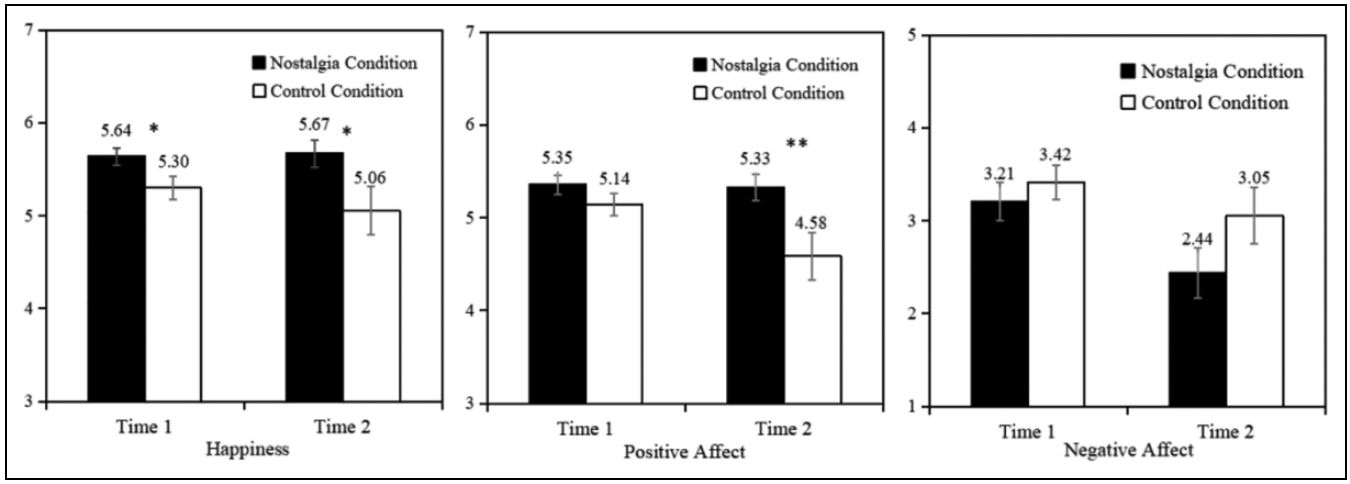

Figure 2. Happiness, positive affect, and negative affect in Study 4 Time 1 ($N = 209$) and in Study 4 Time 2 ($n = 83$). *Note*. The black columns represent the nostalgia condition, and the white columns represent the control condition. Happiness, positive affect, and negative affect are continuous variables ranging from 1 to 7. Error bars represent ± 1 standard error. *$p < .05$. **$p < .01$.

control ($M = 3.42$, 95% CI [3.04, 3.79]) participants did not differ on NA, $F(1, 207) = 0.58$, $p = .447$, $d = .106$ (Figure 2, right panel).

Time 2

Manipulation check. The nostalgia induction was effective. Participants in the nostalgia condition ($M = 5.09$; 95% CI [4.65, 5.52]) felt more nostalgic than controls ($M = 4.07$; 95% CI [3.43, 4.72]), $F(1, 81) = 7.47$, $p = .008$, $d = .613$.

Happiness and affect. Nostalgic participants ($M = 5.67$, 95% CI [5.37, 5.97]) reported more happiness than controls ($M = 5.06$, 95% CI [4.53, 5.58]), $F(1, 81) = 4.74$, $p = .032$, $d = .488$ (Figure 2, left panel). Moreover, nostalgic participants ($M = 5.33$, 95% CI [5.04, 5.62]) reported higher PA than controls ($M = 4.58$, 95% CI [4.06, 5.11]), $F(1, 81) = 7.14$, $p = .009$, $d = .599$ (Figure 2, middle panel). However, nostalgic ($M = 2.44$, 95% CI [1.90, 2.98]) and control ($M = 3.05$, 95% CI [2.43, 3.67]) participants did not differ on NA, $F(1, 81) = 2.29$, $p = .134$, $d = .339$ (Figure 2, right panel).

Time 1 Versus Time 2

To examine whether the magnitude of the nostalgia effect changed across time, we tested the Nostalgia (nostalgia vs. control) × Time (Time 1 vs. Time 2) interaction on the variables of interest. Of the 209 participants who completed the experiment at Time 1, 83 completed Time 2. Thus, treating time as a within-subject variable in a mixed analysis of variance would result in loss of Time 1 data for 126 (209 − 83) participants. To avoid this, we used hierarchical linear modeling, with time points nested within participants. We treated the participant-level intercept as a random effect and used a general Satterthwaite approximation for degrees of freedom (the same model specification was used in Studies 5 and 6). The Nostalgia × Time interactions were not significant: manipulation check: $F(1, 107) = 0.29$, $p = .594$, $\eta_p^2 = .001$; happiness: $F(1, 102) = 0.06$, $p = .810$, $\eta_p^2 = .000$; PA: $F(1, 92.5) = 2.21$, $p = .140$, $\eta_p^2 = .005$; NA: $F(1, 84.9) = 0.46$, $p = .499$, $\eta_p^2 = .001$.[5] These results indicate that a booster sufficed to reinstate the beneficial effects of nostalgia on happiness and PA over time.

Study 5

We tested the replicability of Study 4 findings with minor measurement alterations. The study ran over 2 days (April 29, 2020 = Time 1; April 30, 2020 = Time 2) when infections were rising in all countries from which our participants originated.

Participants

Based on prior research (Cox et al., 2015), we estimated a medium effect size ($d = .50$) aiming for a minimum of $N = 176$ to achieve power $(1 - \beta) = .95$ at $\alpha = .05$. We recruited 196 MTurk workers (103 men and 93 women; $M_{years} = 39.16$, $SD_{years} = 14.33$, and 1 unreported).

Method

Time 1

We induced nostalgia as in Study 4 (nostalgia condition $n = 99$, control condition $n = 97$). Responses to the manipulation check cohered ($\alpha = .962$). We next gathered the dependent measures. For generalizability purposes, we used another measure of happiness (Kahneman & Deaton, 2010): "Right now, how much do you experience happiness?" "Right now, how much do you experience enjoyment?" and "How much do you want to smile or laugh right now?" ($\alpha = .859$). Based on PANAS, we formed PA ($\alpha = .943$) and NA ($\alpha = .979$) composites.

Table 5. Correlations Among Variables in Study 5.

Variable	*M*	*SD*	Happiness (Time 1)	Positive Affect (Time 1)	Negative Affect (Time 1)	Happiness (Time 2)	Positive Affect (Time 2)
Happiness (T1)	5.28	1.39					
Positive affect (T1)	4.92	1.37	.710**				
Negative affect (T1)	2.49	1.76	−.113	.058			
Happiness (T2)	4.71	1.50	.640**	.606**	−.002		
Positive affect (T2)	4.62	1.34	.570**	.735**	.018	.770**	
Negative affect (T2)	2.12	1.43	−.199*	−.070	.800**	−.153	−.121

Note. Time 1, $N = 196$; Time 2, $n = 121$.
*$p < .05$. **$p < .01$.

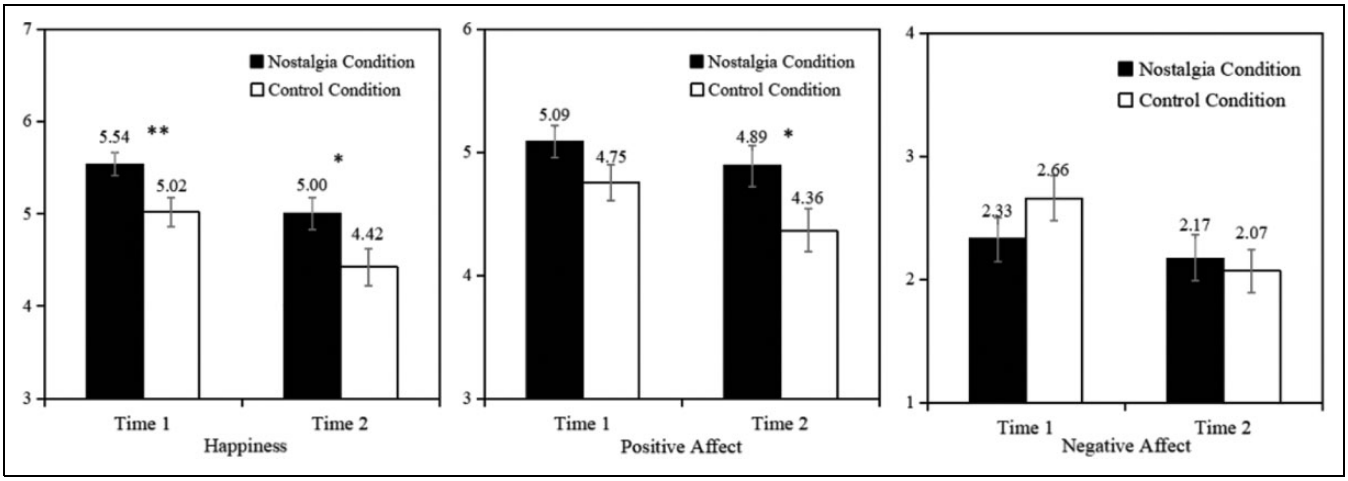

Figure 3. Happiness, positive affect, and negative affect in Study 5 Time 1 ($N = 196$) and in Study 5 Time 2 ($n = 121$). *Note.* The black columns represent the nostalgia condition, and the white columns represent the control condition. Happiness, positive affect, and negative affect are continuous variables ranging from 1 to 7. Error bars represent ± 1 standard error. *$p < .05$. **$p < .01$.

Time 2

One day after the original assessment, participants ($n = 121$) received a nostalgia-induction booster (nostalgia condition $n = 60$ and control condition $n = 61$) as in Study 4. Then, they completed the same manipulation check ($\alpha = .982$), happiness measure ($\alpha = .916$), and PA ($\alpha = .936$) and NA ($\alpha = .963$) measure as at Time 1 (Table 5).

Results

Time 1

Manipulation check. Participants in the nostalgia condition ($M = 5.52$; 95% CI [5.29, 5.74]) felt more nostalgic than controls ($M = 4.48$; 95% CI [4.13, 4.84]), $F(1, 194) = 24.32$, $p < .001$, $d = .708$.

Happiness and affect. Nostalgic participants ($M = 5.54$; 95% CI [5.29, 5.78]) reported more happiness than controls ($M = 5.02$; 95% CI [4.71, 5.32]), $F(1, 194) = 6.98$, $p = .009$, $d = .379$ (Figure 3, left panel). Nostalgic participants ($M = 5.09$; 95% CI [4.83, 5.34]) tended to report higher PA than controls ($M = 4.75$; 95% CI [4.47, 5.04]), $F(1, 194) = 2.90$, $p = .090$, $d = .244$ (Figure 3, middle panel), but the two groups did not differ on NA ($M_{\text{nostalgia}} = 2.33$, 95% $\text{CI}_{\text{nostalgia}}$ [2.00, 2.66]; $M_{\text{control}} = 2.66$, 95% $\text{CI}_{\text{control}}$ [2.29, 3.03]), $F(1, 194) = 1.73$, $p = .190$, $d = .189$ (Figure 3, right panel).

Time 2

Manipulation check. Participants in the nostalgia condition ($M = 4.44$; 95% CI [4.02, 4.87]) tended to feel more nostalgic than controls ($M = 3.86$; 95% CI [3.40, 4.33]), $F(1, 119) = 3.40$, $p = .068$, $d = .338$.

Happiness and affect. Nostalgic participants ($M = 5.00$; 95% CI [4.65, 5.35]) reported more happiness than controls ($M = 4.42$; 95% CI [4.02, 4.83]), $F(1, 119) = 4.67$, $p = .033$, $d = .396$ (Figure 3, left panel). Nostalgic participants ($M = 4.89$; 95% CI [4.56, 5.22]) reported more PA than controls ($M = 4.36$; 95% CI [4.01, 4.71]), $F(1, 119) = 4.78$, $p = .031$, $d = .401$ (Figure 3, middle panel), but the two groups did not differ on NA ($M_{\text{nostalgia}} = 2.17$, 95% $\text{CI}_{\text{nostalgia}}$ [1.78, 2.55]; $M_{\text{control}} = 2.07$, 95% $\text{CI}_{\text{control}}$ [1.71, 2.42]), $F(1, 119) = 0.15$, $p = .700$, $d = .071$ (Figure 3, right panel).

Table 6. Correlations Among Variables in Study 6.

Variable	*M*	*SD*	Happiness (Time 1)	Positive Affect (Time 1)	Negative Affect (Time 1)	Happiness (Time 2)	Positive Affect (Time 2)
Happiness (T1)	5.42	1.19					
Positive affect (T1)	5.36	1.14	.642**				
Negative affect (T1)	3.33	1.97	.201**	.199**			
Happiness (T2)	5.30	1.31	.764**	.659**	.189*		
Positive affect (T2)	5.21	1.28	.616**	.865**	.211*	.792**	
Negative affect (T2)	2.94	1.79	.144	.154	.914**	.118	.142

Note. Time 1, $N = 190$; Time 2, $n = 136$.
*$p < .05$. **$p < .01$.

Time 1 Versus Time 2

We used hierarchical linear modeling to examine change in the nostalgia (vs. control) effect over time. None of the Nostalgia × Time interactions were significant—manipulation check: $F(1, 152) = 3.33$, $p = .070$, $\eta_p^2 = .007$; happiness: $F(1, 138) = 0.01$, $p = .908$, $\eta_p^2 = .000$; PA: $F(1, 129) = 2.39$, $p = .125$, $\eta_p^2 = .006$; NA: $F(1, 122) = 1.06$, $p = .304$, $\eta_p^2 = .003$.

Discussion

Study 5 replicated the Study 4 results with a different measure of happiness. The nostalgia-induction booster sufficed to reinstate nostalgia's beneficial effects over time (as in Study 4).

Study 6

In a partially preregistered experiment (https://aspredicted.org/blind.php?x=7ff8ej), we tested the replicability of Study 4 and 5 findings in the absence of a nostalgia-induction booster. The study ran over 2 days (December 21, 2020 = Time 1; December 22, 2020 = Time 2) when infections were rising in all pertinent countries.

Participants

We estimated a medium effect size ($d = .50$) aiming for a minimum of $N = 210$ to achieve power $(1 - \beta) = .95$ at $\alpha = .05$. We recruited 209 U.S. MTurk workers (108 women and 101 men; $M_{\text{years}} = 38.34$ and $SD_{\text{years}} = 11.22$) but excluded 19 for failing to complete the manipulation, resulting in $N = 190$.

Method

Time 1

We induced nostalgia as in Studies 4 and 5 (nostalgia condition $n = 94$ and control condition $n = 96$) and administered the same manipulation check ($\alpha = .929$). We measured happiness ($\alpha = .876$), and formed PA ($\alpha = .923$) and NA ($\alpha = .980$) composites, as in Study 5.

Time 2

The day after, we recruited participants ($n = 136$; nostalgia condition $n = 74$ and control condition $n = 62$) for the follow-up survey. With no mention of the nostalgic or ordinary event, we instructed them to complete the same manipulation check ($\alpha = .959$), happiness measure ($\alpha = .890$), and PA ($\alpha = .938$) and NA ($\alpha = .977$) measure as at Time 1 (Table 6).

Results

Time 1

Manipulation check. Participants in the nostalgia condition ($M = 5.70$; 95% CI [5.51, 5.89]) felt more nostalgic than controls ($M = 4.56$; 95% CI [4.22, 4.89]), $F(1, 188) = 35.28$, $p < .001$, $d = .866$.

Happiness and affect. Nostalgic participants ($M = 5.66$; 95% CI [5.46, 5.86]) were happier than controls ($M = 5.19$; 95% CI [4.92, 5.46]), $F(1, 188) = 7.63$, $p = .006$, $d = .403$ (Figure 4, left panel). Nostalgic participants ($M = 5.53$; 95% CI [5.30, 5.75]) had higher PA than controls ($M = 5.20$; 95% CI [4.96, 5.44]), $F(1, 188) = 4.00$, $p = .047$, $d = .292$ (Figure 4, middle panel), but the two groups did not differ on NA ($M_{\text{nostalgia}} = 3.51$, 95% $\text{CI}_{\text{nostalgia}} = [3.07, 3.95]$; $M_{\text{control}} = 3.14$, 95% $\text{CI}_{\text{control}} = [2.78, 3.51]$), $F(1, 188) = 1.63$, $p = .204$, $d = .186$ (Figure 4, right panel).

Time 2

Manipulation check. Participants in the nostalgia condition ($M = 4.79$; 95% CI [4.41, 5.17]) tended to feel more nostalgic than controls ($M = 4.23$; 95% CI [3.74, 4.72]), $F(1, 134) = 3.31$, $p = .071$, $d = .320$.

Happiness and affect. Nostalgic ($M = 5.42$; 95% CI [5.14, 5.71]) and control ($M = 5.16$; 95% CI [4.80, 5.52]) participants did not differ on happiness, $F(1, 134) = 1.35$, $p = .248$, $d = .202$ (Figure 4, left panel), although the directional difference mimicked that of Studies 4 and 5. The effect size for happiness was approximately halved compared to Time 1 but in the same direction. Nostalgic ($M = 5.35$; 95% CI [5.07, 5.64]) and control ($M = 5.04$; 95% CI [4.70, 5.38]) participants did not

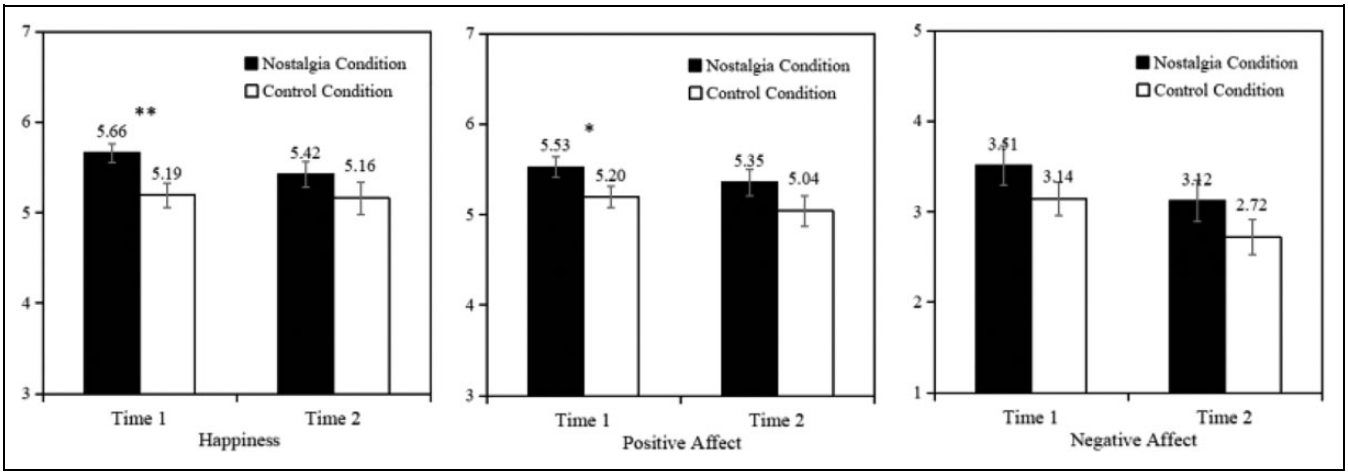

Figure 4. Happiness, positive affect, and negative affect in Study 6 Time 1 ($N = 190$) and in Study 6 Time 2 ($n = 136$). *Note*. The black columns represent the nostalgia condition, and the white columns represent the control condition. Happiness, positive affect, and negative affect are continuous variables ranging from 1 to 7. Error bars represent ± 1 standard error. $^{*}p < .05$. $^{**}p < .01$.

differ on PA, $F(1, 134) = 2.03$, $p = .156$, $d = .247$, but the effect was in the same direction as at Time 1 (Figure 4, middle panel). The effect size was essentially the same as at Time 1, suggesting that the effect was not weakened, but power was reduced due to attrition ($N = 190$ at Time 1 and $n = 136$ at Time 2).The two groups did not differ on NA ($M_{\text{nostalgia}} = 3.12$, 95% $\text{CI}_{\text{nostalgia}}$ [2.67, 3.57]; $M_{\text{control}} = 2.72$, 95% $\text{CI}_{\text{control}}$ [2.32, 3.12]), $F(1, 134) = 1.69$, $p = .196$, $d = .226$ (Figure 4, right panel).

Time 1 Versus Time 2

We examined change in the nostalgia effect over time using hierarchical linear modeling. The Nostalgia × Time interaction was not significant for PA, $F(1, 144) = 1.46$, $p = .228$, $\eta_p^2 = .004$, or NA, $F(1, 136) = 0.29$, $p = .589$, $\eta_p^2 = .001$. However, the Nostalgia × Time interaction was significant for the manipulation check, $F(1, 157) = 7.91$, $p = .006$, $\eta_p^2 = .018$, and happiness, $F(1, 150) = 4.99$, $p = .027$, $\eta_p^2 = .013$. The effect of nostalgia on the manipulation check and happiness was significantly stronger at Time 1 than Time 2.

Discussion

Study 6 replicated the Study 4 and 5 Time 1 findings but not the Time 2 findings. In light of these results, it is prudent to conclude that the booster is important for producing the beneficial nostalgia effects at Time 2. However, we cannot definitively rule out the possibility that nostalgia's benefits may persist over time even in the absence of a booster. First, the failure to find significant effects on happiness and PA (and the manipulation check) at Time 2 may be due, in part, to reduced power stemming from attrition. All three effects were in the predicted direction, and, whereas the effects on the manipulation check and happiness were significantly smaller at Time 2, the effect size for PA was practically unchanged. Second, IDAs of Studies 4–6 (see Supplementary Material) revealed that (a) the magnitude of nostalgia effects at Time 2 did not vary significantly between studies (Nostalgia × Study interactions were not significant) and (b) the change in nostalgia effects from Time 1 to Time 2 did not vary significantly between studies (Nostalgia × Time × Study interactions were not significant). There was no evidence that diminution of nostalgia effects over time was significantly larger in Study 6 (when the booster was absent) than in Study 4 or Study 5 (when the booster was present).

General Discussion

Loneliness, a widespread psychological and societal problem (Cacioppo, 2010; Haslam et al., 2018), is threatening to become an international health crisis during the pandemic (Banerjee & Rai, 2020; Zandifar & Badrfam, 2020). Loneliness appears to have triggered a wave of nostalgia, from a surge in popularity of old-fashioned board games to social media trends like #MeAt20 and rebroadcasting of classic sporting events (*The Guardian*, 2020a). We theorized that nostalgia constitutes an antidote to loneliness. Nostalgia counters the negative aftermaths of loneliness (unhappiness), establishing a homeostatic correction.

We obtained support for our hypothesis in three surveys (Studies 1–3) conducted in three cultures (China, United States, United Kingdom) and at different stages of the pandemic (infections leveling off in China, rising in the United States/United Kingdom). Loneliness conduced to unhappiness but also to nostalgia. Nostalgia in turn elevated happiness, counteracting the adverse influence of loneliness. In three experiments, testing Western participants, nostalgia exerted a direct impact on happiness and PA. In two of them (Studies 4 and 5), following an induction booster, nostalgia heightened happiness and PA up to 2 days later. In Study 6, which did not involve a booster, the effect of nostalgia on Time 2 happiness and PA was in the predicted direction but nonsignificant, potentially due (at least in part) to reduced power stemming from attrition. Thus, an induction booster is sufficient to produce nostalgia's

beneficial effects up to 2 days later, but more research is needed to determine whether it is necessary.

Our work enriched the literature. We proposed and supported empirically a suppression model involving the simultaneous operation of loneliness, nostalgia, and happiness. Also, we demonstrated that nostalgia can elevate happiness—all using varied methodological procedures and operationalizations of loneliness or happiness.

A possible limitation of our work is the small effect sizes. Yet, we obtained correlations that are typical of those reported in personality/social psychology (Funder & Ozer, 2019; Gignac & Szodorai, 2016). More importantly, even small effect sizes can be meaningful and consequential (Funder & Ozer, 2019). For example, nostalgia may increase appreciably happiness or help to counteract loneliness—at least in the short run—at the population level.

Another possible limitation concerns our use of cross-sectional mediation models, which has been criticized (Maxwell & Cole, 2007; O'Laughlin et al., 2018). However, this criticism is largely inapplicable. First, we tested a specific theory, being interested in its empirical plausibility. Testing the cross-sectional mediation models was informative because it placed the theory at risk (Anderson & Bushman, 1997; Fiedler et al., 2011)—a theory that has strong empirical grounding (Sedikides et al., 2015). Second, we tested our theory by first assessing how nostalgia, via happiness, counters loneliness and then establishing the causal influence of nostalgia on happiness. An additional limitation is that we did not assess individual variation in fear of COVID-19 (Ahorsu et al., 2020), a possible moderator of our findings.

Our findings have interventional implications, especially during the pandemic when social life is restricted. Nostalgia is easy to implement, as it can be self-initiated. Also, nostalgic engagement is mostly pleasurable (Sedikides et al., 2015), and its effects likely sustained with some effort (Studies 4 and 5), although boosters may need to be frequent (e.g., two to three times a week, corresponding to the natural frequency of nostalgizing; Wildschut et al., 2006) and refer to diverse nostalgic experiences rather than repeat a single one (Lyubomirsky, 2011). Such interventions can be cost- and time-effective. Nostalgia's potential can be harnessed to combat loneliness toward averting a downward spiral of declining mental health.

Declaration of Conflicting Interests

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Supplemental Material

The supplemental material is available in the online version of the article.

Notes

1. This sample size afforded sufficient power to detect a small indirect effect of loneliness on happiness via nostalgia ($b^*_a = .10$, $b^*_b = .10$, $b^*_c = .10$), given $N = 1{,}546$. Power exceeded .95 (MedPower application; Kenny, 2017).
2. For ethnic composition of all samples, see Supplementary Material.
3. This sample size afforded sufficient power to detect a small indirect effect of loneliness on happiness via nostalgia ($b^*_a = .10$, $b^*_b = .10$, $b^*_c = .10$), given $N = 1{,}572$. Power exceeded .95 (MedPower; Kenny, 2017).
4. This sample size afforded sufficient power to detect a medium indirect effect of loneliness on happiness via nostalgia (based on average of coefficients in Studies 1 and 2: $b^*_a = .15$, $b^*_b = .20$, $b^*_c = .15$), given $N = 572$. Power equaled .95 (Kenny, 2017).
5. We used the *effectsize_rep* Statistical Analysis System macro to calculate partial η^2 (η^2_p) for hierarchical linear models (Tippey & Longnecker, 2016).

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