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Review

Trait nostalgia: Four scales and a recommendation

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Abstract
We review four established scales for measuring individual differences in trait-level nostalgia: the Nostalgia Inventory, the Southampton Nostalgia Scale, the Nostalgia Prototype Scale, and the Personal Inventory of Nostalgic Experiences. To examine their convergent validity, we re-analyzed data from a published study in which all four scales were administered simultaneously. Multi-group confirmatory factor analyses demonstrated that a one-factor model accurately described the interrelations among the four scales, and supported full metric and partial scalar invariance across U.S. and Chinese samples. When measuring trait nostalgia, we recommend that researchers also consider potential confounders. Specifically, we discuss the importance of controlling for other ways in which individuals habitually reflect on their past, including brooding rumination and upward self-referent counterfactual thinking.

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Nostalgia, Measurement, Convergent validity, Confounders, Statistical control.

Introduction
Increased interest in nostalgia over the past two decades has resulted in a remarkable proliferation of scales for measuring trait-level individual differences in the general propensity to experience the emotion. This diversity is indicative of a vibrant research area. However, consumers and future contributors to the relevant literature may ask whether the various scales measure the same or different underlying constructs, and which scale would be best suited to their research purposes. To address these questions, we review four established scales for assessing trait nostalgia. In chronological order of development, these are the Nostalgia Inventory [1], the Southampton Nostalgia Scale [2,3], the Nostalgia Prototype Scale [4], and the Personal Inventory of Nostalgic Experiences [5]. We assess their convergent validity by re-analyzing data from a previously published study, in which all four scales were administered to participants from the U.S. and China [6]. Specifically, we use confirmatory factor analysis (CFA) to test if a one-factor model adequately captures the interrelations among the four scales, and conduct multi-group comparisons to assess measurement invariance across the U.S. and Chinese samples. We start by introducing our main characters—the scales. Space limitations do not permit a detailed discussion of scale development procedures, but this information is generally available from the primary sources. We present English and Chinese language versions of the four scales in Supplementary Materials.

Nostalgia Inventory
The Nostalgia Inventory (NI) instructs participants to rate how much they miss each of the 20 items from their past. Some of the items, such as “toys,” “pets,” “friends,” and “family,” are tangible. Other items are more abstract, such as “the way people were,” “the way society was,” “not knowing sad or evil things,” and “not having to worry.” The selection of items was exploratory and aimed to cover a wide range of typical experiences. The NI boasts sizeable split-half ($r = .78, p < .01$) and one-week test-retest ($r = .84, p < .01$) reliability [1].

Southampton Nostalgia Scale
The initial version of the Southampton Nostalgia Scale (SNS) consisted of five items [3]. A subsequent version added two items to create a 7-item scale [2]. Four items measure propensity to nostalgize (e.g., How prone are you to feeling nostalgic?“) or frequency of nostalgizing (e.g., “Generally speaking, how often do you bring to mind nostalgic experiences?“). The other three items measure how important, valuable, and significant participants find nostalgia to be. Both the 5-item and 7-item version of the scale have good psychometric properties [7–10]. Variations of the SNS include a version that is suitable for children [11] and a version assessing romantic relationship nostalgia [12].

Nostalgia Prototype Scale
The Nostalgia Prototype Scale (NPS) comprises five statements (e.g., “I bring to mind rose-tinted memories”)

that incorporate central features of nostalgia. These features were drawn from cross-cultural research on lay persons' prototypical conceptions of the emotion [13,14]. Participants rate each prototypical nostalgia statement on frequency and importance. This generates 10 ratings (5 statements × 2 ratings), which are averaged to create a reliable overall score (α = .86).

Personal Inventory of Nostalgic Experiences

The trait version of the Personal Inventory of Nostalgic Experiences (PINE) assesses how nostalgic participants feel in general. The scale comprises four items (e.g., "How nostalgic do you feel?") that were selected from a larger initial pool of 15 items. These items captured a variety of phrases used to describe nostalgia that were drawn from dictionaries, existing scales, and participant reports. The scale has good psychometric properties [5].

Interrelations among trait nostalgia scales in the U.S. and China

To date, only one study has administered all four scales simultaneously [6]. We re-analyzed data from this study to (a) assess interrelations among the scales, (b) test whether a one-factor model adequately describes these interrelations, and (c) evaluate measurement invariance across samples from the U.S. (who completed English versions) and China (who completed Mandarin Chinese versions). The U.S. sample comprised 311 participants (164 women) ranging in age from 18 to 72 years (M = 34.77, SD = 11.27). The Chinese sample included 300 participants (167 women) ranging in age from 19 to 59 years (M = 29.17, SD = 6.31). We present descriptive statistics, Cronbach's reliability coefficients, and correlations among the scales in Table 1. The overall scores on the NI, SNS, NPS, and PINE were highly and significantly (p < .001) intercorrelated in both samples, offering prima facie support for convergent validity, that is, agreement between multiple assessments of the same trait through different methods [15].

Table 1

Descriptive statistics, Cronbach's reliability coefficients (α), and correlations for four established nostalgia scales in a Chinese and U.S. sample.

Scale	China			U.S.			Correlation with			
	M	*SD*	α	*M*	*SD*	α	NI	SNS	NPS	PINE
NI	5.17	0.74	.87	4.42	1.09	.90		.76	.79	.76
SNS	5.24	0.86	.85	4.53	1.34	.94	.72		.80	.82
NPS	5.36	0.85	.88	4.25	1.27	.91	.75	.75		.82
PINE	5.33	0.91	.79	4.48	1.44	.91	.55	.71	.69	

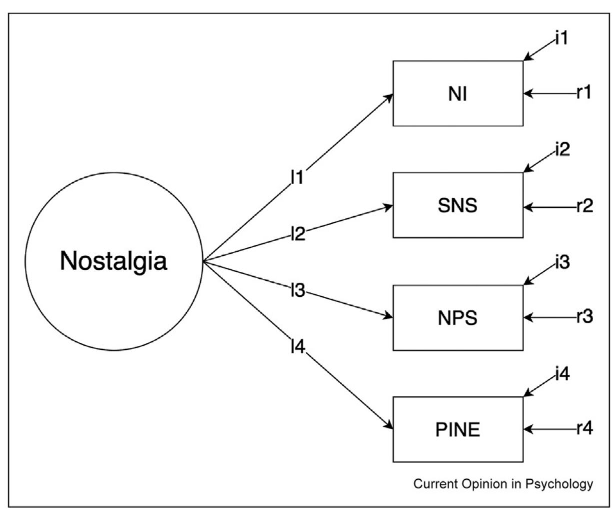
Note: NI = Nostalgia Inventory. SNS = Southampton Nostalgia Scale. NPS = Nostalgia Prototype Scale. PINE = Personal Inventory of Nostalgic Experiences. Correlations for Chinese sample below diagonal (n = 300). Correlations for U.S. sample above diagonal (n = 311). All correlations, p < .001. Data reproduced with permission from: Kelley NJ, Davis WE, Dang J, Liu L, Wildschut T, Sedikides C: **Nostalgia confers psychological wellbeing by increasing authenticity**. *J Exp Soc Psychol.* 2022, **102**:104379. https://doi.org/10.1016/j.jesp.2022.104379.

Confirmatory factor analysis and measurement invariance

We formally assessed convergent validity by using CFA to test whether the overall NI, SNS, NPS, and PINE scores are indicators of a single latent variable, and by evaluating measurement invariance across the U.S. and Chinese samples via multi-group comparisons. Thus, we treated the four scales as observed variables, consistent with how they are used routinely in the literature. An alternative approach would be to test whether these scales are unidimensional by modelling each as a latent variable in a hierarchical factor model, with a superordinate nostalgia factor. We chose not to do so because at least one of the scales, the NI, is not unidimensional [1] and examining the factor structure of each scale is beyond the scope of this article. We present the basic factor-analytic model in Figure 1.

Tests of measurement invariance assess the equivalence of a construct across groups (or measurement occasions) and are used to determine whether a construct has the same meaning to those groups (or on those occasions) [16]. Researchers commonly distinguish among four progressive levels of measurement invariance: configural, metric (or weak factorial), scalar (or strong factorial), and residual (or strict) [17]. In our case, configural invariance

Figure 1



Confirmatory Factor Analysis Model of Trait Nostalgia. *Note:* NI = Nostalgia Inventory. SNS = Southampton Nostalgia Scale. NPS = Nostalgia Prototype Scale. PINE = Personal Inventory of Nostalgic Experiences. l = indicator factor loading. i = indicator intercept. r = indicator residual. For metric invariance, the factor loadings (l) are the focal constraints between groups. For scalar invariance, the intercepts (i) are the focal constraints. For residual invariance, the residuals (r) are the focal constraints.

means that, in both U.S. and Chinese groups, the four scales have the same one-factor model structure but their factor loadings and intercepts can vary between samples. The next step is to test for metric invariance by constraining factor loadings (i.e., the loadings of the four scales on the latent variable) to be equivalent in the U.S. and Chinese groups (but still allowing scale intercepts to vary). Metric invariance means that U.S. and Chinese participants attribute the same meaning to the latent variable in question [18]. If metric invariance is achieved, the next step is to test for scalar invariance by also constraining the scale intercepts to be equivalent in both groups. Scalar invariance indicates that the mean difference between the U.S. and Chinese groups on the latent variable captures fully the mean group difference in the shared variance of the four scales [16]. If scalar invariance is supported, the mean group difference on the latent variable has a substantive interpretation, rather than reflecting differences that are potentially unrelated to the latent variable. The final step is to test for residual invariance by also constraining the residuals of the four scales to be equivalent in the U.S. and Chinese groups. This step is often omitted, because it is not a prerequisite for testing mean group differences on the latent variable [16]. Our analyses did not support residual invariance and we do not consider it further.

We report three measures of model fit. The first is the χ^2 test, with a non-significant test indicating good model fit. However, when sample size is large, as it is in our case, this test is overly sensitive to small deviations from the hypothesized model and produces too many Type 1 errors (i.e., incorrectly rejects the null hypothesis of good fit) [19,20]. For this reason, we prioritize two alternative fit indices: the standardized root mean square residual (SRMR), with a value smaller than .08 indicating good fit, and the comparative fit index (CFI), with a value greater than .95 indicating good fit [21]. We do not report the popular root mean square error of approximation (RMSEA), because models with few degrees of freedom, such as ours, can have artificially large RMSEA values [22].

To evaluate measurement invariance, we compare nested models corresponding to progressive levels of invariance. We started by testing configural invariance and then added equality constraints to evaluate each subsequent level of invariance. When the addition of equality constraints does not substantially reduce model fit, invariance at the given level is supported. We used three criteria to compare the nested models, such that invariance is supported given (1) a nonsignificant increase in model χ^2 ($\Delta\chi^2$), (2) an increase in SRMR ($\triangle$SRMR) less than .03 for metric invariance or .01 for scalar invariance [19], and (3) a decrease in CFI ($\triangle$CFI) less than .01 [20].

We present results in Table 2. We began by testing the one-factor model separately in the U.S. and Chinese groups. Model fit in the U.S. group was excellent. In the Chinese group, the SRMR and CFI indicated good model fit but the χ^2 statistic was significant. Because exclusive reliance on the χ^2 test risks incorrectly rejecting the null hypothesis of good fit, and given the acceptable SRMR (<.08) and CFI (>.95) values, we concluded that the one-factor model was also supported in the Chinese group. Next, we tested and found support for full configural invariance in a multi-group analysis (Table 2, Step 1). The overall χ^2 statistic for this multi-group analysis equals the sum of the χ^2 statistics for the separate one-factor model tests in each group, with the Chinese group contributing 86% of the overall χ^2.

Having established full configural invariance, our next step was to test metric invariance by constraining the four factor loadings to be equivalent in both groups. Imposing these constraints resulted in a non-significant $\Delta\chi^2$, a $\triangle$SRMR less than .03, and a $\triangle$CFI less than −.01 (Table 2, Step 2). Accordingly, full metric invariance was supported. We present factor loadings and squared multiple correlations for the metrically invariant model in Table 3. U.S. and Chinese participants attributed the same meaning to the latent nostalgia factor.

Table 2

Confirmatory factor analysis results for one-factor model of four established nostalgia scales in a Chinese and U.S. sample.

	χ^2	df	*p*	SRMR	CFI	vs.	$\Delta\chi^2$	Δdf	*p*	ΔSRMR	ΔCFI
U.S.	4.47	2	.107	.008	.998						
China	27.41	2	<.001	.030	.968						
Step 1: Configural invariance	31.87	4	<.001	.022	.985						
Step 2: Full metric invariance	39.62	7	<.001	.048	.983	Step 1	7.75	3	.052	.026	−.002
Step 3a: Full scalar invariance	67.44	10	<.001	.052	.969	Step 2	27.82	3	<.001	.004	−.014
Step 3b: Partial scalar invariance	48.37	9	<.001	.042	.979	Step 2	8.75	2	.013	−.006	−.004
Step 3c: Partial scalar invariance	40.57	8	<.001	.041	.983	Step 2	0.95	1	.330	−.007	.000

Table 3

Unstandardized factor loadings, standardized factor loadings, and R^2 statistics for the metrically invariant model (Step 2 in Table 2).

	Unstandardized factor loading	China		U.S.	
		Standardized factor loading	R^2	Standardized factor loading	R^2
NI	0.944	0.801	0.642	0.856	0.733
SNS	1.209	0.875	0.765	0.896	0.803
NPS	1.176	0.876	0.767	0.910	0.828
PINE	1.253	0.805	0.648	0.897	0.804

Note: NI = Nostalgia Inventory. SNS = Southampton Nostalgia Scale. NPS = Nostalgia Prototype Scale. PINE = Personal Inventory of Nostalgic Experiences. Unstandardized factor loadings were identical for both groups. Standardized factor loadings differ between the Chinese and U.S. groups, because item variances are unequal across groups and standardized factor loadings are calculated on a per group basis. R^2 values are squared multiple correlations and indicate the proportion of shared variance between the latent factor and each of the four nostalgia scales.

Our final step was to test scalar invariance by also constraining the four scale intercepts to be equivalent in both groups. Whereas △SRMR did not exceed .01, $\Delta\chi^2$ was statistically significant and △CFI exceeded −.01 (Table 2, Step 3a). Thus, results did not support full scalar invariance. To explore partial scalar invariance, we inspected modification indices and sequentially released parameters associated with the largest Lagrange multiplier statistic. The first parameter we released was the equality constraint on the intercepts of the SNS. This model still yielded a statistically significant $\Delta\chi^2$ (compared to Step 2), whereas both △SRMR and △CFI values were acceptable (Table 2, Step 3b). The next parameter we released was the equality constraint on the intercepts of the PINE. This model produced non-significant $\Delta\chi^2$ and acceptable △SRMR and △CFI values (Table 2, Step 3c). Thus, depending on the weight one assigns to the $\Delta\chi^2$ criterion, partial scalar invariance was achieved by releasing either the first (Step 3b) or both (Step 3c) equality constraints.

Provided that at least two factor loadings and intercepts are constrained to be equivalent in both groups, it is possible to assign a substantive interpretation to group differences in latent factor means [23]. As this prerequisite was met, we proceeded to compare the latent factor means of the U.S. and Chinese groups in the partially invariant model (Step 3c). By setting the latent factor mean of the U.S. group to 0, the latent factor mean of the Chinese group is equal to the difference between the groups in standard deviation units [18]. The latent factor mean was significantly higher in the Chinese (compared to U.S.) group, $M = 1.004$, $SE = .092$, $t = 10.94$, $p < .001$, indicating that Chinese participants scored approximately one standard deviation higher on the latent nostalgia factor. We offer a tentative interpretation of this cultural difference below.

Confounders and the role of statistical control

Research on trait nostalgia has to grapple with the inherent limitations of correlational data, including the third-variable or confounder problem [24,25]. We therefore recommend that researchers interested in measuring trait nostalgia also control for potential confounders. This can be achieved by implementing experimental designs with random assignment (between-participants) or counterbalancing (within-participants). However, these experimental approaches typically involve shifting the level of analysis from trait nostalgia to transient state nostalgia, and psychological processes may not generalize from one level of analysis to the other. Another approach is to measure potential confounders and model their associations with trait nostalgia as well as other variables of interest. We demonstrate this approach next, in relation to two confounders of trait nostalgia: rumination and counterfactual thinking [26,27].

At the trait level, nostalgia is positively correlated with rumination (i.e., “thoughts and behaviors that focus an individual’s attention on the negative mood, the causes and consequences of this mood, and self-evaluations related to the mood” [28], p. 790) and counterfactual thinking (i.e., the cognitive process of imagining alternatives to the past and considering how certain events could have resulted in a different outcome [29]). This shared variance could point to a general or *g* factor reflecting global individual differences in past orientedness [10]. How this overlap is treated can shape conclusions regarding trait nostalgia.

For illustrative purposes, we focus on the association between trait nostalgia and the memory function of bitterness revival. Bitterness revival refers to the tendency to use memories to rekindle resentment toward others [30], and is negatively related to mental health [31]. In a study on the relations between trait nostalgia and memory functions [26], nostalgia was positively correlated with bitterness revival. However, in the same study, rumination and counterfactual thinking were also positively correlated with bitterness revival, and more strongly so than was nostalgia. Controlling for these confounders in a multiple regression analysis rendered the association between nostalgia and bitterness revival non-significant.

A key concern with this approach to controlling for or "partialling out" confounders relates to the substantive interpretation of a predictor variable (i.e., trait nostalgia) after the variance shared with other predictors is removed. This unease is justified when the variables in the predictor set are highly correlated, have fuzzy boundaries, and are unreliable. The problem is less severe when correlations among predictors are modest, the constructs are homogeneous or clearly delineated, and the measures are reliable [32]. In the latter case, controlling for confounders, such as rumination and counterfactual thinking, can increase precision [33].

Coda

Both the English- and Chinese-language versions of four established nostalgia scales are indicators of a single underlying trait, supporting their convergent validity. Ideally, we recommend that researchers studying trait nostalgia (1) combine two or more of these scales to meet the desideratum of implementing multiple converging operations [15,34], and (2) control for other ways in which individuals habitually reflect on their pasts [10], including rumination (especially its brooding component [35]) and counterfactual thinking (particularly upward self-referent counterfactuals [29]). The markedly higher level of trait nostalgia in the Chinese (compared to U.S.) group, although not the main focus of this article, points to an interesting direction for future cross-cultural research. A possible explanation is that Chinese (compared to U.S.) culture emphasizes interdependent self-construal [36], which is positively associated with trait nostalgia [37].

Editorial disclosure statement

Given their role as Guest Editors, Constantine Sedikides and Tim Wildschut had no involvement in the peer review of the article and had no access to information regarding its peer-review. Full responsibility for the editorial process of this article was delegated to Joost M. Leunissen.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.copsyc.2023.101608.

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