

Distress prospectively predicts higher nostalgia, and nostalgia prospectively predicts lower distress

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Abstract

Objective: We were concerned with the relation between distress and nostalgia. At the state level, extensive research has established that momentary nostalgia is evoked by (experimentally manipulated) distress. However, at the trait level, the directionality of this relation is unclear. We conducted a longitudinal study to clarify the directional relation between these two constructs.

Method: We surveyed first-year university students ($N = 3167$) twice across six months. We assessed nostalgia, psychological distress (depression), and physical distress (somatization) at both timepoints. We also assessed Big Five personality at the first timepoint.

Results: Initial distress prospectively predicted increased nostalgia, and initial nostalgia prospectively predicted reduced distress, six months later and independently of the Big Five.

Conclusions: Habitual nostalgia follows rather than precedes naturalistically occurring distress and serves to relieve it.

KEYWORDS

Big Five personality, nostalgia, physical distress, psychological distress

1 | INTRODUCTION

When Johannes Hofer submitted his dissertation to University of Basel's Medical School in 1688, he painted a bleak picture of nostalgia—a term he coined from the Greek words “nostos,” meaning homecoming, and “algos,” meaning pain (the suffering one endures by the desire to return to their place of origin). He conceptualized nostalgia as a neurological affliction, “a cerebral disease” (p. 387). He based this inference on a handful of interviews of Swiss mercenaries who, making their livelihood in France or Italy, pined for their homeland. They exhibited, Hofer argued, a variety of psychological and physical symptoms including despondency, bouts of

weeping, cardiac palpitations, and stomach pain. Hofer's argument was echoed later by other luminaries, such as the German-Swiss physician Scheuchzer, and by military physicians in the French Revolutionary army and American Civil War. By the beginning of the 20th century, the view of nostalgia as a neurological disease had waned, trading places with another label: clinical disorder. Symptoms were, again, of the psychological and physical variety, such as sadness, pessimism, weakness, loss of appetite, insomnia, and fever. Psychodynamic theorizing in mid-century reinforced that label (“mentally repressive compulsive disorder”; Fodor, 1950, p. 25), asserting that nostalgia emerges from subconscious longing to return to one's fetal condition. The blighted stature of nostalgia

was softened by the end of the century, but it nevertheless carried over to the next (Bednar et al., 2020; Natali, 2004; Todorova, 2010; Zinchenko, 2011). (For reviews, see: Batcho, 2013; Dodman, 2018; Sedikides et al., 2004).

The view of nostalgia as a dismal emotion originated in a likely inferential error (Sedikides et al., 2008; Sedikides & Wildschut, 2016). Hofer (1688 [1934]) assumed that nostalgia was the cause, and distress (i.e., psychological and physical symptoms) was the effect. This relation, however, might take another form. According to the regulatory model of nostalgia (Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015; Wildschut & Sedikides, 2022a, 2022b), a distressing psychological or physical stimulus evokes a negative psychological condition, but also nostalgia. Nostalgia, in turn, counteracts the distressing stimulus (i.e., weakens its adverse impact on the condition), re-establishing psychological equilibrium. Thus, distress can be the cause, eliciting nostalgia as a coping mechanism. Coming full circle back to Hofer's story, to be able to cope with their misfortune, Swiss mercenaries probably resorted to nostalgia.

1.1 | Distress-to-higher-nostalgia link, and nostalgia-to-lower-distress link, at the state level

The distress-to-higher-nostalgia link is well supported by research that addresses nostalgia as in-the-moment sentimental longing for one's valued past. Psychologically adverse stimuli that are experimentally manipulated elicit nostalgia; such stimuli include loneliness (Wildschut et al., 2010; Zhou et al., 2008), avoidance motivation (Stephan et al., 2014), sadness (Garrido & Schubert, 2015; Wildschut et al., 2006), boredom (Van Tilburg et al., 2013), disillusionment (Maher et al., 2021), loss of control (Huang et al., 2023), meaninglessness (Routledge et al., 2011), death cognitions (Juhl et al., 2010; Routledge et al., 2008), social exclusion (Seehusen et al., 2013; Wildschut et al., 2010), procedural injustice (Van Dijke et al., 2015), and self-discontinuity (Sedikides, Wildschut, Routledge, & Arndt, 2015). Physically adverse stimuli that are experimentally manipulated also elicit nostalgia; such stimuli include low ambient temperatures (Zhou et al., 2012), rain, thunder, or wind sounds (Van Tilburg et al., 2018), and physical pain (Kersten et al., 2020).

Furthermore, the elicited nostalgia serves to relieve distress, both psychological and physical; the nostalgia-to-lower-distress link. From a psychological standpoint, momentary nostalgia increases self-esteem (Hepper et al., 2012; Vess et al., 2012; Wildschut et al., 2006), optimism (Cheung et al., 2013; Evans et al., 2021; Reid et al., 2015), inspiration (Evans et al., 2021; Hinsch et al., 2020; Stephan et al., 2015), self-continuity (Hong et al., 2021, 2022; Sedikides, Wildschut, Routledge, & Arndt, 2015),

meaningfulness (Hepper et al., 2012; Routledge et al., 2011; Van Tilburg et al., 2013), and social support (Lasaleta et al., 2021; Routledge et al., 2011; Zhou et al., 2008) or social connectedness (Evans et al., 2021; Hepper et al., 2012; Wildschut et al., 2006). Additionally, momentary nostalgia eases physical distress by fostering a sense of physiological comfort (Zhou et al., 2012) and curtailing perceptions of pain (Kersten et al., 2020; Zhang et al., 2022).

1.2 | Trait nostalgia

Nostalgia, though, can manifest not only as a transient experience or state, but also as a trait. A trait represents an individual's base-rate proclivity toward (or away from) a set of emotions, cognitions, or actions, whereas a state represents the actual set of emotions, cognitions, or actions experienced in a certain context (Fleeson, 2001; Lenton et al., 2013). In addition, traits and states differ on duration, continuity, and abstractness (Fridhandler, 1986; Jayawickreme et al., 2019; Nezlek, 2007). States are more short-lived than traits. In addition, states are more continuous than traits: A particular state episode manifests relatively continuously, whereas traits are less uniform over time. Lastly, states are more concrete (observable through direct experience) than traits (requiring inference); thus, traits are better predicted from a sample of state episodes than a single episode.

At the trait level, nostalgia refers to habitually rekindling fond memories, such as those involving one's childhood or close relationships (Batcho, 1995; Hepper et al., 2012, 2014). These memories refer to personally meaningful and shared events (e.g., vacations, picnics, anniversaries, birth of a child, family gatherings). Nostalgic reflection, reported to occur at least once a week for most people (Hepper et al., 2021; Wildschut et al., 2006),¹ may involve contentment, tenderness, or joy, but also tinges of longing or sadness for the irrevocably by-gone moments (Batcho, 2007; Hepper et al., 2012; Newman et al., 2020, Study 5). Indeed, nostalgic narratives contain expressions of both positive affect and—to a lesser extent—negative affect (Holak & Havlena, 1998; Newman et al., 2020, Study 5; Wildschut et al., 2006). Lastly, nostalgia is distinct from such constructs as rumination, homesickness, or counterfactual thinking (Cheung et al., 2018; Jiang et al., 2021; Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015). In all, nostalgia is a self-relevant, social, and predominantly positive emotion.

1.3 | From trait distress to trait nostalgia and vice versa

We maintain that the distress-to-higher-nostalgia link, and the nostalgia-to-lower-distress link, are likely to hold

not only at the state level (as an outcome of experimental manipulation), but also at the trait level. There is suggestive evidence for the distress-to-higher-nostalgia link at this level. Pertinent studies have linked bereavement (Reid et al., 2021), boredom (Van Tilburg et al., 2013, Study 5), loneliness (Abeyta et al., 2020, Study 1; Zhou et al., 2008, Study 1; Zhou et al., 2022, Studies 1–3), negative affect, regret, search for meaning, depression, and lower self-esteem (Newman et al., 2020, Study 2), as well as need to belong (Seehusen et al., 2013) to nostalgia, but the evidence is cross-sectional, precluding directional inferences. The same applies to research showing that feeling lonely or dissatisfied with one's sex life or current relationship is associated with sexual nostalgia (Muise et al., 2020, Studies 1 and 2), defined as “reflection on positive sexual experiences with past partners” (p. 1538). In addition, nostalgia is elicited by loneliness to counteract its pernicious influence on social support (Zhou et al., 2008, Study 1) or social confidence (Abeyta et al., 2020), but again the evidence is cross-sectional. Lastly, research conducted during the Covid-19 pandemic, documented a link between loneliness-elicited nostalgia and happiness (Zhou et al., 2022, Studies 1–3), and between fear of isolation and nostalgic media use (Wulf et al., 2022), but the evidence does not inform conclusively the directionality of the distress–nostalgia connection.

There is also suggestive evidence for the nostalgia-to-lower-distress link at the trait level. High (compared to low) nostalgics have stronger preferences for social interactions (Abeyta et al., 2015) or social activities (Batcho, 1998), have more interdependent self-construals (Abakoumkin et al., 2020), perceive higher levels of social support (Zhou et al., 2008), are better able to maintain psychological wellbeing across the adult life span (Hepper et al., 2021), and are more proficient at using state nostalgia to gain psychological benefits such as increased optimism (Cheung et al., 2016) or lowered death anxiety (Juhl et al., 2010). Further, in a multi-week intervention, high (compared to low) nostalgics benefitted more from a regular nostalgic writing activity, manifesting greater well-being (i.e., positive affect, life satisfaction, subjective vitality, eudaimonia) after six weeks and at a one-month follow-up (Layous et al., 2022). Taken together, trait nostalgia appears to act as a well of resourcefulness, and individuals who can dip into this well (i.e., are high on the trait) are able to cope better with distress.

1.4 | Overview

Given the cross-sectional nature of the above-described trait-level evidence, direction of causality is ambiguous.

What we interpreted as support for the distress-to-higher-nostalgia link others might consider evidence for a nostalgia-to-higher-distress link. Likewise, what we presented as evidence for a nostalgia-to-lower-distress link is also consistent with the reverse causal direction. A longitudinal investigation can clarify this directionality. We duly implemented a longitudinal design (i.e., two timepoints separated by six months) testing the regulatory model. In particular, we used a cross-lagged panel model (CLPM) to examine the lagged associations between distress and nostalgia, and nostalgia and distress. This was the most suitable model for our purposes, given that we were interested in between-person variance (Orth et al., 2021). That is, the CLPM tests the prospective effect of individual differences in a trait on change in individual differences in another trait. In the present case, the model allows us to examine whether participants who reported more (vs. less) distress than others at Time 1 experienced a subsequent rank-order increase in nostalgia at Time 2 (i.e., their rank-order value in nostalgia at Time 2 is higher than would be expected based on their rank-order value in nostalgia at Time 1), and whether participants who reported more (vs. less) nostalgia than others at Time 1 experienced a subsequent rank-order decrease in distress at Time 2 (i.e., their rank-order value in distress at Time 2 is lower than would be expected based on their rank-order value in distress at Time 1).

We assessed trait nostalgia in terms of propensity, frequency, and personal relevance (Routledge et al., 2008). We focused on the two types of distress mentioned above: psychological (i.e., depression) and physical (i.e., somatization). In addition, we controlled for Big Five personality, given that trait nostalgia is positively correlated with Neuroticism ($r = .11-.21$), Extraversion ($r = .07-.27$), Openness to Experience ($r = .07-.24$), Conscientiousness ($r = .06-.11$), and Agreeableness ($r = .08-.24$; Juhl et al., 2020; Luo et al., 2016; Newman et al., 2020; Seehusen et al., 2013; Stephan et al., 2014; Tullett et al., 2015).

2 | METHOD

2.1 | Participants

We tested first-year university students at Zhejiang Ocean University twice. Participants completed our measures as part of a mass-testing session. They were seated in a quiet room separated by dividers. At T1—between the 2nd and 9th week of the first semester—3167 students (1723 men, 1444 women; age in years: $Range = 16-28$, $M = 19.00$, $SD = 1.11$), the full class enrollment, completed the measures. At T2—approximately six months

later (interval in days: *Range* = 154–204, *M* = 177.00, *SD* = 7.75)—3047 students (1657 men, 1390 women; age in years: *Range* = 17–29, *M* = 20.00, *SD* = 1.11) completed the measures (attrition rate = 3.79%).² A sensitivity power analysis with G*Power 3.1.9.4 (Faul et al., 2007) revealed that our sample size afforded sufficient power (0.80) to detect a small effect ($f^2 \geq 0.002$, $\alpha = .05$, two-tailed).

2.2 | Procedure and measures

Following demographic questions, participants filled out the measures in the following order.

2.2.1 | Big Five personality traits

We assessed at T1 the Big Five personality traits with 50 items from the International Personality Item Pool Big Five factor markers (Goldberg, 1992), a scale validated in Chinese samples (Zheng et al., 2008). The scale comprises five subscales of 10 items each: Extraversion (e.g., “I start conversations”; $\alpha = .84$), Agreeableness (e.g., “I sympathize with others’ feelings”; $\alpha = .79$), Conscientiousness (e.g., “I am always prepared”; $\alpha = .78$), Neuroticism (e.g., “I get stressed out easily”; $\alpha = .83$), Openness to Experience (e.g., “I am full of ideas”; $\alpha = .83$). Participants rated how accurately each item described them (1 = *very inaccurately*, 6 = *very accurately*).

2.2.2 | Distress

Psychological distress

We operationalized psychological distress as depression. We measured it with the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which is validated in Chinese samples (Chin et al., 2015; Fong et al., 2016). The CES-D consists of 20 symptoms associated with depression. Sample items are: “I was bothered by things that usually don’t bother me,” “I felt that I could not shake off the blues even with help from my family,” “I felt that I was just as good as other people” (reverse-scored). Participants rated how often they had felt each of these symptoms during the past week (0 = *rarely or none of the time*, 3 = *all of the time*; $\alpha_{T1} = .89$, $\alpha_{T2} = .90$).³ Higher scores reflect more severe depression.

Physical distress

We assessed physical distress with a somatization scale, the Chinese Health Questionnaire (CHQ; Cheng et al., 1990;

Chong & Wilkinson, 1989), which has been adapted from the General Health Questionnaire (Goldberg, 1978) to Chinese culture. The CHQ contains 30 items. A factor analysis on a Chinese sample ($N = 377$; Yang et al., 2003) yielded four factors: Somatic Symptoms (10 items), Social Dysfunction/Poor Family Relationships (9 items), Anxiety/Worry (6 items), and Depression (5 items). We included the Somatic Symptoms subscale in the mass-testing session and our study. Participants reported how frequently they experienced each symptom in the past week. Sample items are: “Been suffering from headache or pressure in your head?”, “Had palpitations and worried that you might have a heart trouble?”, “Had discomfort or a feeling of pressure in your chest?” (1 = *never*, 4 = *always*; $\alpha_{T1} = .93$, $\alpha_{T2} = .92$). Higher scores represent greater somatization.

2.2.3 | Nostalgia

We assessed nostalgia with the 5-item Southampton Nostalgia Scale (SNS; Routledge et al., 2008), a scale validated in Chinese samples (Zhou et al., 2008). One item asks about the propensity to nostalgize (e.g., “How prone are you to feeling nostalgic?”; 1 = *not at all*, 7 = *very much*), three about the frequency of nostalgizing (e.g., “Generally speaking, how often do you bring to mind nostalgic experiences?”; 1 = *very rarely*, 7 = *very frequently*), and one about the personal relevance of nostalgia (e.g., “How important is it for you to bring to mind nostalgic experiences?”; 1 = *not at all*, 7 = *very much*; $\alpha_{T1} = .85$, $\alpha_{T2} = .82$). Higher scores reflect more nostalgia.

3 | RESULTS

We present the means, standard deviations, and variable intercorrelations—for both timepoints—in Table 1.

3.1 | Factor structure of the 5-item Southampton nostalgia scale

We carried out a confirmatory analysis to validate the factor structure of T1 SNS. We constructed a one-factor model with all five items loading onto a single latent variable. For model specification, we set the variance of the latent factor to 1 while freely estimating the factor loadings and errors (residuals).

The one-factor model for the 5-item SNS fit well, $\chi^2(5) = 102.13$, $p < .001$, Comparative Fit Index (CFI) = 0.987, Tucker–Lewis Index (TLI) = 0.974; Root

TABLE 1 Means, standard deviations, and correlations among nostalgia, distress, and Big Five personality across two timepoints.

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. T1 Nostalgia	4.80	1.22	-									
2. T2 Nostalgia	4.30	1.14	0.57***	-								
3. T1 Depression	0.51	0.43	0.23***	0.19***	-							
4. T2 Depression	0.57	0.45	0.15***	0.22***	0.52***	-						
5. T1 Somatization	1.71	0.61	0.17***	0.14***	0.46***	0.40***	-					
6. T2 Somatization	1.54	0.55	0.11***	0.14***	0.36***	0.51***	0.42***	-				
7. T1 Extraversion	3.42	0.89	-0.02	-0.02	-0.22***	-0.14***	-0.09***	-0.09***	-			
8. T1 Agreeableness	4.71	0.60	0.07***	0.06**	-0.32***	-0.25***	-0.20***	-0.18***	0.21***	-		
9. T1 Conscientiousness	4.19	0.72	-0.06**	-0.07***	-0.37***	-0.26***	-0.24***	-0.21***	0.08***	0.45***	-	
10. T1 Neuroticism	3.53	0.82	0.28***	0.25***	0.55***	0.38***	0.32***	0.28***	-0.25***	-0.27***	-0.39***	-
11. T1 Openness to Experience	4.10	0.73	0.04*	0.00	-0.25***	-0.11***	-0.13***	-0.14***	0.40***	0.35***	0.38***	-0.27***

* $p < .05$; ** $p < .01$; *** $p < .001$.

Mean Square Error of Approximation (RMSEA) = 0.078; Standardized Root Mean Square Residual (SRMR) = 0.020. All items loaded significantly on the single factor ($ps < .001$; see Figure 1 for model visualization and parameter estimations). The average variance extracted (AVE) was 0.57, which is above the cut-off point of 0.50 according to the Fornell-Larcker criterion for convergent validity (Fornell & Larcker, 1981). The results indicated that the 5-item SNS shows satisfactory construct validity.

3.2 | Testing measurement invariance

We used structural equation modeling (SEM) to test the measurement invariance of nostalgia and distress over time. For the measurement models, the five SNS items loaded on the nostalgia latent factor. In addition, we split CES-D and CHQ items into four and three parcels, respectively, using balancing technique (Little et al., 2002), and loaded them to the depression and somatization latent factors; subsequently, we loaded the depression and somatization latent factors to a higher-order distress latent factor. We allowed the uniqueness of individual indicators to correlate across time in order to control for bias due to item or parcel-specific variance (Cole & Maxwell, 2003). We proceeded to examine the longitudinal measurement invariance of distress and nostalgia following criteria set by Cheung and Rensvold (2002) and Chen (2007): $\Delta CFI \leq 0.1$, $\Delta RMSEA \leq 0.015$, $\Delta SRMR \leq 0.030$. Both configural and metric invariance were met (Table 2), confirming the appropriateness of longitudinal comparisons.

3.3 | The cross-lagged relation between distress and nostalgia

To examine the cross-lagged relation between distress and nostalgia, and vice-versa, we constructed a series of SEM models. We present the model fit in Table 3. We first specified a full cross-lagged model: Model A (Figure 1). In particular, we specified the autoregressive paths (nostalgia T1 to nostalgia T2, and distress T1 to distress T2), cross-lagged paths (nostalgia T1 to distress T2, and distress T1 to nostalgia T2), and the covariance between constructs at the same timepoint (covariance between nostalgia T1 and distress T1, and covariance between the error terms for nostalgia T2 and distress T2). The autoregressive paths estimated the stability of the constructs, and the cross-lagged paths estimated the prospective effects of one construct on the other. Model A yielded good fit, $\chi^2(240) = 1623.17$, $p < .001$, CFI = 0.974, TLI = 0.970, RMSEA = 0.043, SRMR = 0.056. Both autoregressive

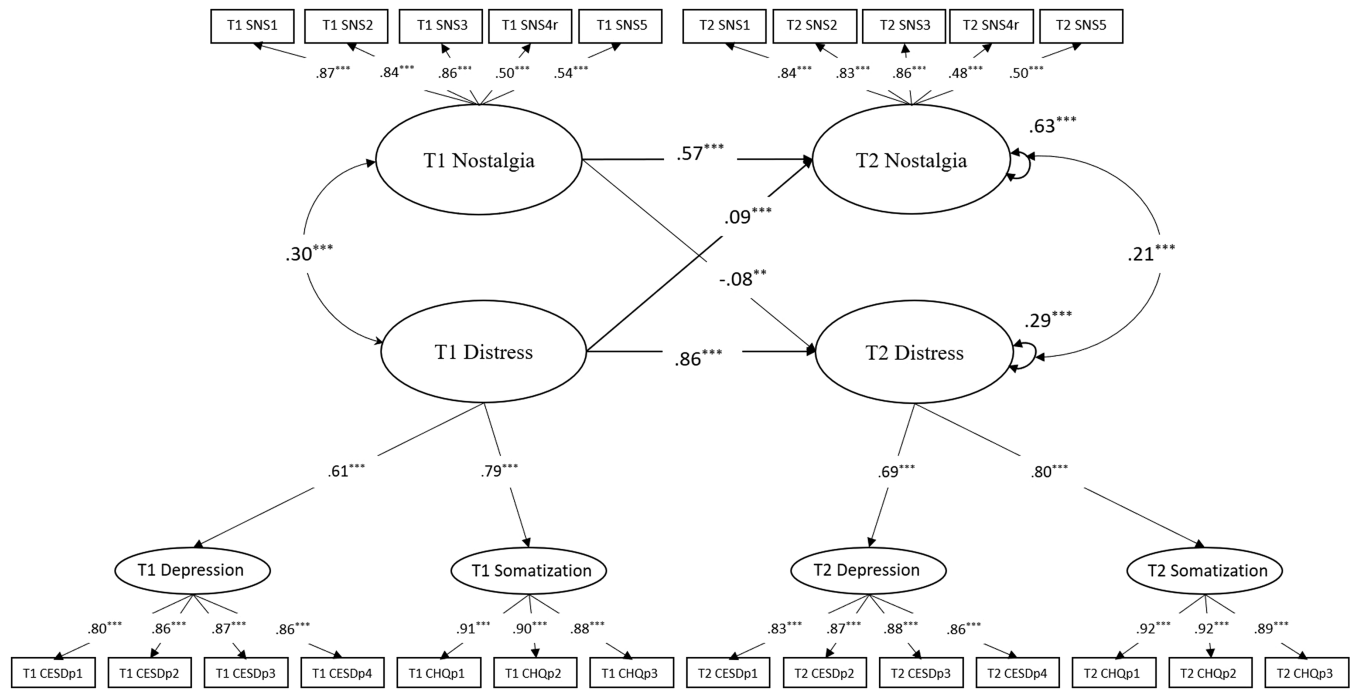


FIGURE 1 Cross-lagged effects between distress and nostalgia. CESD, Center for Epidemiologic Studies Depression Scale; CHQ, Chinese Health Questionnaire; p, parcel; r, reverse-scored item; SNS, Southampton Nostalgia Scale. Standardized structural coefficients for the nostalgia—distress cross-lagged model (Model A) with metric invariance. Error terms of manifest indicators and covariances among error terms of manifest indicators are omitted to avoid clutter. * $p < .05$, ** $p < .01$, *** $p < .001$.

TABLE 2 Goodness-of-fit indices for models testing longitudinal measurement invariance.

Model	χ^2	df	CFI	TLI	RMSEA [90% CI]	SRMR
Nostalgia						
Configural invariance	305.02	29	0.982	0.973	0.055 [0.049, 0.060]	0.033
Metric invariance	345.19	33	0.980	0.973	0.055 [0.050, 0.060]	0.039
Distress						
Configural invariance	494.68	65	0.988	0.983	0.046 [0.042, 0.049]	0.029
Metric invariance	563.24	71	0.986	0.983	0.047 [0.043, 0.050]	0.038

Abbreviations: CFI, Comparative Fit Index; CI, confidence interval; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Square Residual; TLI, Tucker-Lewis Index.

paths were significant, $b^*_{distress\ T1 \rightarrow distress\ T2} = 0.86$, $p < .001$, 95% CI = [0.80, 0.90], $b^*_{nostalgia\ T1 \rightarrow nostalgia\ T2} = 0.57$, $p < .001$, 95% CI = [0.54, 0.60]. Importantly, the prospective effect of T1 distress on T2 nostalgia was positive, $b^*_{distress\ T1 \rightarrow nostalgia\ T2} = 0.09$, $p < .001$, 95% CI = [0.05, 0.14], whereas the prospective effect of T1 nostalgia to T2 distress was negative, $b^*_{nostalgia\ T1 \rightarrow distress\ T2} = -0.08$, $p = .001$, 95% CI = [-0.12, -0.03].

We next removed the cross-lagged paths in turn. In Model B, we removed the cross-lagged path from T1 nostalgia to T2 distress. This model fitted significantly worse than Model A, $\Delta\chi^2(1) = 11.32$, $p < .001$, indicating that the omission of a cross-lagged path from T1 nostalgia to T2 distress reduced model fit. In this model, the path

from earlier distress to later nostalgia remained significant, $b^*_{distress\ T1 \rightarrow nostalgia\ T2} = 0.09$, $p < .001$, 95% CI = [0.05, 0.13]. In Model C, we removed the cross-lagged path from T1 distress to T2 nostalgia. Again, this model fitted significantly worse than Model A, $\Delta\chi^2(1) = 19.35$, $p < .001$, indicating that the omission of a cross-lagged path from T1 distress to T2 nostalgia reduced model fit. In this model, the path from earlier distress to later nostalgia remained significant, $b^*_{nostalgia\ T1 \rightarrow distress\ T2} = -0.07$, $p = .001$, 95% CI = [-0.12, -0.03]. These findings reveal that experiencing higher level of distress at an earlier time is prognostic of later nostalgia, whereas resorting to nostalgia more frequently at an earlier time predicts lower levels of later distress.

TABLE 3 Testing the cross-lagged relations between nostalgia and distress.

Model	Autoregressive path				Cross-lagged path				Model fit					
	T1 nostalgia → T2 nostalgia		T1 distress → T2 distress		T1 nostalgia → T2 distress		T1 distress → T2 nostalgia		χ^2	df	CFI	TLI	RMSEA	SRMR
	b*	95% CI	b*	95% CI	b*	95% CI	b*	95% CI						
A	0.57	[0.54, 0.60]	0.86	[0.82, 0.90]	-0.08	[-0.12, -0.03]	0.09	[0.05, 0.14]	1623.17	240	0.974	0.970	0.043	0.056
B	0.58	[0.55, 0.61]	0.82	[0.79, 0.86]	-	-	0.09	[0.05, 0.13]	1634.48	241	0.973	0.970	0.043	0.056
C	0.60	[0.57, 0.63]	0.85	[0.81, 0.90]	-0.07	[-0.12, -0.03]	-	-	1642.51	241	0.973	0.969	0.043	0.057
D	0.55	[0.52, 0.58]	0.86	[0.77, 0.95]	-0.05	[-0.09, -0.01]	0.07	[0.01, 0.13]	2105.58	340	0.969	0.963	0.040	0.052

Note: Model A = Full cross-lagged model with all cross-lagged effects, autoregression effects, and correlations between factors at the same time point; Model B = Only cross-lagged effect of distress on nostalgia with autoregression effects and correlations between factors at the same time point; Model C = Only cross-lagged effect of nostalgia on distress with autoregression effects and correlations between factors at the same time point; Model D = Full cross-lagged model with all cross-lagged effects, autoregression effects, and correlations between factors at the same time point, controlling T1 Big Five personality traits.

Abbreviations: CFI, Comparative Fit Index; CI, confidence interval; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Square Residual; TLI, Tucker–Lewis index.

3.4 | The prospective effect of early distress on later nostalgia, and vice-versa, above and beyond Big Five personality

To examine further whether the prospective effect of early distress on later nostalgia, and vice-versa, held above and beyond Big Five personality, we included Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience in Model A to form Model D. In this latter model, we added paths from the Big Five personality traits measured at T1 to predict T2 nostalgia and T2 distress.

Model D fit well, $\chi^2(340) = 2105.58$, $p < .001$, CFI = 0.969, TLI = 0.963, RMSEA = 0.040; SRMR = 0.052. As before, both the autoregressive paths were significant, $b^*_{distress\ T1 \rightarrow distress\ T2} = 0.86$, $p < .001$, 95% CI = [0.77, 0.95], $b^*_{nostalgia\ T1 \rightarrow nostalgia\ T2} = 0.55$, $p < .001$, 95% CI = [0.52, 0.58]. More importantly, after controlling for Big Five personality, the prospective effect of T1 distress on T2 nostalgia remained significant, $b^*_{distress\ T1 \rightarrow nostalgia\ T2} = 0.07$, $p = .028$, 95% CI = [0.01, 0.13], as did the prospective effect of T1 nostalgia on T2 distress, $b^*_{nostalgia\ T1 \rightarrow distress\ T2} = -0.05$, $p = .032$, 95% CI = [-0.09, -0.01]. These results indicated that higher early distress is uniquely prognostic of increased later nostalgia, whereas higher early nostalgia is uniquely prognostic of reduced later distress, above and beyond Big Five personality (for Model D Big Five results; Supplemental Materials).

4 | DISCUSSION

4.1 | Summary of the findings

The directional relation between distress and nostalgia has been in dispute for over 330 years. Relying on anecdotal or cross-sectional evidence, early scholars proposed that nostalgia conduces to distress. Experimental research in the last 20 years has documented the reverse direction: distress, both psychological and physical, instigates nostalgia. Nostalgia, in turn, acts as a protective mechanism alleviating the adverse consequences of distress. Does the direction of causality, however, hold when tested at the trait level? We addressed this question with a longitudinal study. The results were consistent with prior findings at the state level. Initial distress prospectively predicted higher nostalgia, whereas initial nostalgia prospectively predicted lower distress, six months later. Although it is rare in psychological research for cross-lagged effects to have opposite signs, such a pattern is not unique. For example, Oh et al. (2020) found that, at the between-person level, earlier externalizing problems (e.g., aggression, non-compliance) *positively* predicted

later internalizing problems (e.g., inhibition, fear), but earlier internalizing problems *negatively* predicted later externalizing problems. These findings, they proposed, were consistent with the idea that “internalizing problems act as a protective or buffering factor against the development of externalizing problems” (p. 477). We concur that cross-lagged effects with opposite signs can point to the operation of a protective mechanism; in the present case, nostalgia.⁴

4.2 | Implications of the findings

The study took steps toward clarifying the directional relation between distress and nostalgia at the trait level. By measuring nostalgia as a relatively stable individual difference and tracking it across time, we were able to observe that distress preceded nostalgia, whereas nostalgia reduced it. That is, participants who frequently experienced distress—both psychologically and physically—were more likely to resort to nostalgizing, whereas those who frequently nostalgized were less likely to be distressed.

The results are congruent with the regulatory model of nostalgia (Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015; Wildschut & Sedikides, 2022a, 2022b), but they extend the model to the trait level. Our findings are consistent with recent advances in the literature. As mentioned previously, loneliness or fear of isolation during the Covid-19 lockdown were associated with higher nostalgia (Zhou et al., 2022) or nostalgic media engagement (Wulf et al., 2022), respectively. Repeatedly evoked nostalgic states might build up into habitual or trait-like nostalgia (Bleidorn et al., 2020). In addition, individuals might become more proficient in using nostalgia to regulate their discomforting states and establish psychological homeostasis. In turn, those proficient in nostalgia use (i.e., those high on trait nostalgia) are likely to be more sensitive to aversive cues that engender discomfort (Yang et al., 2021), react to them faster (Yang et al., 2021), experience stronger in-the-moment nostalgia (Barrett et al., 2010; Sedikides et al., 2022; Yang et al., 2021), and gain more psychological benefits from nostalgizing (Cheung et al., 2016; Juhl et al., 2010; Layous et al., 2022). Thus, high trait nostalgia may be considered a marker of emotional resilience, a coping mechanism that can fortify in the long-run against distress.

The findings strengthen the conceptualization of nostalgia as a desirable trait. Previous work has positively linked trait nostalgia with both unfavorable (e.g., bereavement, Reid et al., 2021; loneliness, Zhou et al., 2008, 2022) and favorable (e.g., psychological wellbeing, Hepper et al., 2021; Layous et al., 2022) outcomes. Our study clarifies these ostensibly contradictory findings and showcases

the malleability of trait nostalgia as a coping resource in response to distress. This assertion is congruent with recent neuroscientific and genetic advances on trait nostalgia. At the neuroscientific level, a polymorphism in the promoter of the serotonin transporter gene (5-HTTLPR), which is associated with sensitivity to negative experiences (Drabant et al., 2012; Osinsky et al., 2008), is found among individuals higher (than lower) on nostalgia (Luo et al., 2019). Similarly, nostalgia is positively associated with right-frontal cortical asymmetry, which is an indicator of withdrawal motivation often instigated by negativity (Tullett et al., 2015). Further, nostalgia implicates brain activity involved in emotion regulation processing (i.e., anterior cingulate cortex, medial prefrontal cortex) and reward processing (i.e., striatum, substantia nigra, ventral tegmental area, ventromedial prefrontal cortex; Yang et al., 2022). At the genetic level, nostalgia is positively related to satisfaction with life, with the correlation largely accounted for by non-shared environment (Luo et al., 2022).

Evidence from two streams of research—experimental and cross-sectional or longitudinal studies—is consistent with the possibility that higher nostalgia follows, rather than precedes, distress. We turn now to a third source of evidence, daily diary or Experience Sampling Methodology (ESM) studies. Such studies assess participants multiple times in much shorter time-intervals than longitudinal studies, thus capturing the trajectory of transient nostalgia in daily life (Myin-Germeys et al., 2009). ESM studies reflect “more mundane, less intense” forms of nostalgia (Newman et al., 2020, p. 342).

This nascent literature depicts nostalgia as a more positive than negative experience. For example, Thibault (2016, Study 2) reported a daily diary study wherein daily nostalgic memories were associated with significantly more positive affect than daily non-nostalgic memories. Evans et al. (2022, Study 4) found that daily fluctuations in romantic nostalgia (i.e., nostalgia about shared dyadic experiences) were accompanied by positive affect. In addition, Turner and Stanley (2021) observed that among younger and middle-aged adults increases in positive affect were accompanied by a 2-times-larger increase in nostalgia (relative to non-nostalgia) likelihood, with the increase being slightly smaller among older participants. Participants in all three age groups rated daily nostalgic experiences as more positive than negative (i.e., a positivity offset; J. R. Turner, personal communication, August 9, 2022).⁵ This literature also highlights nostalgia’s palliative role, consistent with the regulatory model of nostalgia. In two ESM studies (random once-a-day assessments) by Van Dijke et al. (2019, Studies 1-2), momentary nostalgia predicted higher intrinsic motivation or work effort in the presence of distress (i.e., low interactional justice in organizations)

but not in the absence of it. In addition, in a daily-diary study by (Zou et al., 2022), momentary nostalgia conduced to authenticity, which counteracted the adverse impact of COVID-related stress in a sample of working adults. Moreover, in a daily diary study, Van Tilburg et al. (2018, Study 2) found that nostalgia counteracted psychological distress.

A daily diary study by Muise et al. (2020, Study 3) yielded more nuanced findings. On the one hand, within-person analyses (i.e., using daily ratings) were generally consistent with the regulatory model: relationship dissatisfaction predicted sexual nostalgia. That is, on days when participants experienced lower sexual or relationship satisfaction with their current partner than normal, they reported increased sexual nostalgia for a previous partner, although this pattern was observed only among men (but not women) who were low (but not high) on attachment avoidance. On the other hand, between-person analyses (i.e., using average ratings across days) appeared to be generally inconsistent with the regulatory model. Average (across 28 days) sexual nostalgia for a previous partner predicted reduced satisfaction with one's sex life and relationship three months later. So, people who were habitually nostalgic for positive past sexual experiences manifested a decline in satisfaction with their current relationship. However, as Muise et al. pointed out, chronic nostalgic reverie about past sexual experiences may reflect a strategy to cope with current lack of sexual or relational fulfillment, introducing uncertainty about direction of causality. Regardless, this pattern was observed only among individuals low (but not high) on attachment anxiety.

Daily diary studies by Newman et al. (2020) produced mixed results. In their Study 3, loneliness and negative deactivation (i.e., sadness, depression) prospectively predicted increased daily nostalgia over time, consistent with our present findings and the regulatory model's tenet that nostalgia is a response to distress. Inconsistent with the model, daily nostalgia prospectively predicted negative change over time in three out of 14 wellbeing measures. Daily nostalgia was unrelated to negative change in the remaining 11 wellbeing measures. In Study 4, out of six wellbeing measures, the only significant lagged relation was between momentary nostalgia and subsequent increases in positive activation (i.e., excited, enthusiastic), in line with our findings and the regulatory model. In summary, in respect to the regulatory model, Studies 3 and 4 yielded some consistent, some inconsistent, but mostly inconclusive (i.e., null) findings. A possible explanation for these discrepancies is that Study 3 participants rated retrospectively how nostalgic they had felt on a given day (e.g., "How nostalgic did you feel today"), whereas Study 4 participants rated how nostalgic they felt in-the-moment

("How nostalgic do you feel right now?"). We suggest that the latter is psychologically healthier than the former; it is adaptive to draw momentarily on discrete nostalgic memories when needed to boost or restore wellbeing, but perhaps not to spend the better part of one's day in diffuse nostalgic reverie.⁶

Finally, Newman et al. (2020, Study 5) compared participants' descriptions and ratings of (1) their most nostalgic experience, (2) their daily nostalgic experiences, and (3) their ordinary daily experiences. Participants evaluated all three types of experience as considerably more positive than negative (i.e., a positivity offset, consistent with Turner & Stanley, 2021). Coders also rated participants' narrative descriptions of these three types of experience as predominantly positive. Daily nostalgic and daily ordinary experiences differed in terms of coders' positivity ratings only. Coders rated descriptions of daily nostalgic experiences as significantly more positive than descriptions of daily ordinary experiences, consistent with the regulatory model.

Future daily diary or ESM studies may clarify the level of support for the regulatory model. Importantly, the Muise et al. (2020) and Newman et al. (2020) findings point to interesting lines of research. For example, to what extent is the construct of sexual nostalgia similar or different to the construct of general or personal nostalgia that has guided the bulk of the literature? Also, how might nostalgia-as-diffuse-affect differ from nostalgia-as-discrete-experience? It is likely, for example, that nostalgia-as-diffuse-affect correlates positively with brooding, regret, and counterfactual thinking.

Understanding of nostalgia and its link to distress would benefit from investigations that integrate state dynamics and trait nostalgia. Recent work on personality change has emphasized the role of daily dynamics and states in trait change as well as their interaction (Bleidorn et al., 2020; Quintus et al., 2021). Traits might influence and predict states in response to various situations. In turn, change in traits might unfold gradually as a result of repeated experience of states. Combining ESM and longitudinal designs can help to clarify how trait nostalgia shields against daily discomfort, and how daily distress-induced nostalgia transforms in the long-term as trait nostalgia.

Lastly, our study underscored the desirable psychometric properties of the SNS (Routledge et al., 2008) in Chinese context. The SNS—albeit predominantly its 7-item version—is commonly used for measuring trait nostalgia and has shown high convergence with alternative measures of nostalgia as well as music-evoked and scent-evoked nostalgia (Wildschut & Sedikides, 2022c). Zhou et al. (2008) translated the 5-item version of SNS used in the current study into Chinese and documented

its high internal consistency and convergence with the Chinese version of Batcho's (1995) Nostalgia Inventory. Using confirmatory factor analysis and tests of measurement invariance, we further validated the 5-item SNS for measuring trait nostalgia in Chinese samples.

4.3 | Limitations

Our research has certain limitations. In particular, the sample was limited to Chinese university students, although people around the world think of nostalgia similarly (Hepper et al., 2014), and the benefits of nostalgia transcend cultural boundaries (Sedikides & Wildschut, 2019; Zou et al., 2018). In addition, level of depression among our participants appeared to be rather low. In particular, participants reported an average T1 CES-D sum score of 10.18 ($SD = 8.62$), and an average T2 CES-D sum score of 11.39 ($SD = 9.07$). These statistics are comparable to other samples of young-adult (18–30 years old) Chinese individuals ($M = 12.30$, $SD = 10.39$; Zhang et al., 2010). However, Radloff (1977) reported a cutoff score of 16 to identify clinical depression. Thus, our findings are applicable to the relation between depression and nostalgia in non-clinical samples, especially those with somewhat low levels of depression. Whether the findings generalize to clinical samples, or non-clinical samples with high levels of depression, remains to be seen. We note, however, that the benefits of nostalgia are equally potent among individuals high and low on neuroticism (Frankenbach et al., 2021), a correlate of depression (Schmitz et al., 2003).

Another limitation is that we only assessed distress and nostalgia twice with a 6-month interval. Replications with more sampling time points would ensure the generalizability of our findings. Finally, follow-up research could use multiple indicators of distress and multiple measures of nostalgia (although the SNS is highly correlated with other nostalgia scales; Kelley et al., 2022).

4.4 | Coda

Our longitudinal investigation contributes to the resolution of a 330-year old debate, clarifying the directional relation between trait nostalgia and distress. Consistent with experimental research, the findings indicate that nostalgia is a consequence rather than an inciter of distress, and further that it is an alleviator of distress.

AUTHOR CONTRIBUTIONS

Yuqi Wang: Conceptualization; methodology; formal analysis; writing – original draft; review and editing.
Constantine Sedikides: Conceptualization; writing –

original draft; review and edit. **Tim Wildschut:** Conceptualization; writing – review and editing. **Ying Yang:** Investigation. **Huajian Cai:** Conceptualization; project administration; funding acquisition; writing – review and edit; supervision.

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CONFLICT OF INTEREST STATEMENT

We have no conflict of interest.

ETHICS STATEMENT

We received ethical approval from Zhejiang Ocean University. We report only the subset of measures (see below) relevant to our theoretical objectives (and thus analyzed), and follow Journal Article Reporting Standards (Kazak, 2018).

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ENDNOTES

¹ Turner and Stanley (2021) reported that nostalgia was more frequent among middle-aged and older adults than among younger adults. Among younger adults, 50% reported experiencing nostalgia at least once a week. It is important to note, however, that Turner and Stanley explicitly instructed participants that “an experience of nostalgia is an experience you were not actively seeking” (p. 954). Thus, the researchers screened out instances where participants intentionally evoked nostalgia, as participants often do (Sedikides, Wildschut, Routledge, Arndt, Hepper, et al., 2015; Wildschut et al., 2006).

² We found no evidence for selective attrition. Participants who completed versus did not complete the T2 assessments did not differ significantly on any variables at T1, $t(3165) \leq |1.929|$, $p > .05$.

³ In our initial CES-D administration, responses ranged from 1 (*rarely or none of the time*) to 4 (*all of the time*). However, in Radloff (1977), responses to the CES-D ranged from 0 (*rarely or*

none of the time) to 3 (all of the time). For comparability purposes (see Discussion), we converted the current scale responses to 0–3, and analyzed the data accordingly.

- ⁴ Models of balancing feedback mechanisms are common in medicine. For example, increases in blood sugar levels prospectively predict *higher* insulin levels, and increases in insulin levels prospectively predict *lower* blood sugar levels (Ito et al., 1998). Gische et al. (2021) modeled this homeostatic process using the CLPM.
- ⁵ Turner and Stanley (2021) reported that, among older participants, increases in negative affect were associated with a ninefold increase in nostalgia (relative to non-nostalgia) likelihood (odds ratio = 9.34). Odds ratios are difficult to interpret, because they are ratios of ratios. Whereas an odds ratio of 9.34 might suggest that, among older adults, nostalgic events were associated with much more negative affect than were non-nostalgic events, this was not the case. Older adults reported hardly any negative affect (rated on a 5-point scale; 1 = *very slightly or not at all*, 5 = *extremely*) for either non-nostalgic ($M = 1.11$, $SD = 0.19$) or nostalgic ($M = 1.22$, $SD = 0.37$) daily experiences (J. R. Turner, personal communication, August 9, 2022).
- ⁶ The same point applies to a study by Newman and Sachs (2020). Newman and Sachs (2022) issued a corrigendum in which they disclosed that the analyses reported by Newman and Sachs (2020) used data previously reported by Newman et al. (2020, Study 3).

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SUPPORTING INFORMATION

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