behavioral sciences

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Self-Compassion's Lagged Links to Well-Being Weaken When Stable Between-Person Differences Are Partialed Out: A Three-Wave Random-Intercept Cross-Lagged Panel Network

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Abstract

Self-compassion is consistently associated with subjective well-being, but cross-sectional and two-wave designs cannot separate stable between-person differences from within-person change. We collected three waves, about three months apart, from 1400 Chinese university students (T2 n = 1167; T3 n = 1044). Nine-node cross-lagged panel networks of six self-compassion facets and three well-being indicators were estimated with and without random intercepts; a 12-node random-intercept network added two emotion-regulation strategies and brooding rumination. Without random intercepts, 5 of 18 self-compassion-to-well-being paths reached $|\beta| \geq 0.10$; with random intercepts, the same five paths had a median $|\beta|$ of 0.018, and two reversed sign. In the 12-node within-person network, one of ten pre-specified edges survived Benjamini–Hochberg correction (expressive suppression $\rightarrow$ negative affect, $\beta = 0.113$). Self-judgment $\rightarrow$ brooding ($\beta = 0.080$) did not, and the indirect effect through brooding was close to zero with an interval including zero, so the primary mechanism hypothesis was not supported. The within-person system explained about 2–7% of wave-to-wave variance. In these data, at a three-month lag, the lagged self-compassion–well-being structure of conventional panel networks was largely attributable to stable between-person differences; small or faster within-person effects cannot be excluded.

Keywords: self-compassion; subjective well-being; random-intercept cross-lagged panel network; within-person dynamics; brooding rumination; Chinese university students

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Academic Editors: Julio C. de la Torre-Montero and Amelia Rizzo

Received: 11 September 2026
Revised: 14 November 2026
Accepted: 20 November 2026
Published: 24 November 2026

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1. Introduction

Self-compassion has been consistently associated with subjective well-being across cultures and developmental stages (MacBeth & Gumley, 2012; I. C. Marsh et al., 2017; Neff, 2003a; Zessin et al., 2015), yet the within-person temporal patterning linking the components of self-compassion to the components of subjective well-being is less well understood. Recent network analyses have re-cast both constructs as multidimensional systems whose internal connectivity may carry information beyond total scores (Borsboom et al., 2021); most network evidence to date, however, is cross-sectional or two-wave (e.g., Tang et al., 2023; Zhang et al., 2026) and rarely separates stable between-person differences from time-varying within-person dynamics. The present study addresses that gap directly: the same nine-node network is estimated with and without random intercepts in a three-wave panel of Chinese university students (Epskamp, 2020; Hamaker et al., 2015), so that

the two layers can be compared on identical data, and a twelve-node random-intercept network then adds two candidate mechanism families—emotion regulation and brooding rumination—to the within-person layer.

What a network formulation adds to the within-/between-person distinction deserves to be stated explicitly. A random-intercept model on total scores would already tell us whether self-compassion as a whole predicts later well-being within persons. Self-compassion, however, is a six-facet construct and well-being is a three-indicator construct, so the substantive question is which facet-to-indicator paths carry any lagged association, how those paths compare in size once every other node at the preceding wave is held constant, and whether a node sits on many paths without sending a directed signal (bridge connectivity). A cross-lagged panel network answers these questions in one model, and adding random intercepts lets the same node set be compared with and without partialing out stable differences. The contribution of the present study is therefore a layer-by-layer comparison at the level of specific edges, together with a test of two mechanism families, rather than a new estimator.

The study makes three contributions. First, it quantifies on identical data how much of the conventional facet-level bridge structure remains once stable between-person differences are partialed out. Second, it tests a pre-specified brooding-based mechanism and an emotion-regulation mechanism at the within-person level, reporting the indirect effect and its uncertainty rather than the significance of single paths alone. Third, it documents the measurement, attrition and model-conditioning limits that bound any such inference in a three-wave questionnaire panel.

2. Theoretical Background and Hypotheses

2.1. Self-Compassion Components and Subjective Well-Being

Self-compassion, as theorized by Neff (2003a, 2003b), comprises three positive elements (self-kindness, common humanity, and mindfulness) and three negative elements (self-judgment, isolation, and over-identification). Meta-analytic evidence indicates moderate associations between higher self-compassion and greater subjective well-being, weaker negative affect, and lower internalizing symptoms (MacBeth & Gumley, 2012; I. C. Marsh et al., 2017; Zessin et al., 2015). The six-factor versus two-factor debate (Muris & Otgaar, 2020) suggests that aggregate scores may mask facet-specific effects and motivates component-level analyses. In Chinese student samples specifically, the total score of the Chinese version of the self-compassion scale has been shown to correlate with life satisfaction and with positive and negative affect (Chen et al., 2011). A cross-sectional study of 842 Chinese college students likewise found hope to mediate, and emotion regulation to moderate, the association between self-compassion and psychological flourishing (C. Liu et al., 2024), which illustrates both the appeal of process accounts in this population and the between-person designs on which they still rest.

Subjective well-being is conventionally indexed by life satisfaction (Diener et al., 1985) and the two affect scales of the Positive and Negative Affect Schedule (Watson et al., 1988). Decomposing well-being into these three indicators permits asymmetric relations: the same self-compassion facet may, for example, predict later life satisfaction more strongly than later positive affect.

2.2. What a Two-Wave Panel Network Leaves Open

In a recent two-wave cross-lagged panel network of Chinese university students, Y. Liu et al. (2026) reported that mindfulness and self-judgment functioned as the most influential bridge nodes connecting the self-compassion community to the subjective-well-being community. That study extended prior work beyond standard cross-lagged structural equation

models toward fully connected directed networks. Two features of that design restrict what its bridge estimates can mean. First, with only two measurement occasions, a cross-lagged panel network confounds stable trait differences with time-varying within-person change (Hamaker et al., 2015; H. W. Marsh et al., 2022). Second, the model contained no putative mechanism variables; bridge nodes between self-compassion facets and subjective-well-being indicators may operate via emotion-regulation or rumination processes that, when omitted, are absorbed into the cross-lagged paths themselves. The first of these two features is directly testable: if a bridge reflects a within-person process, it should survive the addition of random intercepts to the same node set in the same data; if it reflects stable trait covariation, it should not. That comparison is the primary analysis reported here.

2.3. Mechanism Candidates: Emotion Regulation and Brooding Rumination

Two mechanism families dominate process-oriented accounts of how self-compassion translates into subjective well-being (though decentering, values clarification, and self-distancing have also been proposed; Ayduk & Kross, 2010; Lindsay & Creswell, 2017). The emotion-regulation pathway proposes that self-compassion increases the likelihood of cognitive reappraisal and decreases reliance on expressive suppression (Finlay-Jones et al., 2015; Gross & John, 2003; Trompetter et al., 2016). Expressive suppression—the deliberate inhibition of ongoing emotion-expressive behavior—has been consistently associated with poorer affective outcomes in cross-sectional and short-term longitudinal studies (Brockman et al., 2017; Gross & John, 2003). Longitudinal work in emerging adults treats reappraisal and suppression as separable outcomes with distinct antecedents rather than as two ends of a single adaptive–maladaptive dimension (Li et al., 2026). The rumination pathway proposes that the negative facets of self-compassion—particularly self-judgment and isolation—amplify maladaptive repetitive thinking, especially the brooding component (Krieger et al., 2016; Treynor et al., 2003). Brooding has been singled out from reflection because it is consistently associated with depressive symptoms, whereas reflection shows mixed relations with well-being (Joormann, 2006; Treynor et al., 2003; Watkins & Roberts, 2020). Brooding has also been modeled as an indirect route through which behavioral and cognitive resources reach psychological distress in non-student samples (Yan et al., 2026), though such designs are cross-sectional and cannot separate within-person change from stable individual differences.

Despite considerable cross-sectional support for both pathways, neither mechanism family has been tested within a panel network of self-compassion and subjective well-being. Whether either family yields a within-person lagged bridge once between-person stability is partialed out remains an open question.

2.4. Random-Intercept Cross-Lagged Panel Networks

Random-intercept cross-lagged panel models (RI-CLPM; Hamaker et al., 2015) decompose each observed variable into a person-specific stable component (the random intercept, capturing trait-level differences) and a person-occasion deviation (the within-person component, capturing time-varying change). Cross-lagged paths in an RI-CLPM are therefore unconfounded by stable individual differences. Epskamp (2020) generalized this logic to multivariate panel networks via panelgvar, yielding three interpretable matrices per model: the temporal (within-person directed lag) network, the within-person contemporaneous partial-correlation network, and the between-person random-intercept partial-correlation network. The same decomposition has been applied to well-being outcomes in Chinese samples, where within- and between-person estimates are reported side by side (Z. Han et al., 2025). The present analysis uses this framework and treats the temporal network as the main basis for hypothesis testing.

2.5. The Present Study and Hypotheses

The conceptual model is summarized in Figure 1. The primary comparison and three hypotheses were specified before the main lagged-effect inspection.

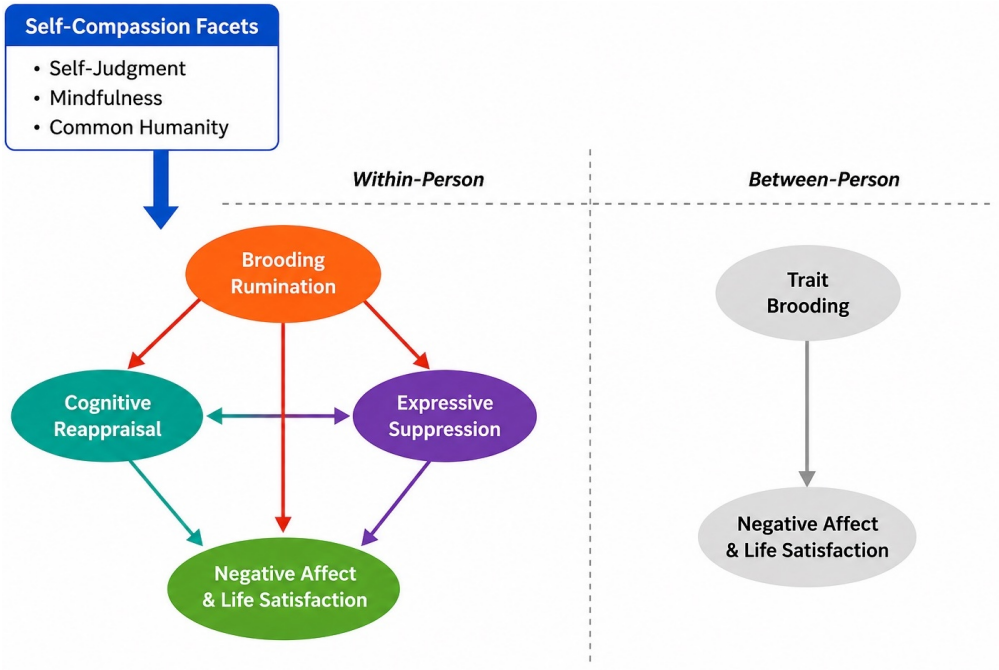


Figure 1. Conceptual framework. The thick blue arrow marks the self-compassion facets entering the system; teal and purple arrows mark the H2 emotion-regulation paths (reappraisal and suppression), the double-headed arrow their mutual association, and the grey arrow the between-person layer. The primary (H1) within-person mechanism chain self-judgment → brooding → negative affect is shown in red; H2 emotion-regulation strategies (suppression, reappraisal) constitute a parallel secondary mechanism family. The vertical dashed line separates the within-person dynamic layer (left) from the between-person trait layer (right): random intercepts are estimated in the between-person block and partialed out of every within-person cross-lagged path.

Primary comparison (layer decomposition). The nine-node network of six self-compassion facets and three subjective-well-being indicators is estimated twice on the same data, once without random intercepts and once with them. Facet-to-indicator paths that reflect within-person process should retain their magnitude under the second specification; paths carried by stable trait covariation should shrink towards zero. The contrast is descriptive by design—it asks how much of the conventional bridge structure survives the decomposition, not whether any single path is significant.

H1 (Primary—Brooding as the within-person mechanism). At the within-person level, self-judgment positively predicts later brooding, and brooding in turn positively predicts later negative affect; the indirect effect through brooding is non-zero. This is the central path of Figure 1. H1 follows from theoretical and empirical accounts that frame brooding as a self-focused, self-critical form of repetitive negative thinking that is recruited by self-evaluative content and amplifies negative affect over time (Krieger et al., 2016; Treynor et al., 2003; Watkins & Roberts, 2020). H1 is falsified if the upstream self-judgment → brooding path, the downstream brooding → negative-affect path, or the indirect-effect estimate falls in the null band ($|\beta| < 0.05$) or changes direction. The same band is applied to every edge in the primary family, including those aligned with the hypotheses. Evidence for H1 is evaluated on the indirect effect itself (the product of the two lagged coefficients, with a Monte Carlo 95% interval; Section 3.4), not on the significance of either path alone; a significant single path is not treated as evidence of mediation.

H2 (Secondary—Emotion regulation as a parallel mechanism candidate). Expressive suppression positively predicts later negative affect, and cognitive reappraisal positively predicts later life satisfaction. H2 follows from converging cross-sectional and short-term longitudinal evidence that suppression is a less adaptive regulation strategy and reappraisal a more adaptive one (Brockman et al., 2017; Gross & John, 2003; Trompetter et al., 2016).

H3 (Secondary—Mindfulness-to-well-being trend). As an additional secondary expectation, mindfulness positively predicts later life satisfaction at the within-person level, consistent with two-wave and meta-analytic results in the self-compassion/well-being literature (Lee et al., 2021; Y. Liu et al., 2026; I. C. Marsh et al., 2017). The mindfulness facet of the SCS-26 has four items and a narrower content than dispositional mindfulness; this limit applies to H3 and to every statement about mindfulness below (see Measures).

Minimum effect-size of interest. Following the design's power analysis, the smallest within-person lagged effect of practical interest was set at $\beta \approx 0.08$–0.10. A single three-zone convention is applied to every edge in the paper: $|\beta| < 0.05$ is negligible (the null band), $0.05 \leq |\beta| < 0.08$ is indeterminate, and $|\beta| \geq 0.08$ is of practical interest. An edge that does not pass false-discovery-rate correction is described as an uncorrected trend, never as a finding, whatever its size; an edge that passes correction but falls in the negligible zone would not be treated as practically meaningful. A two-factor self-compassion aggregation (positive vs. negative self-compassion composites) was pre-specified as a measurement-structure sensitivity analysis. The full pre-specified primary edge family—ten lagged paths that span H1, H2, H3 and four secondary cross-construct edges—is listed in Section 3.4.

The layer comparison and the three hypotheses are tested in a three-wave (0, 3, and 6 months) panel of Chinese university students (target $N \approx 800$ retained), fitting a 12-node RI-CLPN that combines the six self-compassion facets, three subjective-well-being indicators, two emotion-regulation strategies, and brooding rumination. The nine-node network is fitted in both specifications—without random intercepts, as in conventional cross-lagged panel networks, and with them—and a twelve-node no-random-intercept comparator is fitted as a sensitivity check. Robustness checks include complete-case versus available-case sensitivity, RRS total-score and reflection/symptom-rumination swaps, and a two-factor self-compassion specification. The 10 primary edges are evaluated under false-discovery-rate control; unsigned bridge strength (Jones et al., 2021) is reported for the within-person network.

3. Materials and Methods

3.1. Participants and Procedure

A three-wave longitudinal panel was conducted in undergraduate students at a comprehensive Chinese university. Three measurement occasions were spaced approximately three months apart (T1 baseline, T2 at 3 months, T3 at 6 months). Recruitment yielded $N = 1400$ valid T1 respondents who consented to longitudinal follow-up. Of these, 1167 (83.4%) completed T2 and 1044 (74.6%) completed T3, with 891 (63.6%) providing valid responses at all three waves. The longitudinal sample size meets the design target of approximately 800 complete-case respondents derived from an a priori power analysis (Section 3.2).

Inclusion criteria, applied before the main analysis, were current enrolment as a university student, a unique anonymous matching code across waves, completion of the T1 attention-check item, and within-wave missingness below a predefined threshold. Respondents ranged in age from 17 to 26 years ($M = 20.14$, $SD = 1.63$), and 855 of the 1400 were women; the full demographic composition is given in Supplementary Table S1. The study was conducted in accordance with the Declaration of Helsinki; participants provided informed consent before T1 and were free to withdraw at any wave. Gender, age, year of

study, major group, and device type were recorded at each wave and are used in two places only: the attrition model in Section 4.1 and the demographic-residualization robustness model (R6) in Section 4.7. They were not entered into the primary networks, and individual-level demographic distributions are reported in Supplementary Table S1 rather than in the main text; the implications for generalizability are addressed in Section 5.5. Ages ranged from 17 to 26 years; 66 respondents (4.7%) were younger than 18 years at T1 (all aged 17). They were enrolled university students, and their participation rested on the university's institutional (school-level) agreement together with their own informed consent.

3.2. Sample Size and Power

No closed-form power formula exists for a 12-node random-intercept panel network, so the design target was derived by Monte Carlo simulation of item-level questionnaire data (250 replications per scenario). The assumed lagged effects were anchored on the two-wave estimates reported by Y. Liu et al. (2026) and shrunk towards the smallest effect of interest, $\beta \approx 0.08$–0.10. Four findings from the simulations shaped the design. (i) With a complete-data sample of 800 and clean measurement, the planned lagged edges were recovered at $p < 0.05$ in 68% of replications (brooding $\rightarrow$ negative affect), 50% (self-judgment $\rightarrow$ brooding), 42% (mindfulness $\rightarrow$ life satisfaction) and 11% (isolation $\rightarrow$ negative affect). (ii) With $N = 1100$ at T1 and about 25% attrition by T3, the corresponding rates were 58%, 42%, 33% and 12%. (iii) In a scenario with stable trait correlations but no within-person paths, the random-intercept specification returned false positives for 3.8% of primary edges against 65.3% for an ordinary cross-lagged panel network. (iv) Recovery fell further when item noise, careless responding and skew were added. The target was therefore set at roughly 800 retained respondents (1000–1200 recruited); the achieved sample of 891 complete cases exceeds it. Two consequences follow for interpretation. The layer comparison, which pools many edges, is well powered. Single edges of $|\beta| < 0.10$ are detected in well under 70% of replications, so a non-significant small edge is uninformative about its existence, and the Discussion avoids reading such edges as evidence of absence. The simulation results are listed in Supplementary Table S9.

3.3. Measures

All scales were administered in simplified-Chinese versions and presented online. Subscale scores were computed as item means (range = scale minimum to scale maximum). Item-level descriptives, reverse-coded items, and per-wave Cronbach's α are reported in the Supplementary Materials. Published and validated Chinese versions were used for every scale: the SCS-26 follows (Chen et al., 2011), the SWLS (Xiong & Xu, 2009), the PANAS (Huang et al., 2003), the ERQ (Wang et al., 2007) and the RRS-22 (X. Han & Yang, 2009). The versions were used as published, without new translation or back-translation by the authors and without modification of items; the reliability and validity evidence in the present sample is given below. Reliability in the present sample is reported per wave in Supplementary Table S2; the values are lower than the conventional 0.70 for several short subscales (Section 4.1), and the consequences are examined in the Results and Discussion. Longitudinal measurement invariance of all twelve scores was tested and is reported in Section 4.3.

Self-compassion. The 26-item Self-Compassion Scale (SCS-26; Neff, 2003b) was scored as six facet means: self-kindness (5 items), self-judgment (5 items), common humanity (4 items), isolation (4 items), mindfulness (4 items), and over-identification (4 items). Items were rated on a 5-point Likert scale (1 = *almost never*, 5 = *almost always*). For comparability with Y. Liu et al. (2026), facets were retained in raw direction (no reverse coding for the negative facets) so that higher self-judgment, isolation, and over-identification scores

reflect more uncompassionate response. This convention departs from Neff's original total-score scoring rule but mirrors the recent network-analytic convention. The four-item SCS-26 mindfulness facet captures the *non-judgmental attention to painful experience* aspect of mindfulness; it is narrower than dispositional mindfulness as measured by the FFMQ or MAAS (Brown & Ryan, 2003; Keng et al., 2011), and conclusions about "mindfulness" in this study are bounded by that operationalization.

Subjective well-being. Life satisfaction was measured with the 5-item Satisfaction with Life Scale (SWLS; Diener et al., 1985), rated on a 7-point Likert scale. Positive and negative affect were measured with the 20-item Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), rated on a 5-point Likert scale (10 items per affect dimension).

Emotion regulation. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) provided cognitive-reappraisal (6 items) and expressive-suppression (4 items) subscales, rated on a 7-point Likert scale.

Rumination. The 22-item Ruminative Responses Scale (RRS-22; Treynor et al., 2003) provided three subscales: brooding (5 items), reflection (5 items), and symptom rumination (12 items), rated on a 4-point Likert scale. Brooding was the primary rumination indicator in the 12-node network; reflection, symptom rumination, and the RRS total score were retained for sensitivity analyses.

3.4. Analytic Strategy

The layer-decomposition comparison, the primary edge family, the secondary models, and the robustness sequence were specified before the main lagged-effect inspection. Allowed pre-substantive activities were file-integrity, missingness, completion-time, and item-coding checks; cross-lagged paths were not inspected before the analytic strategy was finalized.

3.4.1. Primary Model

A 12-node RI-CLPN (M1) was fitted as a random-intercept panel GVAR model (Epskamp, 2020, 2025) under full-information maximum-likelihood (FIML) estimation (psychonetrics 0.17.8, `panelgvar`). The 12 nodes were as follows: self-kindness, self-judgment, common humanity, isolation, mindfulness, over-identification, life satisfaction, positive affect, negative affect, cognitive reappraisal, expressive suppression, and brooding. The model simultaneously estimates a temporal effects matrix β (lag-1, within-person; reported here as standardized partial directed correlations, PDC), a within-person contemporaneous partial-correlation matrix Ω_{within}, and a between-person random-intercept partial-correlation matrix Ω_{between}. The three matrices answer different questions and are interpreted accordingly. β gives the prediction of each node at wave $t + 1$ from every node at wave t, within persons and with all other nodes at t held constant; it is a lagged association, not a causal effect. Ω_{within} gives the associations among the within-person residuals of the same wave that the lagged paths leave unexplained and carries no direction. Ω_{between} gives the associations among the stable person-level components (random intercepts), that is, how persons who are high on one node tend to be high or low on another across the whole study. Only β is used to test the hypotheses.

3.4.2. Layer-Decomposition Comparison

The primary comparison contrasts two nine-node models on the same node set and the same data: a cross-lagged panel network without random intercepts (M2), which is the specification used in conventional panel networks, and a random-intercept cross-lagged panel network on the identical node set (M3). All 18 facet-to-indicator paths are reported for both. A 12-node CLPN without random intercepts (M4) is fitted as a no-RI sensitivity comparator for the primary 12-node model.

3.4.3. Primary Edge Family and Inferential Control

Ten directed lagged edges constituted the primary edge family (Section 4.6): mindfulness → life satisfaction, mindfulness → positive affect, self-judgment → negative affect, self-judgment → life satisfaction, isolation → negative affect, brooding → negative affect, self-judgment → brooding, isolation → brooding, reappraisal → life satisfaction, and suppression → negative affect. Family-wise inference used Benjamini–Hochberg false-discovery-rate (FDR) control at $q = 0.05$ on the 10 raw p values from M1. Edges outside this family are reported as exploratory.

3.4.4. Convergence, Identification and Conditioning Diagnostics

For each of the four panel-network models, we recorded optimizer convergence codes and examined the model-implied covariance matrix of the random intercepts: its eigenvalues, its condition number (largest over smallest eigenvalue), and the distribution of the absolute partial correlations among the intercepts. The same quantities were computed for the within-person block. A positive smallest eigenvalue indicates a positive-definite matrix; a very large condition number indicates near-singularity, in which case associations in that block are estimated imprecisely even though the model is identified. Parameter stability was assessed through the robustness sequence (R1–R7b), which re-estimates the model on different subsamples and node definitions. These diagnostics are reported in Section 4.8 and Supplementary Table S7.

3.4.5. Indirect Effect (H1)

The indirect effect of self-judgment on negative affect through brooding was computed from M1 as the product $a \times b$, where a is the lagged coefficient from self-judgment to brooding and b the lagged coefficient from brooding to negative affect (unstandardized temporal coefficients). With three waves, the indirect effect is a two-lag quantity. Its 95% interval was obtained by Monte Carlo simulation: 20,000 draws of the parameter vector from a multivariate normal distribution centered on the M1 estimates with the model's joint covariance matrix of the estimates so that the covariance between a and b is respected. We also report the direct lagged path from self-judgment to negative affect and the two-lag total effect (the corresponding entry of $\mathbf{B}^2$).

3.4.6. Longitudinal Measurement Invariance Testing

For each of the twelve scores, a three-wave confirmatory factor model was fitted to the item responses (lavaan 0.7.2, maximum likelihood with FIML, the same item allowed to correlate across waves). Configural, metric and scalar models were compared; invariance was retained if $|\Delta\text{CFI}| \leq 0.010$ and $|\Delta\text{RMSEA}| \leq 0.015$ between successive models. Items were treated as continuous. These are single-scale tests and not a joint model of the twelve scales.

3.4.7. Bridge Strength Computation

Bridge strength (Jones et al., 2021) was computed on the symmetrized absolute temporal (β) network of M1 as the summed absolute weight of the edges linking a node to nodes in other communities (one step). Because absolute weights are used, the index is unsigned and carries no direction; it is a measure of cross-community connectivity, not of expected influence in the signed sense and not of mediation. The primary specification has four communities fixed in the analysis plan: self-compassion (six facets), subjective well-being (three indicators), emotion regulation (two strategies), and brooding (one node). A three-community specification in which brooding belongs to emotion regulation is reported as a

sensitivity analysis. The bridge-strength figure (Section 4.6.4) and all values in the text use the same definition.

3.4.8. Robustness Specifications

Eight robustness models were fitted: (R1) complete-case three-wave subsample; (R2) $\geq$ 2-valid-wave subsample; (R3) RRS total score swapped in for brooding; (R4) two-factor self-compassion model (positive- and negative-self-compassion composites; 8 nodes total); (R5) exclusion of fast responders (any wave with survey duration below the 5th percentile across the pooled dataset, <470 s); (R6) demographic-residualization model in which every node at every wave was OLS-residualized on gender (3 levels), age, year of study (5 levels), major group (6 levels), and device (3 levels) before the same 12-node RI-CLPN was re-estimated; (R7a) brooding swapped for reflection; (R7b) brooding swapped for symptom rumination.

3.4.9. Within-Person Variance Explained: Computation

For each node, the share of its within-person variance at waves 2 and 3 that is explained by the lagged system was computed from the model-implied matrices of M1 as $\mathrm{diag}(\mathbf{B}\boldsymbol{\Sigma}_{\eta}\mathbf{B}')/\mathrm{diag}(\boldsymbol{\Sigma}_{t})$, where $\mathbf{B}$ is the unstandardized temporal matrix, $\boldsymbol{\Sigma}_{\eta}$ the within-person covariance at the preceding wave and $\boldsymbol{\Sigma}_{t}$ the model-implied within-person covariance at wave t. The calculation assumes that the wave-1 within-person covariance equals the stationary covariance. This replaces summing squared standardized coefficients, which is valid only for uncorrelated predictors and is not valid here.

3.4.10. Reporting

All analyses were performed in R (4.5.0 for the primary models; 4.6.1 for the revision analyses) using the psychonetrics (Epskamp, 2025) (0.17.8), lavaan, semTools and qgraph packages; bridge strength was computed directly from the weight matrix, with descriptive and reliability summaries computed in Python 3.13.5 (pandas, pingouin). Standardized lagged effects (PDC) are reported with three decimals; p values to three decimals (with $p < 0.001$ shorthand below that). Approximate 95% confidence intervals for standardized edges are derived from the Wald test of the corresponding unstandardized coefficient. The strongest causal language used is "within-person temporal prediction" or "lagged association"; no causal claim is made.

3.4.11. Missing Data

Every subscale score could be computed for every respondent who answered at least one item of that subscale, so there was no subscale-level missingness within a completed wave. Wave-level attrition is described in Section 4.1; psychonetrics handles wave-level missingness via FIML internally. Selective-attrition diagnostics compare T3-retained versus T3-dropped respondents on T1 baseline scores using Cohen's d, and a logistic model of T3 retention on the 12 baseline nodes and the demographic variables quantifies how predictable attrition is. FIML is unbiased only if missingness depends on observed variables (missing at random, MAR); that assumption cannot be tested from the data and is questionable when attrition is selective, so FIML estimates are treated as conditional on MAR and the complete-case model (R1) is a sensitivity check, not evidence that attrition is ignorable.

3.5. Ethics

The study was conducted in accordance with the Declaration of Helsinki and approved by the Life Science Ethics Committee of Zhengzhou University (Approval No. ZZU-IRB-2025-1227; approved on 22 December 2025). All participants provided informed consent before the T1 questionnaire and were free to withdraw at any wave. Responses were

matched across waves through a self-generated anonymous code; contact information was held separately from the analysis file and was not available to the analysts.

4. Results

In the conventional specification without random intercepts, the self-compassion facets predict later subjective well-being at magnitudes comparable to those reported in the two-wave literature. Adding random intercepts to the same node set removes most of that structure. What survives at the within-person level is a small set of paths that do not involve the self-compassion facets directly: expressive suppression predicts later negative affect, and self-judgment predicts later brooding as an uncorrected trend. The hypothesized indirect effect through brooding (H1) was not supported.

4.1. Sample, Attrition, and Reliability

A total of 1400 respondents provided valid T1 data. Wave retention was 1167 (83.4%) at T2 and 1044 (74.6%) at T3; 891 (63.6%) provided valid responses at all three waves. Subscale-level missingness was 0% at every wave because subscale scores are item-mean composites.

Internal consistency was modest for several short subscales. Cronbach's α ranged from 0.52 to 0.81 across scales and waves. The two PANAS subscales and cognitive reappraisal exceeded the conventional 0.70 threshold (α = 0.71–0.81); the six SCS-26 facets fell between 0.54 and 0.67; and SWLS, ERQ-suppression, brooding, and reflection ranged from 0.52 to 0.69. These values are typical of four- and five-item facet subscales and place a ceiling on the recoverable size of any within-person lagged path: at these reliabilities, attenuation alone can reduce a true path by a third. The same subscales enter both specifications of the layer comparison, so attenuation alone cannot account for a difference between them, although measurement error can interact with the model structure, as set out below. Full reliability tables by wave are in Supplementary Table S2. Low reliability has three consequences for what follows. It attenuates every lagged coefficient towards zero, and it does so most for the short subscales. It leaves more of the within-person residual variance as measurement error, which lowers the variance the lagged system can explain. Additionally, because observed subscale scores are used rather than latent factors, error that is stable across waves is absorbed by the random intercepts, so the between-person layer is partly a measurement artefact and the within-person layer is a conservative estimate. A failure to detect a lagged path for a low-reliability facet therefore carries less weight than the same failure for a reliable one. The four-item SCS-26 mindfulness facet (α = 0.54–0.67) is the clearest example, and every statement about mindfulness below is bounded by it.

Selective attrition was observed. T3-dropped respondents scored higher than T3-retained respondents at T1 on negative affect (Cohen's $d = 0.64$), RRS total ($d = 0.50$), self-judgment ($d = 0.49$), symptom rumination ($d = 0.49$), brooding ($d = 0.45$), isolation ($d = 0.28$), suppression ($d = 0.27$), and over-identification ($d = 0.26$); the absolute d values exceeded the $|d| \geq 0.20$ flag threshold defined in the planned analysis. Group differences on the positive self-compassion facets, life satisfaction, positive affect, and reappraisal were all $|d| \leq 0.14$. A logistic regression of T3 retention on the 12 T1 primary nodes and the demographic covariates yielded Cox–Snell pseudo-$R^2 = 0.15$ and Nagelkerke pseudo-$R^2 = 0.21$, indicating that attrition is materially predictable from baseline scores and is therefore not missing-completely-at-random. The most informative attrition predictors were T1 negative affect ($z = -7.58$), brooding ($z = -5.91$), and self-judgment ($z = -4.77$), all in the direction of higher-distress baseline raising the probability of T3 drop-out. The primary FIML model and a complete-case sensitivity model (R1) are reported side-by-side in Section 4.7; the substantive pattern was the same under both. This agreement does not show that attrition was ignorable: FIML and the complete-case model both rest on the

assumption that missingness depends only on observed scores, the retained sample underrepresents the higher-distress end of the distribution, and a pattern that is the same under two estimators with similar assumptions is weak evidence about unmeasured selection. The consequences for estimates and generalization are discussed in Section 5.5.

Brooding correlated with negative affect at $r = 0.16$–0.24 across waves and symptom rumination correlated with negative affect at $r = 0.47$–0.49—well below the $r \geq 0.70$ threshold that would have triggered down-weighting of the mechanism interpretation.

4.2. Descriptive Statistics and Zero-Order Associations

Descriptive statistics for all 17 reported nodes by wave are presented in Table 1. Means and standard deviations were stable across the three waves; the largest wave-to-wave shift in any primary subscale mean was 0.39 scale points (cognitive reappraisal from T2 to T3, on a 1–7 scale; see Section 4.3 for whether this is interpretable as change in the latent mean); on the 1–5 scales, the largest shifts were self-judgment, which rose 0.24 from T1 to T3, and negative affect, which rose 0.23 from T1 to T2 and returned to baseline by T3. Per-wave zero-order correlation matrices among the 12 primary nodes are given in Supplementary Figures S1–S3. Self-judgment and brooding, the two nodes of the hypothesized upstream link, correlated at $r = 0.12$ at T1, so the two subscales do not measure a common content domain despite their shared self-evaluative framing.

Table 1. Means, standard deviations, and per-wave *n* for the 12 primary nodes and 5 sensitivity nodes.

Variable	T1 *M* (*SD*), *n*	T2 *M* (*SD*), *n*	T3 *M* (*SD*), *n*
1. Self-kindness	3.08 (0.74), 1400	3.09 (0.74), 1167	3.06 (0.72), 1044
2. Self-judgment	2.81 (0.72), 1400	2.91 (0.73), 1167	3.05 (0.71), 1044
3. Common humanity	2.97 (0.81), 1400	2.94 (0.80), 1167	2.95 (0.83), 1044
4. Isolation	2.84 (0.75), 1400	2.90 (0.73), 1167	2.72 (0.70), 1044
5. Mindfulness	3.16 (0.75), 1400	3.12 (0.74), 1167	3.31 (0.73), 1044
6. Over-identification	2.91 (0.83), 1400	2.91 (0.80), 1167	2.91 (0.80), 1044
7. Life satisfaction	4.10 (1.10), 1400	4.09 (1.09), 1167	4.16 (1.03), 1044
8. Positive affect	3.19 (0.65), 1400	3.06 (0.63), 1167	3.22 (0.65), 1044
9. Negative affect	2.89 (0.68), 1400	3.12 (0.66), 1167	2.86 (0.67), 1044
10. Reappraisal	4.06 (1.13), 1400	3.97 (1.16), 1167	3.58 (1.09), 1044
11. Suppression	3.96 (1.23), 1400	3.74 (1.19), 1167	3.86 (1.19), 1044
12. Brooding	2.33 (0.55), 1400	2.42 (0.54), 1167	2.31 (0.54), 1044
Reflection	2.44 (0.49), 1400	2.51 (0.50), 1167	2.32 (0.48), 1044
Symptom rumination	2.26 (0.44), 1400	2.39 (0.44), 1167	2.25 (0.42), 1044
RRS total	2.32 (0.39), 1400	2.42 (0.40), 1167	2.28 (0.38), 1044
Positive self-compassion	3.07 (0.52), 1400	3.05 (0.52), 1167	3.11 (0.51), 1044
Negative self-compassion	2.85 (0.51), 1400	2.90 (0.53), 1167	2.89 (0.50), 1044

Note. SCS-26 facets, brooding, reflection, and symptom rumination are scored on a 1–5 (SCS, PANAS) or 1–4 (RRS) Likert scale; SWLS and ERQ on a 1–7 scale.

4.3. Longitudinal Measurement Invariance

Metric and scalar invariance across the three waves were retained for all twelve scores. Moving from the configural to the metric model changed CFI by at most 0.002 in absolute value and RMSEA by at most 0.003; moving from metric to scalar changed CFI by at most 0.003 and RMSEA by at most 0.006 (largest values: expressive suppression, $\Delta\text{CFI} = 0.002$, $\Delta\text{RMSEA} = 0.005$), far inside the 0.010 and 0.015 criteria. The T2 to T3 decline in cognitive reappraisal (0.39 scale points) can therefore be read as a change in the latent mean and not as a shift in what the items measure (scalar $\Delta\text{CFI} = 0.002$). Full fit values for every scale are in Supplementary Table S6.

Three qualifications limit this result. For five of the six SCS-26 facets (all but self-judgment) and for brooding, the configural models fit almost perfectly (CFI $\approx$ 1.000, RMSEA $\approx$ 0) because the items correlate weakly ($\alpha = 0.54$–0.67), which leaves little power

to detect non-invariance, so the tests show the absence of detectable differences and do not prove equivalence. The tests are single-scale and treat ordinal items as continuous. Additionally, invariance of the scores does not remove the attenuation due to low reliability described above. Conclusions about "within-person change" are therefore conclusions about change in observed subscale scores that are comparable across waves, with the limits on precision stated in Section 4.1.

4.4. Layer Decomposition: What Survives the Addition of Random Intercepts

The nine-node network of six self-compassion facets and three subjective-well-being indicators was estimated twice on the same respondents: once without random intercepts (M2), the specification used in conventional cross-lagged panel networks, and once with them (M3). All 18 facet-to-indicator lagged paths from both models are given in Table 2.

Table 2. All 18 facet-to-indicator lagged paths, estimated without random intercepts (M2) and with them (M3) on the same nine-node set and the same respondents.

From	To	M2 (No RI)	M3 (with RI)	Change
Self-kindness	Life satisfaction	0.044	−0.067	−0.111
Self-kindness	Positive affect	**0.106**	−0.018	−0.124
Self-kindness	Negative affect	−0.010	0.002	0.012
Self-judgment	Life satisfaction	−0.054	−0.031	0.022
Self-judgment	Positive affect	0.010	0.041	0.031
Self-judgment	Negative affect	0.093	−0.060	−0.153
Common humanity	Life satisfaction	0.050	−0.009	−0.059
Common humanity	Positive affect	0.052	−0.066	−0.118
Common humanity	Negative affect	−0.036	−0.011	0.025
Isolation	Life satisfaction	−0.052	−0.055	−0.003
Isolation	Positive affect	−0.054	0.015	0.068
Isolation	Negative affect	**0.144**	0.007	−0.137
Mindfulness	Life satisfaction	**0.142**	0.066	−0.076
Mindfulness	Positive affect	**0.120**	−0.007	−0.127
Mindfulness	Negative affect	−0.009	0.048	0.057
Over-identification	Life satisfaction	0.010	0.065	0.056
Over-identification	Positive affect	−0.005	0.019	0.025
Over-identification	Negative affect	**0.152**	0.030	−0.122

Standardized lagged effects (partial directed correlations). **Bold** marks the five paths reaching $|\beta| \geq 0.10$ under M2. Both models use the same nine nodes, the same three waves, and the same 1400 respondents; they differ only in whether random intercepts are included.

Without random intercepts, five of the 18 paths reached $|\beta| \geq 0.10$: over-identification → negative affect (0.152), isolation → negative affect (0.144), mindfulness → life satisfaction (0.142), mindfulness → positive affect (0.120), and self-kindness → positive affect (0.106). The pattern is the familiar one: the negative facets forecast later negative affect, and the positive facets forecast later positive affect and life satisfaction.

Adding random intercepts to the same node set removed that structure. Across those same five paths the median $|\beta|$ fell to 0.018, and two reversed sign. Isolation → negative affect fell from 0.144 to 0.007; over-identification → negative affect from 0.152 to 0.030; mindfulness → positive affect from 0.120 to −0.007; self-kindness → positive affect from 0.106 to −0.018. Mindfulness → life satisfaction retained the largest share of its original magnitude, falling from 0.142 to 0.066 (a four-item facet; see Section 4.1). Across all 18 paths, the median $|\beta|$ fell from 0.052 to 0.031, and 11 of the 18 were smaller in absolute value under M3.

The two models differ in one respect only—whether stable between-person differences are partialed out of the lagged paths—so the contrast is consistent with attributing most of the conventional lagged structure to the between-person layer. Measurement is identical

across the two specifications, so attenuation from short subscales cannot by itself produce the difference. The contrast does not show that within-person effects are absent. The M3 estimates are small and imprecise (individual paths are estimated to within roughly ± 0.07, as the intervals for M1 in Section 4.6 show), the random-intercept block is close to singular (Section 4.8), and a random intercept can absorb stable measurement error as well as stable trait variance. What the contrast shows is that the conventional specification overstates the lagged association relative to a specification that holds stable differences constant.

4.5. Model Fit Across the Four Specifications

The same ordering appears in global fit. All four panel-network models attained CFI between 0.684 and 0.778, well below conventional adequacy (Table 3). Within this constrained fit regime, adding random intercepts produced a consistently better fit than the no-random-intercept specification at both node sizes, which suggests that the decomposition is not removing signal the data support but reallocating variance the simpler model had attributed to lagged paths. This is a relative comparison among misfitting models. Lower AIC for the random-intercept models does not show that they are correctly specified, and none of the four models meets conventional criteria for adequate fit. All four optimizations converged (convergence code 0). The 9-node CLPN that replicated (Y. Liu et al., 2026) without random intercepts (M2) had the worst fit of the four, $\chi^2(261) = 1010.82$, RMSEA = 0.045, CFI = 0.684, TLI = 0.543; the 9-node RI-CLPN (M3) improved CFI to 0.774 and lowered AIC by 177 points relative to M2. At 12-node scale, the primary RI-CLPN (M1) had CFI = 0.778 versus CFI = 0.696 for the no-RI comparator (M4), and AIC favored M1 over M4 by 212 points. Published fit for a standard nine-node CLPN in this literature was not reproduced here; this likely reflects sample and measurement differences rather than a general property of the CLPN form. The within-dataset *relative* comparison—RI-CLPN better than CLPN at both 9- and 12-node scales—is consistent with the methodological argument that random intercepts absorb stable between-person variance otherwise confounded with the cross-lagged signal (Epskamp, 2020; Hamaker et al., 2015).

Table 3. Fit indices for the four panel-network models.

Model	Nodes	RI?	χ^2	*df*	*p*	RMSEA	CFI	TLI	AIC	BIC
M1. 12-node RI-CLPN (primary)	12	✓	1142.56	390	<0.001	0.037	0.778	0.620	94,856	96,492
M2. 9-node CLPN (Y. Liu et al. 2026 replicate)	9	–	1010.82	261	<0.001	0.045	0.684	0.543	68,557	69,312
M3. 9-node RI-CLPN	9	✓	762.15	225	<0.001	0.041	0.774	0.620	68,380	69,324
M4. 12-node CLPN (no-RI sensitivity)	12	–	1486.19	456	<0.001	0.040	0.696	0.556	95,068	96,358

Note. All models fitted under FIML, $N = 1400$. RI? = random intercepts included; ✓ = included, – = not included.

4.6. The 12-Node Within-Person Network

The 12-node RI-CLPN (M1) converged with modest global fit, $\chi^2(390) = 1142.56$, $p < 0.001$, RMSEA = 0.037 (90% CI [0.035, 0.040]), CFI = 0.778, TLI = 0.620, SRMR = 0.034, AIC = 94,856, BIC = 96,492, $N = 1400$. RMSEA and SRMR fall inside the conventional acceptable ranges (RMSEA < 0.06, SRMR < 0.08), whereas CFI and TLI fall well below the conventional adequacy threshold of 0.95 (Hu & Bentler, 1999). We therefore do not claim that M1 fits well; its estimates are interpreted as conditional on a model of modest fit. The CFI/TLI shortfall is present in all four panel-network models (Section 4.5) and in all eight robustness models (Section 4.7); Section 4.8 examines its source. The temporal (within-person lagged) network is shown in Figure 2. The within-person contemporaneous network and the full standardized-β matrix are given in Supplementary Figures S4 and S5.

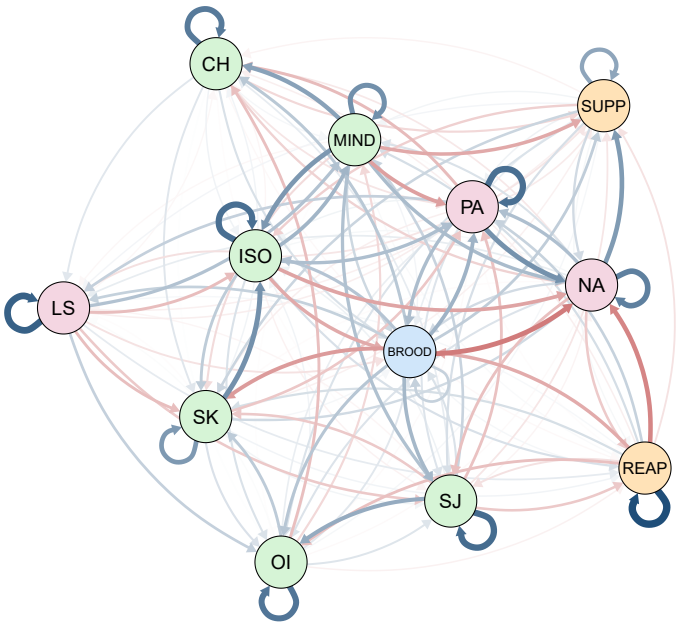


Figure 2. Temporal (within-person lagged) network of the 12-node random-intercept model. Edge thickness is proportional to $|\beta|$; blue denotes positive and red negative coefficients. Node fill encodes community (green, self-compassion facets; pink, subjective well-being; orange, emotion regulation; blue, brooding). SK = self-kindness; SJ = self-judgment; CH = common humanity; ISO = isolation; MIND = mindfulness; OI = over-identification; LS = life satisfaction; PA = positive affect; NA = negative affect; REAP = cognitive reappraisal; SUPP = expressive suppression; BROOD = brooding.

4.6.1. Primary Edges and FDR Results

One of the ten primary edges survived FDR correction (Table 4): expressive suppression positively predicted later negative affect at the within-person level, $\beta = 0.113$, $p = 0.002$, $p_{\text{FDR}} = 0.018$, approximate 95% CI $[0.042, 0.184]$, running from the negligible zone to well above the practical-interest threshold, so the effect is reliably non-zero but its size is uncertain. Three further edges were positive in direction and fell outside the null band ($|\beta| \geq 0.05$) but did not survive FDR correction and are reported as uncorrected trends only: self-judgment $\rightarrow$ brooding, $\beta = 0.080$, $p = 0.029$, $p_{\text{FDR}} = 0.145$; mindfulness $\rightarrow$ life satisfaction, $\beta = 0.069$, $p = 0.055$, $p_{\text{FDR}} = 0.173$; and isolation $\rightarrow$ brooding, $\beta = 0.066$, $p = 0.069$, $p_{\text{FDR}} = 0.173$. The remaining six primary edges, including the direct paths from isolation to negative affect, brooding to negative affect, mindfulness to positive affect, reappraisal to life satisfaction, and the two self-judgment paths to subjective-well-being indicators, were all below or near the null band and non-significant under FDR control. Their intervals are wide enough to include effects of practical interest, so these results are not support for the absence of an effect.

4.6.2. Indirect Effect Through Brooding (H1) and Status of the Hypotheses

H1 was tested on the indirect effect. The upstream path (self-judgment $\rightarrow$ brooding) was $a = 0.057$ ($SE = 0.027$, uncorrected $p = 0.029$) and the downstream path (brooding $\rightarrow$ negative affect) $b = 0.049$ ($SE = 0.042$, $p = 0.242$; standardized $\beta = 0.040$, inside the null band). The two-lag indirect effect was $a \times b = 0.0028$ ($SE = 0.0028$; Monte Carlo 95% interval $[-0.0019, 0.0098]$), with a direct self-judgment $\rightarrow$ negative-affect path of -0.049 ($SE = 0.032$) and a two-lag total effect of -0.004 (95% interval $[-0.030, 0.022]$). The interval for the indirect effect includes zero and the point estimate is far below the smallest effect of interest for a single path, and the downstream path meets the pre-specified falsification criterion. H1 is therefore not supported. The significance of the upstream path before correction is not evidence of mediation.

Table 4. Primary edge family from M1, with Benjamini–Hochberg false-discovery-rate correction at $q = 0.05$, sorted by $|\beta|$.

From → To	β (PDC)	Approx. 95% CI	p (Raw)	p (FDR)	FDR Sig.
Suppression → Negative affect	**0.113**	[0.042, 0.184]	0.002	**0.018**	✓
Self-judgment → Brooding	0.080	[0.008, 0.152]	0.029	0.145	
Mindfulness → Life satisfaction	0.069	[−0.001, 0.139]	0.055	0.173	
Isolation → Brooding	0.066	[−0.005, 0.137]	0.069	0.173	
Self-judgment → Negative affect	−0.056	[−0.128, 0.015]	0.121	0.242	
Self-judgment → Life satisfaction	−0.049	[−0.121, 0.023]	0.181	0.301	
Brooding → Negative affect	0.040	[−0.027, 0.108]	0.242	0.346	
Reappraisal → Life satisfaction	0.022	[−0.052, 0.096]	0.560	0.700	
Isolation → Negative affect	0.008	[−0.062, 0.079]	0.818	0.909	
Mindfulness → Positive affect	−0.004	[−0.074, 0.067]	0.922	0.922	

Note. Standardized lagged effects expressed as partial directed correlations (PDC). FDR control via Benjamini–Hochberg at $q = 0.05$. Bold = FDR-significant; ✓ = significant after FDR correction at $q = 0.05$. Approximate 95% intervals are derived from the Wald statistic of the corresponding unstandardized coefficient (unstandardized estimates and standard errors in Supplementary Table S10).

Table 5 summarizes the outcome for each hypothesis under the three-zone convention.

Table 5. Status of the pre-specified hypotheses.

Hypothesis	Evidence	Status
H1 brooding chain	$a = 0.057$ (uncorrected $p = 0.029$), $b = 0.049$ ($p = 0.242$); indirect effect 0.0028, 95% interval $[-0.0019, 0.0098]$	Not supported
H2a suppression → negative affect	$\beta = 0.113$, $p_{FDR} = 0.018$	Supported
H2b reappraisal → life satisfaction	$\beta = 0.022$, $p_{FDR} = 0.700$	Not supported
H3 mindfulness → life satisfaction	$\beta = 0.069$, $p_{FDR} = 0.173$ (indeterminate zone)	Not supported (uncorrected trend)

4.6.3. Within-Person Variance Explained

Model-implied within-person variance explained ranged from 1.9% (expressive suppression) to 6.8% (cognitive reappraisal) at wave 2, and from 2.0% to 7.3% at wave 3, with a mean near 5% across the twelve nodes. For the three outcomes of central interest, the values at waves 2 and 3 were 4.7% and 5.1% (negative affect), 5.5% and 5.7% (brooding), and 5.0% and 5.2% (life satisfaction). These are small effect sizes typical of three-month within-person panel paths (Funder & Ozer, 2019). They are model-implied values that rest on the stationarity assumption described in the Methods, and they are conservative to the extent that low reliability leaves more of the within-person variance as measurement error. The earlier approximation based on summed squared coefficients is not used. Values for all nodes in M1 and in the three comparison models are in Supplementary Table S8.

4.6.4. Bridge Strength

Bridge strength (Jones et al., 2021) was computed on the symmetrized absolute temporal network with the four communities fixed in the analysis plan (self-compassion, subjective well-being, emotion regulation, and brooding as a community of its own). Brooding ranked first (0.575), ahead of negative affect (0.440) and of every self-compassion facet by at least 0.322 (largest facet value: isolation, 0.253; Figure 3). In the three-community sensitivity specification, in which brooding is assigned to emotion regulation, its value is 0.496 and the order is unchanged (negative affect 0.440; every self-compassion facet at least 0.243 lower). Ranking nodes by total network connectivity, which uses no community definition at all, also places brooding first (0.575 versus 0.547 for negative affect).

The index is unsigned (absolute weights) and symmetrized, so it carries no directional information and is not a measure of expected influence or mediation, and the directed estimates qualify what it can mean. Brooding receives more than it sends: the summed absolute weight of edges into brooding is 0.694 against 0.456 for edges out of it, and its single strongest connection is an incoming and negative one (negative affect → brooding, $\beta = -0.119$). Brooding is therefore the most broadly connected node in this within-person network, but the direction of its connections does not describe a channel running from self-evaluative content to affective outcomes.

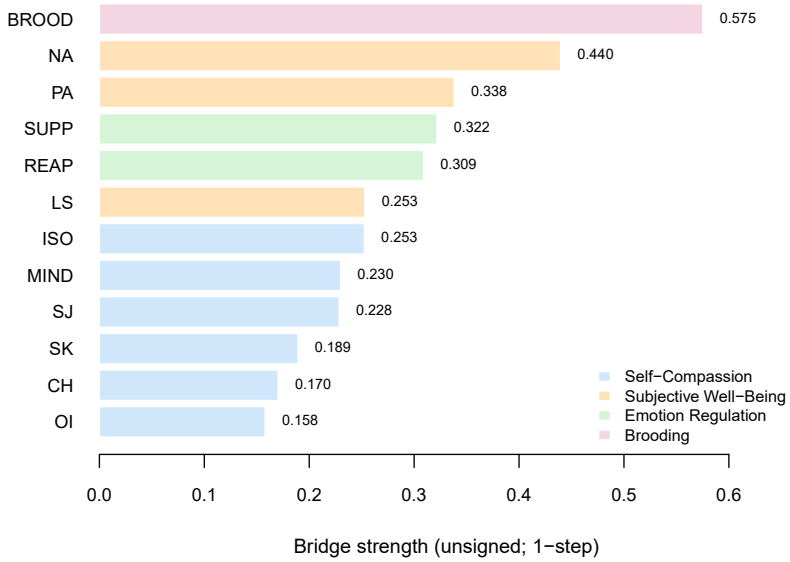


Figure 3. Unsigned bridge strength (one step) for each node of the 12-node within-person network, computed on the symmetrized absolute temporal network with four communities (self-compassion, subjective well-being, emotion regulation, brooding). The index is unsigned and symmetrized, so it carries no directional information; see Section 4.6 for the directed in- and out-strengths of brooding. Node abbreviations as in Figure 2.

4.7. Robustness Analyses

All eight robustness models converged with the same modest global fit observed in the primary model (Table 6, CFI range 0.730–0.798). The FDR-significant primary edge replicated at very similar magnitudes across every robustness specification, while the two largest non-significant H1- and H3-aligned edges also remained directionally consistent:

- **Suppression → Negative affect** PDC: M1 (primary, $N = 1400$) = 0.113; R1 complete-3-wave ($N = 891$) = 0.130; R2 ≥ 2 valid waves ($N = 1320$) = 0.113; R3 RRS-total swap = 0.113; R4 two-factor SC = 0.115; R5 fast-responder excluded ($N = 1232$) = 0.104; R6 demographic-residualized = 0.112; R7a reflection swap = 0.110; R7b symptom-rumination swap = 0.115. PDC range across the eight specifications = 0.104–0.130.
- **Self-judgment → Brooding** PDC: M1 = 0.080; R1 = 0.077; R2 = 0.079; R5 = 0.071; R6 = 0.073. (R3, R7a, and R7b drop the brooding node by design.)
- **Mindfulness → Life satisfaction** PDC: M1 = 0.069; R1 = 0.079; R2 = 0.068; R3 = 0.069; R5 = 0.069; R6 = 0.064; R7a = 0.069; R7b = 0.068.

The two-factor self-compassion sensitivity model (R4; eight nodes total) yielded same-direction effects for the corresponding aggregated paths, with the negative-self-compassion → brooding path larger than its facet-level analog: positive-self-compassion → life satisfaction, PDC = −0.005 (near-null); positive-self-compassion → positive affect, PDC = −0.062; negative-self-compassion → brooding, PDC = 0.130; suppression

→ negative affect, PDC = 0.115; brooding → negative affect, PDC = 0.035. The sensitivity analysis preserved the H1-aligned negative-self-compassion → brooding pattern and the H2 suppression → negative-affect pattern but not a positive self-compassion → life-satisfaction pattern.

R5 excluded the 168 respondents who completed any wave below the 5th percentile of survey duration (<470 s), leaving $N = 1232$ for re-estimation. R6 residualized all 12 nodes at every wave on the demographic variables described in Section 3.1 (gender, age, year of study, major group, device) prior to fitting the same 12-node RI-CLPN, $N = 1400$. Neither check changed the substantive pattern: the suppression → NA effect remained the only FDR-significant primary edge under either specification, and the H1 brooding-chain trend and the H3 mindfulness → LS trend were preserved at their primary-model magnitudes.

No robustness model contradicted the primary FDR finding; the suppression → NA effect was present at PDC ≥ 0.10 in every specification. The non-significant primary edges remained non-significant in every specification.

Table 6. Fit indices for the eight robustness models.

Robustness Model	*N*	χ^2	*df*	RMSEA	CFI	TLI	AIC
R1. Complete-3-wave subsample	891	1077.02	390	0.044	0.730	0.539	69,550
R2. ≥2 valid waves subsample	1320	1172.94	390	0.039	0.761	0.592	92,535
R3. RRS total swapped for brooding	1400	1240.73	390	0.039	0.779	0.623	91,636
R4. Two-factor SC (8 nodes)	1400	763.72	180	0.048	0.756	0.593	57,869
R5. Fast-responder excluded (<470 s)	1232	1035.43	390	0.037	0.782	0.628	82,996
R6. Demographic residualization (gender/age/year/major/device)	1400	1151.10	390	0.037	0.776	0.617	94,326
R7a. Reflection swapped for brooding	1400	1152.53	390	0.037	0.795	0.649	93,943
R7b. Symptom rumination swapped for brooding	1400	1193.46	390	0.038	0.798	0.656	92,321

4.8. Conditioning of the Random-Intercept Block and Interpretation of Fit

The CFI/TLI shortfall across the four panel-network models (CFI 0.68–0.78, TLI 0.54–0.62) cannot be traced to a single cause in these data, but one feature of the random-intercept block bears directly on how far the between-person layer can be trusted. In the 12-node random-intercept model (M1), the covariance matrix of the random intercepts is positive definite (smallest eigenvalue 0.00098) but ill-conditioned (condition number about 1141); in the nine-node model (M3), it is positive definite with smallest eigenvalue 0.00035 and condition number about 2180. The intercepts are correlated at a median absolute $r = 0.26$ (M1), yet their partial correlations, which are conditional on all other intercepts, are large: the median absolute partial correlation among the 12 intercepts is 0.86 and the maximum 0.96, with 9 of 66 pairs above 0.90; for M3, 34 of 36 pairs are above 0.90 (median 0.95). This is what a near-singular matrix looks like: a few dominant dimensions carry most of the stable between-person variance, and the associations conditional on the remaining intercepts are estimated with little information. The within-person block of M1 is well conditioned by comparison (median absolute partial correlation 0.021, maximum 0.081, condition number 4.9).

Four conclusions follow. First, the between-person network is not interpretable as a set of distinct trait-level associations and is not reported. Second, a near-singular intercept block does not by itself bias the within-person temporal estimates, but it reduces the information with which stable variance is separated from within-person variance, so we cannot exclude that some stable variance remained in the lagged paths and some within-person variance was absorbed by the intercepts. The within-person estimates are therefore supported but not proven to be unaffected. The supporting evidence is that all four optimizations converged, that the within-person block is well conditioned, and that the one FDR-significant edge and the leading trends keep their size across nine specifications that vary the sample, the node definitions and the covariates (Section 4.7). Third, RMSEA and

SRMR remained within conventional bounds in every panelgvar fit (RMSEA 0.013–0.045, SRMR 0.025–0.042), but with 390 degrees of freedom and small lagged effects, these indices are lenient, whereas CFI and TLI can be depressed when the average association among variables is weak because the baseline model then already fits comparatively well. We therefore do not read the fit indices as validating the model, and we do not read them as invalidating it. Fourth, differences between M2 and M3, or between M1 and M4, are differences between model specifications on the same observed scores. They show that the lagged association depends strongly on whether stable differences are partialed out; they do not by themselves show that the association is "only" between-person.

4.9. Exploratory Edges

All findings in this subsection are exploratory. Outside the primary edge family, eleven within-person lagged paths exceeded $|\beta| = 0.07$ in the panelgvar primary model. Several involve within-construct directional links inside the self-compassion subnetwork (e.g., isolation $\rightarrow$ self-kindness, $\beta = 0.124$; isolation $\rightarrow$ mindfulness, $\beta = 0.116$; common humanity $\rightarrow$ mindfulness, $\beta = 0.105$). A small set of cross-construct paths point in unexpected directions at face value (e.g., negative affect $\rightarrow$ positive affect, $\beta = 0.122$; negative affect $\rightarrow$ brooding, $\beta = -0.119$; negative affect $\rightarrow$ reappraisal, $\beta = -0.110$). A three-month wave spacing combined with modest subscale reliability provides too coarse an instrument to disambiguate genuine within-person reversals from estimation noise, so these unexpected-sign edges are not given a substantive interpretation here; full values are listed in the Supplementary Materials as candidates for higher-frequency (e.g., daily or weekly) follow-up designs.

5. Discussion

This study asked how much of the lagged association between self-compassion facets and subjective well-being survives when stable differences between persons are held constant and whether two within-person mechanisms, brooding and emotion regulation, carry any of it. The main answer is that the conventional specification overstates the lagged structure, that the hypothesized brooding chain was not supported, and that one emotion-regulation path, from expressive suppression to negative affect, was reliably non-zero. Each of these answers is bounded by a three-month lag, modest reliabilities, selective attrition and a poorly conditioned between-person block, and none is a test of causation.

5.1. Are the Hypotheses Supported?

The primary comparison behaved as predicted by the trait-covariation account: facet-to-indicator paths that were large without random intercepts shrank toward zero with them, and two of the five changed sign, which is what stable between-person covariation would produce. H1 was not supported. The upstream path from self-judgment to brooding was positive and of practical interest but did not survive correction, the downstream path was inside the null band, and the indirect effect was close to zero with an interval that included zero. H2 was half supported: expressive suppression predicted later negative affect and this held across all robustness specifications, whereas reappraisal did not predict later life satisfaction. The suppression result is an emotion-regulation-to-affect link and not evidence for a mechanism running from self-compassion to well-being: no self-compassion facet predicted later suppression (all six lagged coefficients $|\beta| \leq 0.047$, inside the null band), so the upstream step of such a pathway is not supported. H3 was not supported after correction; mindfulness to life satisfaction remained an uncorrected trend of indeterminate size, and the facet it rests on has four items. We stress that the pre-specified edges not supported here have wide intervals; with the simulated detection rates for small edges in the Methods, failure to find them is not evidence that they are zero.

5.2. Relation to Previous Research

Without random intercepts our nine-node network reproduces the pattern reported in a two-wave network of Chinese university students, in which mindfulness and self-judgment are prominent bridging nodes between self-compassion and well-being (Y. Liu et al., 2026); the divergence appears only when stable differences are partialed out. This is the pattern that methodological work on cross-lagged models predicts when trait-like variance is left in the lagged paths (Epskamp, 2020; Hamaker et al., 2015; H. W. Marsh et al., 2022), and it is compatible with reading the meta-analytic associations between self-compassion and well-being (I. C. Marsh et al., 2017; Zessin et al., 2015), which are largely cross-sectional, as predominantly between-person. To the extent that longitudinal studies reporting self-compassion to predict later well-being or lower distress (Krieger et al., 2016; Lee et al., 2021) estimated lagged paths without a stable-trait component, their results concern a different estimand and are not contradicted by ours. On the mechanism side, the small, uncorrected upstream link from self-judgment to brooding is in the direction proposed by accounts of brooding as a self-critical repetitive thought (Treynor et al., 2003; Watkins & Roberts, 2020), but the failure of the downstream link to negative affect differs from cross-sectional evidence that brooding is associated with affective symptoms (Joormann, 2006; Treynor et al., 2003); between-person association need not be mirrored by within-person lagged prediction at three months. The suppression result agrees with daily-life and short-term longitudinal work showing worse affective outcomes after greater use of suppression (Brockman et al., 2017; Gross & John, 2003).

5.3. Theoretical Implications

Three implications follow. First, what a network approach adds to the within-/between-person distinction is edge-level resolution: it shows that even the path that kept most of its size (mindfulness to life satisfaction) roughly halved and that the one node with the highest connectivity, brooding, is a receiver of lagged influence rather than a transmitter. Bridge strength is unsigned and symmetrized, so a node can be the most broadly connected without being a conduit; the directed estimates place brooding on the receiving end and whether it transmits at shorter timescales would require daily or weekly assessment. Second, if the association of self-compassion with well-being is mainly a matter of stable differences between persons, then theories of self-compassion as a within-person regulatory process, in which an increase in self-compassion produces a later gain in well-being, receive little support at this timescale in naturally varying students; theories of self-compassion as a stable disposition or resource are consistent with the data. This does not speak to deliberate increases in self-compassion produced by training. Third, bridge nodes identified in panel networks without random intercepts should not be described as within-person bridges because in these data the label depends on the specification and not only on the constructs.

5.4. Practical Implications for University Students

For campus counseling and student-development work, the findings suggest cautious, specific conclusions. Students who are higher in self-compassion report higher well-being across the term, so self-compassion is a sensible marker of who is doing well; it should not be assumed that the ordinary ups and downs in a student's self-compassion forecast their well-being a term later, so tracking fluctuations alone is a weak basis for early warning. Interventions aimed at raising self-compassion should be evaluated on sustained change in randomized designs and not inferred from panel associations. Expressive suppression, which forecast later negative affect with a reliable but modest effect, is a plausible and low-cost target for psychoeducation on emotion regulation, and our results can motivate a trial but are not evidence that reducing suppression will reduce negative affect.

5.5. Sources of Bias and Limitations

Six bounds define the scope of the results. (1) *Measurement.* Reliabilities were modest for the four- and five-item subscales (α = 0.52–0.81 across scales and waves), observed scores rather than latent variables were modeled, and the four-item mindfulness facet captures non-judgmental attention to painful experience rather than dispositional mindfulness as measured by the FFMQ or MAAS (Brown & Ryan, 2003; Keng et al., 2011). Attenuation biases lagged paths toward zero and so partly explains small within-person estimates; stable measurement error is absorbed into the random intercepts and so inflates the apparent between-person share. Longitudinal invariance was supported, but with little power for the weakly correlated facets. (2) *Model conditioning and fit.* CFI and TLI were low in every model, and the between-person block was close to singular (Section 4.8); the between-person network is uninterpretable, and the within-person estimates are supported but not shown to be free of leakage between layers. (3) *Selective attrition.* Respondents who left before T3 scored higher at baseline on negative affect ($d = 0.64$), rumination and self-judgment. FIML and complete-case analyses assume missingness depends only on observed scores, an assumption that selective attrition makes doubtful; the retained sample under-represents the higher-distress end, and lagged paths involving distress and brooding may be biased toward zero, or in either direction if the dropped students differ in their dynamics. Our two analyses cannot rule this out, and the results should not be generalized to high-distress students. (4) *Timescale and design.* A three-month lag restricts the conclusions to processes that unfold on a quarterly timescale, and the temporal paths are predictive associations, not causal effects, for either variance component. Absence of lagged effects at three months does not exclude effects at shorter lags. (5) *Power and multiplicity.* Individual small edges were recovered in roughly 11–68% of simulated replications (Methods), so non-significant small edges are uninformative; with ten pre-specified edges, FDR control and the exploratory status of all other edges limit false positives but not false negatives. (6) *Sample and context.* The sample is students at a single Chinese university, all data are self-reported, 66 respondents were younger than 18 at T1, and the generalizability to other institutions, cultures and age groups is not established.

5.6. Future Directions

Four extensions follow directly. Ecological momentary assessment of self-judgment, brooding and affect at daily or weekly resolution would show whether the trends detected here are the slow tail of a faster process or absent at every timescale. Multi-indicator latent-variable versions of the random-intercept panel network, with more than four items per facet, would address the attenuation problem and separate stable measurement error from stable trait variance. Retention-focused designs with incentives for higher-distress students, or pattern-mixture sensitivity analyses of the missing-data assumption, would address selective attrition. Finally, an experimental brooding-targeting protocol (Watkins, 2018), or a randomized self-compassion training with repeated measures, would test whether within-person links are manipulable and not merely observable. Applying the same two-specification comparison to existing panel datasets in this literature requires no new data, only the addition of random intercepts to models that have already been fitted.

5.7. Conclusions

In a three-wave panel of 1400 Chinese university students, the lagged associations that link self-compassion facets to subjective well-being in conventional cross-lagged panel networks were largely attenuated when random intercepts were added to the same node set: five paths at $|\beta| \geq 0.10$ fell to a median of 0.018, two of them reversing sign. In the within-person network, one pre-specified edge, expressive suppression to negative affect, survived correction, whereas the hypothesized indirect effect of self-judgment on negative

affect through brooding was not supported, and the within-person system explained about 2–7% of wave-to-wave variance. These results show that, in these data and at a three-month lag, self-compassion's lagged association with well-being depends heavily on stable differences between students. They do not show that within-person effects are absent: reliabilities were modest, attrition was selective, the between-person block was poorly conditioned, and small effects or effects at shorter lags cannot be excluded.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/bs16122235/s1, Table S1, sample demographic composition by wave; Table S2, internal consistency by subscale and wave; Table S3, floor and ceiling rates; Table S4, attrition-baseline comparison; Figures S1–S3, per-wave zero-order correlation matrices among the 12 primary nodes; Figure S4, the within-person contemporaneous network; Figure S5, the full standardized lagged-effects matrix; Table S5, the complete PDC matrices for M1–M4; Table S6, longitudinal measurement invariance by scale; Table S7, conditioning diagnostics of the random-intercept and within-person blocks; Table S8, model-implied within-person variance explained by node and model; Table S9, power-simulation results; Table S10, unstandardized estimates and standard errors of the ten primary edges and the indirect-effect estimates.

Author Contributions: Conceptualization, P.C. and D.H.; methodology, P.C., W.Z., P.W., and D.H.; investigation, W.Z. and P.W.; data curation, P.W. and D.H.; formal analysis, D.H. and P.W.; writing—original draft preparation, D.H.; writing—review and editing, P.C., W.Z., P.W., and D.H.; visualization, D.H.; supervision, P.C. and D.H.; project administration, P.C.; P.C. and W.Z. contributed equally to this work and should be considered co-first authors. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Science and Technology Research Project of Henan Province (Grant No. 262102211061); the 2027 Henan Provincial Teacher Education Curriculum Reform Research Project, "Reform and Practice of Integrating the 'Health First' Educational Philosophy into the Curriculum System of Physical Education Teacher Education" (Grant No. 2027-JSJYZD-043); the 2026 Core Course Project for Professional Degree Postgraduates of Zhengzhou University, "Sociology of Sport" (Grant No. ZYHXKC202601); and the Postgraduate Education Reform and Quality Improvement Project of Henan Province (Grant No. YJS2027KC25).

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Life Science Ethics Committee of Zhengzhou University (Approval No. ZZU-IRB-2025-1227; approved on 22 December 2025).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available because the consent obtained from participants did not cover public deposition of participant-level responses.

Conflicts of Interest: The authors declare no conflicts of interest.

References

Ayduk, Ö., & Kross, E. (2010). From a distance: Implications of spontaneous self-distancing for adaptive self-reflection. *Journal of Personality and Social Psychology*, *98*(5), 809–829. https://doi.org/10.1037/a0019205.

Borsboom, D., Deserno, M. K., Rhemtulla, M., Epskamp, S., Fried, E. I., McNally, R. J., Robinaugh, D. J., Perugini, M., Dalege, J., Costantini, G., Isvoranu, A.-M., Wysocki, A. C., van Borkulo, C. D., van Bork, R., & Waldorp, L. J. (2021). Network analysis of multivariate data in psychological science. *Nature Reviews Methods Primers*, *1*, 58. https://doi.org/10.1038/s43586-021-00055-w.

Brockman, R., Ciarrochi, J., Parker, P., & Kashdan, T. (2017). Emotion regulation strategies in daily life: Mindfulness, cognitive reappraisal and emotion suppression. *Cognitive Behaviour Therapy*, *46*(2), 91–113. https://doi.org/10.1080/16506073.2016.1218926.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822.

Chen, J., Yan, L., & Zhou, L. (2011). Reliability and validity of Chinese version of self-compassion scale. *Chinese Journal of Clinical Psychology*, *19*(6), 734–736.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13.

Epskamp, S. (2020). Psychometric network models from time-series and panel data. *Psychometrika*, *85*(1), 206–231. https://doi.org/10.1007/s11336-020-09697-3.

Epskamp, S. (2025). *Psychonetrics: Structural equation modeling and confirmatory network analysis* (R package version 0.17.8) [Computer software manual]. Comprehensive R Archive Network (CRAN). https://doi.org/10.32614/CRAN.package.psychonetrics.

Finlay-Jones, A. L., Rees, C. S., & Kane, R. T. (2015). Self-compassion, emotion regulation and stress among Australian psychologists: Testing an emotion regulation model of self-compassion using structural equation modeling. *PLoS ONE*, *10*(7), e0133481. https://doi.org/10.1371/journal.pone.0133481.

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science*, *2*(2), 156–168. https://doi.org/10.1177/2515245919847202.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348.

Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. P. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, *20*(1), 102–116. https://doi.org/10.1037/a0038889.

Han, X., & Yang, H. (2009). Trial use of the Nolen-Hoeksema ruminative thinking scale in China. *Chinese Journal of Clinical Psychology*, *17*(5), 549–551.

Han, Z., Chen, S., Yan, Z., Liu, Y., & Guo, C. (2025). The longitudinal relationship between self-esteem, life satisfaction, and depressive and anxiety symptoms among Chinese adolescents: Within- and between-person effects. *Behavioral Sciences*, *15*(2), 182. https://doi.org/10.3390/bs15020182.

Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118.

Huang, L., Yang, T., & Ji, Z. (2003). Applicability of the positive and negative affect scale in the Chinese population. *Chinese Mental Health Journal*, *17*(1), 54–56.

Jones, P. J., Ma, R., & McNally, R. J. (2021). Bridge centrality: A network approach to understanding comorbidity. *Multivariate Behavioral Research*, *56*(2), 353–367. https://doi.org/10.1080/00273171.2019.1614898.

Joormann, J. (2006). Differential effects of rumination and dysphoria on the inhibition of irrelevant emotional material: Evidence from a negative priming task. *Cognitive Therapy and Research*, *30*(2), 149–160. https://doi.org/10.1007/s10608-006-9035-8.

Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, *31*(6), 1041–1056. https://doi.org/10.1016/j.cpr.2011.04.006.

Krieger, T., Berger, T., & Holtforth, M. g. (2016). The relationship of self-compassion and depression: Cross-lagged panel analyses in depressed patients after outpatient therapy. *Journal of Affective Disorders*, *202*, 39–45. https://doi.org/10.1016/j.jad.2016.05.032.

Lee, E. E., Govind, T., Ramsey, M., Wu, T. C., Daly, R., Liu, J., Tu, X. M., Paulus, M. P., Thomas, M. L., & Jeste, D. V. (2021). Compassion toward others and self-compassion predict mental and physical well-being: A 5-year longitudinal study of 1090 community-dwelling adults across the lifespan. *Translational Psychiatry*, *11*, 397. https://doi.org/10.1038/s41398-021-01491-8.

Li, W., Yang, K., & Kong, F. (2026). The roles of happiness motives in cognitive reappraisal and expressive suppression: A longitudinal study in emerging adults. *Behavioral Sciences*, *16*(3), 312. https://doi.org/10.3390/bs16030312.

Lindsay, E. K., & Creswell, J. D. (2017). Mechanisms of mindfulness training: Monitor and acceptance theory (MAT). *Clinical Psychology Review*, *51*, 48–59. https://doi.org/10.1016/j.cpr.2016.10.011.

Liu, C., Lin, P.-T., & Xiong, Z. (2024). Self-compassion and psychological flourishing among college students: The mediating role of hope and the moderating role of emotion regulation. *Behavioral Sciences*, *14*(12), 1149. https://doi.org/10.3390/bs14121149.

Liu, Y., Guo, T., & Kong, F. (2026). Self-compassion and subjective well-being in university students: A cross-lagged panel network analysis. *Mindfulness*, *17*(8), 2395–2407. https://doi.org/10.1007/s12671-026-02849-z.

MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review*, *32*(6), 545–552. https://doi.org/10.1016/j.cpr.2012.06.003.

Marsh, H. W., Pekrun, R., & Lüdtke, O. (2022). Directional ordering of self-concept, school grades, and standardized tests over five years: New tripartite models juxtaposing within- and between-person perspectives. *Educational Psychology Review*, *34*, 2697–2744. https://doi.org/10.1007/s10648-022-09662-9.

Marsh, I. C., Chan, S. W. Y., & MacBeth, A. (2017). Self-compassion and psychological distress in adolescents—A meta-analysis. *Mindfulness*, *9*(4), 1011–1027. https://doi.org/10.1007/s12671-017-0850-7.

Muris, P., & Otgaar, H. (2020). The process of science: A critical evaluation of more than 15 years of research on self-compassion with the Self-Compassion Scale. *Mindfulness*, *11*(6), 1469–1482. https://doi.org/10.1007/s12671-020-01363-0.

Neff, K. D. (2003a). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity*, *2*(2), 85–101. https://doi.org/10.1080/15298860309032.

Neff, K. D. (2003b). The development and validation of a scale to measure self-compassion. *Self and Identity*, *2*(3), 223–250. https://doi.org/10.1080/15298860309027.

Tang, Q., He, X., Zhang, L., Liu, X., Tao, Y., & Liu, G. (2023). Effects of neuroticism on differences in symptom structure of life satisfaction and depression-anxiety among college students: A network analysis. *Behavioral Sciences*, *13*(8), 641. https://doi.org/10.3390/bs13080641.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, *27*(3), 247–259. https://doi.org/10.1023/A:1023910315561.

Trompetter, H. R., de Kleine, E., & Bohlmeijer, E. T. (2016). Why does positive mental health buffer against psychopathology? An exploratory study on self-compassion as a resilience mechanism and adaptive emotion regulation strategy. *Cognitive Therapy and Research*, *41*(3), 459–468. https://doi.org/10.1007/s10608-016-9774-0.

Wang, L., Liu, H., Li, Z., & Du, W. (2007). Reliability and validity of the Chinese version of the emotion regulation questionnaire. *Chinese Journal of Health Psychology*, *15*(6), 503–505.

Watkins, E. R. (2018). *Rumination-focused cognitive-behavioral therapy for depression*. Guilford Press.

Watkins, E. R., & Roberts, H. (2020). Reflecting on rumination: Consequences, causes, mechanisms and treatment of rumination. *Behaviour Research and Therapy*, *127*, 103573. https://doi.org/10.1016/j.brat.2020.103573.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063.

Xiong, C., & Xu, Y. (2009). Reliability and validity of the Chinese version of the satisfaction with life scale among the general public. *Chinese Journal of Health Psychology*, *17*(8), 948–949.

Yan, L., Li, R., Zhang, G., & Liu, W. (2026). Mind–body exercise, cognitive reappraisal, brooding, and psychological distress among middle-aged women. *Behavioral Sciences*, *16*(9), 1596. https://doi.org/10.3390/bs16091596.

Zessin, U., Dickhäuser, O., & Garbade, S. (2015). The relationship between self-compassion and well-being: A meta-analysis. *Applied Psychology: Health and Well-Being*, *7*(3), 340–364. https://doi.org/10.1111/aphw.12051.

Zhang, K., Jia, R., Dong, S., Yang, J., Yang, Q., & Zhang, L. (2026). Mapping the links between celebrity worship and subjective well-being in Chinese undergraduates via network analysis. *Behavioral Sciences*, *16*(1), 28. https://doi.org/10.3390/bs16010028.

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