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Positive Stress Mindset Is Vulnerable: Unpacking the Internal System and External Loop of Dynamic Stress Mindset

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ABSTRACT

Research has shown that individuals' stress mindset—the belief that stress is enhancing or debilitating—can be altered through interventions. However, there is still a lack of findings regarding the dynamic fluctuations of stress mindset and its interplays with psychological outcomes in natural settings. Moreover, few studies have examined the distinct roles of positive and negative stress mindset. The present study aimed to investigate the dynamic characteristics of positive and negative stress mindset in daily life, as well as its reciprocal effects with affective well-being and psychological distress. A total of 365 college students completed the assessment of positive and negative stress mindset, affective well-being (i.e., positive affect and negative affect), and psychological distress for seven consecutive days (five assessments per day). We examined the dynamic characteristics of the internal system of positive and negative stress mindset, as well as their external interactions with affective well-being (i.e., positive affect and negative affect), and psychological distress. Results showed that stress mindset exhibited substantial dynamic fluctuations and individual differences. Both positive and negative stress mindset had significant inertia within a day, and negative stress mindset negatively predicted subsequent positive stress mindset. In addition, there was a self-perpetuating cycle between negative stress mindset and negative affective experiences, whereas positive stress mindset was unidirectionally impaired by psychological distress. These findings highlight the dynamic nature of stress mindset, pinpointing the susceptibility of positive stress mindset to daily negative influences, as such call for targeted interventions on protecting and cultivating a positive view of stress.

1 | Introduction

Stress mindset refers to individuals' belief about whether stress has enhancing or debilitating effects (Crum et al. 2013), which plays a crucial role in our daily lives. Individual's stress mindset affected his or her appraisal of a stressful situation as well as the subsequent behavioural response (Crum et al. 2013). Researchers have found that, compared to those with negative stress mindset (stress-is-debilitating), individuals with positive stress mindset (stress-is-enhancing) exhibited better cognitive functioning and performance (Crum et al. 2013; Crum et al. 2017), greater emotional well-being (Crum et al. 2013), and more adaptive physiological responses (Crum et al. 2013; Crum et al. 2017; Jamieson et al. 2016). However, previous cross-sectional or

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longitudinal studies have primarily focused on trait stress mindset at the aggregate level (Casper et al. 2017; Laferton et al. 2020), with relatively limited attention to the dynamic processes of state stress mindset within individuals. While some manipulation and intervention studies have demonstrated that stress mindset can be modified over short periods of time (Crum et al. 2013, 2020; Yeager et al. 2022), its natural fluctuations and dynamic interplay with relevant factors such as affective experiences remain underexplored. Moreover, individual differences in dynamic stress mindset have yet to be explored in depth. People may differ not only in the general tendency of stress mindset (Zhao et al. 2023), but also in the dynamic characteristics of stress mindset. Investigating individual differences in the natural fluctuations of stress mindset in daily life could provide effective guidance for personalised preventions and interventions. Therefore, the present study employed ecological momentary assessment (EMA) to capture the within-person dynamics of stress mindset in daily life, and used dynamic structural equation modelling (DSEM) to explore the internal system of dynamic stress mindset and its external feedback loop with affective well-being and psychological distress. Specifically, we examined the dynamic characteristics (including equilibrium, volatility, inertia, and reciprocal effects) of positive and negative stress mindset as key features of the internal system, and their dynamic reciprocal relations with affective well-being (i.e., positive affect and negative affect) and psychological distress as processes of the external loop, to promote a deeper understanding of the dynamics of stress mindset.

1.1 | Stress Mindset: From Trait to State

According to the Theory of Stress Mindset (Crum et al. 2013), the belief of stress shaped how individuals perceive and respond to stressors and thus influenced their emotional, cognitive, and physiological reactions. Building on this theoretical framework, different stress mindset are associated with distinct motivational and physiological processes (Crum et al. 2013). Individuals with positive stress mindset perceived stress as a helpful context, and actively engaged in goal-directed behaviours and adaptive coping. In contrast, those with negative stress mindset took actions to avoid or control stress, and were more likely to adopt maladaptive stress coping responses such as avoidance or disengagement. Empirical studies also supported that a positive stress mindset was associated with positive well-being indices (e.g., resilience and positive emotions), whereas a negative stress mindset was associated with psychological symptomatology and negative feelings (Crum et al. 2013; Karampas et al. 2020). Much of the existing research viewed such stress beliefs as a relatively stable cognitive tendency of individuals (Casper et al. 2017; Dweck 2008; Laferton et al. 2020); however, some evidence suggested that stress mindset is more than just a stable trait (Crum et al. 2017; Yeager et al. 2022). Rather, it can be conceptualised as a state that changes over time and across situations.

Some studies have found that individuals' beliefs about stress can be manipulated. Clinical intervention studies showed that a brief stress-is-enhancing intervention could significantly change participants' stress mindset, and benefit their subsequent health and performance outcomes (Chue 2019; Loucas 2022; Yeager et al. 2022). Additionally, some manipulations in lab were also proven to be effective, in which individuals' stress mindset exhibited notable deviations by watching short videos or reading text materials (Beltzer et al. 2014; Crum et al. 2017). In addition, Crum et al. (2013) introduced both general and specific measure of stress mindset, highlighting its potential situational sensitivity. These studies indicate that stress mindset is malleable and may have state components.

Although previous studies have suggested the possibility that a stress mindset could be altered, how an individual's stress mindset naturally fluctuates in daily life remains unclear. According to the Process Model of Mindset (PMM; Ruiter and Thomaes 2023), a stable trait mindset stems from everyday experiences and events. Positive and negative state stress mindset interact internally with each other and externally with daily life experience and events, which ultimately shape a relatively stable mindset of stress (Ruiter and Thomaes 2023). In addition, previous research on individual differences of stress mindset has focused primarily on the overall level (Zhao et al. 2023). However, considering that the overall level of an individual's stress mindset emerges from the dynamic process of positive and negative stress mindset within an individual, exploring how an individual's stress mindset fluctuates over time and how individuals differ in these fluctuations would provide valuable insights to individual differences in stress mindset. Therefore, it is necessary to explore the internal dynamic system and external dynamic processes of positive and negative stress mindset and the individual differences.

1.2 | Internal System of Dynamic Stress Mindset

In traditional longitudinal studies (with a few measurements each spanning several months or years), researchers mainly focused on the trajectory of the overall level of the construct, and treated deviations from the overall level as noise (McNeish and Hamaker 2020). Recently, a growing body of research has pointed to the importance of intensive longitudinal studies (with 20 or more measurements at intervals of days or hours) in exploring the dynamics of the construct (McNeish and Hamaker 2020). In these studies, fluctuations around the overall level were meaningful and of interest. Specifically, the dynamic characteristics of interest in intensive longitudinal studies of stress mindset are shown in Table 1. The *equilibrium* represents the person-specific mean level that positive and negative stress mindset fluctuates around. It is commonly operationalised by the intraindividual mean. As for the variability around the mean, it is conceptualised as the *volatility* of stress mindset, describing the extent of fluctuations over time. Some studies adopted the standard deviation (SD) to describe the overall magnitude of the observed fluctuations (Mun et al. 2019; Ram et al. 2005); however, the SD could not possess temporal sensitivity and could not capture the frequency of fluctuations (Mun et al. 2019). To address these limitations, some researchers suggested to use mean square of successive differences (*MSSD*) to represent the extent of fluctuations over time (Mun et al. 2019). The *MSSD* reflects the average changes between two adjacent observations, combining both the magnitude of change and temporal dependency (Leiderman and Shapiro 1962).

TABLE 1 | Definitions and operationalizations of the dynamic characteristics of stress mindset.

Indices	Definition	Operationalisation
Equilibrium	The mean level that positive or negative state stress mindset fluctuates around.	Intraindividual average of positive or negative state stress mindset over a defined period of time.
Volatility	The extent of fluctuations in positive or negative state stress mindset.	Intraindividual mean square of successive difference (*MSSD*) of positive or negative state stress mindset over a defined period of time.
Inertia	The resistance to change or shift in positive or negative state stress mindset.	Autoregressive effects of positive or negative stress mindset at time *t* on the same stress mindset at *t*-1.
Reciprocal effects	The extent to which positive and negative stress mindset affects each other subsequently.	Cross-lagged effects between positive stress mindset and negative stress mindset from time *t*-1 to *t*.

Furthermore, some advanced modelling approaches, such as DSEM, could capture more nuanced dynamics within the internal system of stress mindset. Regarding the dynamic processes of stress mindset, *inertia* can be used to characterise the 'carryover' or resistance to the change in stress mindset. Inertia represents the degree to which the current state of stress mindset can be predicted by the previous state, and is typically quantified by the autoregressive effects. Specifically, a positive autoregressive value close to one indicates strong temporal dependency, where momentary stress mindset tends to persist over time, showing slow adjustment back to equilibrium. A value close to 0 reflects weak temporal dependency, suggesting rapid return to equilibrium after temporary deviations. In contrast, a negative autoregressive value indicates anti-persistence, where deviations from equilibrium tend to reverse direction at the next time point.

Regarding the dynamic interplay between positive and negative stress mindset, *reciprocal effects* can be used to describe the time-lagged influences of fluctuations in one aspect of stress mindset on the other. Some researchers have noted that positive and negative stress mindset may be relatively independent (Dweck et al. 1995; Tedadi et al. 2022). In our daily life, people's perceptions of the impact of stress are often ambiguous—for example, one might expect stress to enhance performance, yet simultaneously feel overwhelmed as a deadline approaches. Similar evidence has been observed in the domain of intelligence mindset, where fixed and growth beliefs have been identified as distinct constructs and coexisted within individuals (Barroso et al. 2023; McNeil et al. 2023). These findings suggest that positive and negative stress mindset may function somewhat independently and mutually influence each other over time. These mutual influences can be quantified by the cross-lagged effects between positive and negative stress mindset.

1.3 | External Processes With Affective Well-Being and Psychological Distress

In addition to the internal interplay between positive and negative stress mindsets, their external interactions with other individual states also worth attention, particularly in relation to affective experiences. Previous research has shown that stress mindset is strongly associated with affective well-being. Studies found that, compared to those with negative stress mindsets, people who held positive stress mindset experienced more positive affect and less negative affect (Crum et al. 2013, 2020; Nabi et al. 2013; Park et al. 2018). In addition to positive and negative affect, another commonly examined and more severe emotional state is psychological distress. Psychological distress is characterised by symptoms of depression and anxiety (Arvidsdotter et al. 2016), and has been conceptualised as a dynamic state that fluctuates over time in intensive longitudinal studies (Grégoire et al. 2021; Luo et al. 2024; Peltz and Rogge 2022). Although direct evidence on the relation between stress mindset and psychological distress is limited, previous research has found that stress mindset was strongly related to depressive symptom and anxiety (X. Wang et al. 2022; Caleon et al. 2023; Crum et al. 2017).

However, most of these studies have been cross-sectional or longitudinal studies with time points spanning several months. A key limitation is that they failed to distinguish between between-person and within-person level associations. Given that relations in between-person level do not necessarily generalise to within-person level (Bolger and Laurenceau 2013; Hamaker 2012), the dynamic associations between positive and negative stress mindset with affective well-being and psychological distress still requires further exploration. In addition, Park et al. (2018) noted that negative affective experiences may deepen the negative stress mindset, indicating that stress mindset could not only affect, but also be affected by affective experiences. This process may form a reciprocally reinforcing feedback loop. However, there is still a lack of empirical evidence on such the dynamic bidirectional associations. Thus, how stress mindset reciprocally interacts with affective well-being and psychological distress in daily life awaits further investigation.

1.4 | The Current Study

The main objective of the current study was to investigate the dynamic characteristics (including equilibrium, volatility, inertia, and reciprocal effects) of positive and negative stress mindset, and their dynamic loops with affective well-being and psychological distress in daily life, focusing on both internal and external processes of stress mindset. To capture the potential within-day fluctuations of stress mindset in natural settings, we used ecological momentary assessment (EMA), which allows for

more accurate tracking of dynamic changes while reducing retrospective bias and enhancing ecological validity. Specifically, we conducted EMA for seven consecutive days (five assessments per day), and examined the internal and external dynamic processes of stress mindset using DSEM. Based on the literature review, we expected that positive and negative stress mindset would fluctuate in natural contexts, and that these fluctuations would exhibit individual differences. Additionally, we expected that positive and negative stress mindset would have bidirectional associations with affective well-being (i.e., positive affect and negative affect) and psychological distress.

2 | Methods

2.1 | Participants and Procedure

A total of 356 Chinese college students (270 females) with a mean age of 20.689 (SD = 1.658) participated in this study. The sample size was determined according to previous empirical studies based on dynamic structural equation models (Luo et al. 2024). Data were collected via Wenjuanxing (https://www.wjx.cn/), a widely used online survey platform in China. First, all participants signed the informed consent form, and were required to complete a questionnaire about their demographic information. For the next 7 days, participants received a link to a questionnaire five times a day (at 11:00, 14:00, 17:00, 20:00, and 23:00), which measured their positive and negative stress mindset affective well-being (i.e., positive and negative affect) and psychological distress. Each survey link remained active for 30 min to ensure timely repsonses. Participants was expected to complete a total of 35 assessments (five times per day for seven consecutive days). Finally, 90.594% (n = 11288) of all short questionnaires (N = 12460; 356 participants × 35 measures) were completed. Among all participants, 81.46% (n = 290) completed at least 30 out of 35 assessments, and 22.75% (n = 81) completed all 35 assessments, which indicated satisfactory compliance. The study was approved by the university's ethics committee.

2.2 | Measures

Positive and Negative Affect. The Chinese version (Huang et al. 2003) of the 10-item Positive and Negative Affect Scale (PANAS; Watson et al. 1988) was used to measure positive and negative affect. Positive affect was assessed by five items (e.g., enthusiastic, inspired), and negative affect was assessed by five items (e.g., upset, nervous). Participants were asked to rate the extent to which they had felt since they had completed the last questionnaire from 1 ('very slightly or not at all') to 5 ('extremely'). The average scores of the items were calculated respectively. Higher scores represent higher levels of positive or negative affect. According to Geldhof et al. (2014), level-specific reliabilities were estimated by calculating McDonald's ω, which showed acceptable reliabilities (ω_{PA} = 0.760 at the within-person level; ω_{PA} = 0.931 at the between-person level; ω_{NA} = 0.769 at the within-person level; ω_{NA} = 0.971 at the between-person level).

Psychological Distress. Psychological distress was measured by the four-item Patient Health Questionnaire (PHQ-4; Kroenke et al. 2009; Löwe et al. 2010). Participants were required to respond to the four items: 'not being able to stop or control worrying', 'feeling nervous, anxious or on edge', 'little interest or pleasure in doing things', and 'feeling down, depressed, or hopeless' on a five-point scale (from 1 = 'not at all' to 5 = 'very much'). The average score of the four items was calculated. McDonald's ω indicated acceptable reliabilities (ω_{PD} = 0.741 at the within-person level; ω_{PD} = 0.969 at the between-person level).

Positive and Negative State Stress Mindset. Positive and negative stress mindset was measured by the two items with the highest loadings on the Stress Mindset Measure (SMM; Crum et al. 2013), respectively. Participants reported the extent to which they agreed with the statements 'the effects of stress are negative and should be avoided' and 'the effects of stress are positive and should be utilised' as a general attitude toward stress. Responses were rated on a seven-point scale (1 = 'strongly disagree', 7 = 'strongly agree'). Higher scores represent higher levels of positive or negative stress mindset.

To ensure that participants' assessments of stress mindset were grounded in their current experiences, they were first asked whether they had encountered any stressors since the last assessment. The checklist was adapted from Baker et al. (2020) and included nine stressors commonly experienced by college students, such as academic workload, interpersonal conflict, financial pressure, and career concerns. We also provided the following instruction for the stress mindset items: 'What is the primary source of stress in your life right now? In considering this particular stressor, please rate the extent to which you agree or disagree with the following statements.'

2.3 | Analysis Strategies

Descriptive and correlational analyses were conducted using R version 4.2.2 with the *psych* package (Revelle 2017). First, to provide an overall understanding of the equilibrium and volatility of state stress mindset, we calculated the mean and *MSSD* for each participant. All non-missing observations were used to calculate the mean, and all pairs of non-missing adjacent observations were used to calculate the *MSSD*. We plotted the trajectories of positive and negative stress mindset across 35 assessment points for two typical participants using the *ggplot2* package in R (Wickham 2009). Individual differences in equilibrium and volatility were quantified using the standard deviation (SD) and range of the person-specific means and *MSSD* values. Additionally, 90% and 95% heterogeneity intervals were computed and interpreted based on Goldring and Bolger (2021).

To examine the inertia and reciprocal relations of positive and negative stress mindset, we established a bivariate dynamic structural equation model in M*plus* (see Figure 1) version 8.3 (Muthén and Muthén 2017). The positive and negative stress mindset was decomposed into two components: person-mean levels (reflecting between-person differences) and person-mean centred deviations (capturing within-person fluctuations across time). At the within-person level, autoregressive effects of positive and negative stress mindset as well as their cross-lagged effects were estimated for each participant, and the mean values

and variances of these effects were estimated across all participants. To further examine the individual differences in the inertia and reciprocal effects of state stress mindset, we extracted person-specific standardized autoregressive and cross-lagged effects using the STDRESULTS command in the SAVE section of M*plus*. We then calculated the proportion of participants whose person-specific estimates shared the same sign as the corresponding average effect, and reported the 90% and 95% heterogeneity intervals. At the between-person level, the mean values of positive and negative stress mindset, and their autoregressive and cross-lagged effects, were allowed to be freely correlated.

Finally, to investigate the dynamic relations between stress mindset and affective well-being and psychological distress, we constructed three dynamic structural equation models (see Figure 2) respectively for positive affect, negative affect, psychological distress. For each model, the autoregressive and cross-lagged effects of all variables were estimated at the within-person level, and the correlations of the person means of all variables were estimated at the between-person level.

In these four dynamic structural equations models, the parameters were estimated using the Bayes estimator with non-informative priors (the default option in M*plus*). Two Markov Chain Monte Carlo (MCMC) chains were employed, each comprising 5000 iterations, with a thinning value of 10. To assess the statistical significance of the effects, the 95% credible intervals (CIs) were examined. If the intervals did not include zero, the corresponding effects could be considered statistically significant.

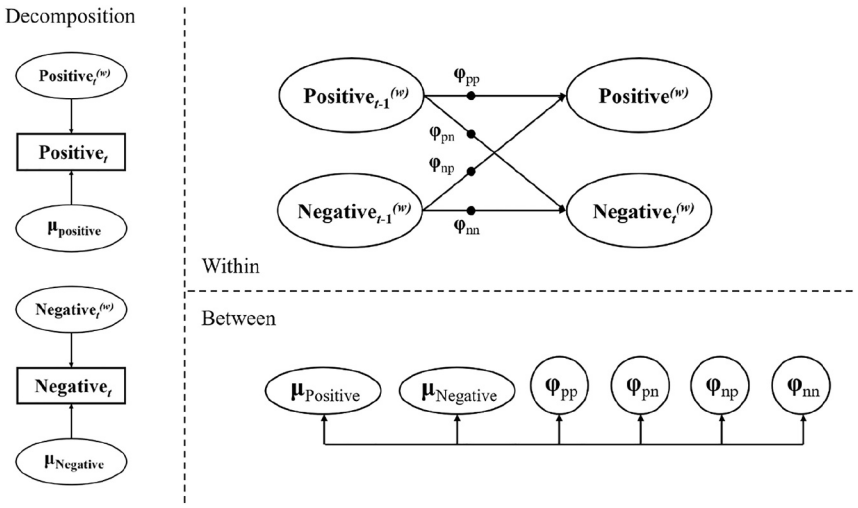

FIGURE 1 | Dynamic Structural Equation Model for Positive and Negative Stress Mindset. Positive = Positive stress mindset, Negative = Negative stress mindset. Black dots indicate person-specific autoregressive and cross-lagged effects.

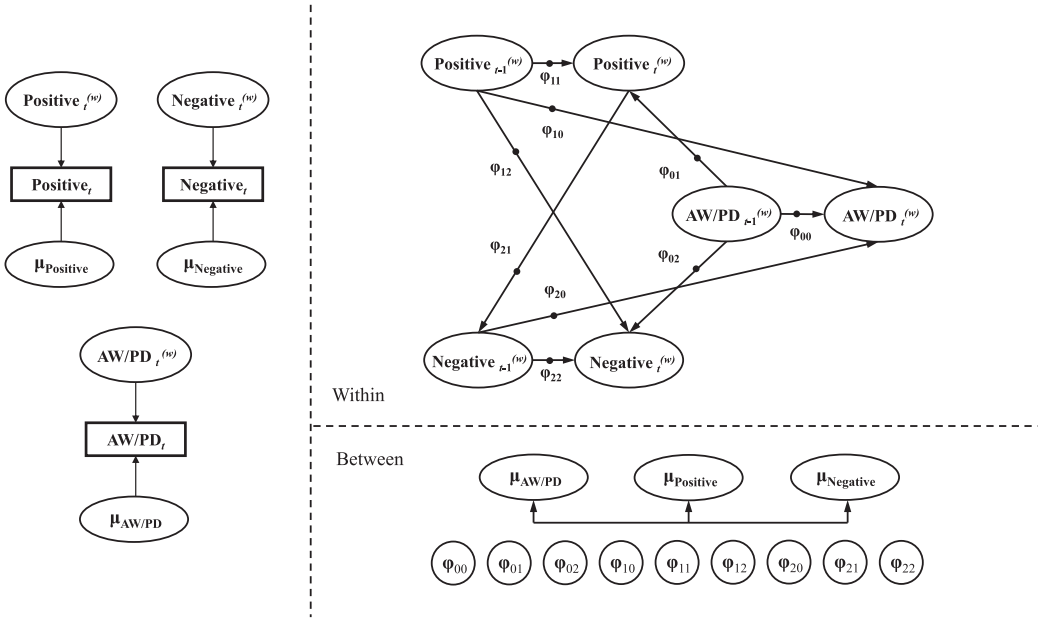

FIGURE 2 | Dynamic Structural Equation Model for Positive and Negative Stress Mindset and Affective Well-being and Psychological Distress. Positive = Positive stress mindset, Negative = Negative stress mindset, AW/PD = Affective well-being (i.e., positive affect and negative affect) and Psychological distress. Black dots indicate person-specific autoregressive and cross-lagged effects.

All data, M*plus* syntax and R code are available at https://osf.io/xjqcb/?view_only=02ff8d7823a04a93b2dc314f68a066e0.

3 | Results

3.1 | Descriptive Statistics and Correlations

Descriptive statistics and correlations between positive and negative stress mindset, positive and negative affect, affective well-being and psychological distress are presented in Table 2. The intraclass correlations (ICCs) for positive and negative stress mindset, positive and negative affect, and psychological distress were 0.694, 0.667, 0.708, 0.687 and 0.673, respectively, suggesting that about 30% of the variance of all variables was within individuals. At both the within-person and between-person levels, positive stress mindset was negatively correlated with negative stress mindset. Positive stress mindset was positively correlated with positive affect, and negatively correlated with negative affect and psychological distress. Negative stress mindset was positively associated with negative affect and psychological distress, and negatively associated with positive affect.

3.2 | Internal System of Dynamic Stress Mindset

Equilibrium and Volatility. Table 3 shows the descriptive statistics for person-specific equilibrium and volatility of positive and negative stress mindset. The means of equilibrium across people were 4.473 for positive stress mindset and 3.573 for negative stress mindset. These person-specific equilibriums covered a wide range and exhibited meaningful heterogeneity. The person at the high end of the distribution exhibited an equilibrium nearly 1.5 times higher than the average (97.5th percentile of equilibrium: positive = 6.038; negative = 6.831), suggesting substantial individual differences in the overall levels of stress mindset.

Additionally, the means of volatility of positive and negative stress mindset were 0.997 and 1.220, respectively, demonstrating that stress mindset fluctuated meaningfully over time at the group level. Regarding individual differences in volatility, the person at the high end of the distribution was more than three times as fluctuating as the average person (97.5th percentile of volatility: positive = 5.236; negative = 4.019). Additional analyses found that while the majority of participants exhibited meaningful within-person variation in stress mindset over the 7-day period, a small subset—8.42% (30 out of 356) of participants always reported the same score for positive stress mindset, and 8.14% (29 out of 356) for negative stress mindset—showed relatively stable response patterns. This may reflect that stress mindset is more stable for some individuals, highlighting individual differences in the degree of fluctuation.

Figure 3 shows the dynamics of positive and negative stress mindset for two example participants. The time series of the stress mindset for participants A and B showed significant fluctuations around the equilibrium over time. Individuals varied in their equilibriums of stress mindset, with some having similar levels of positive and negative stress mindset (participant A), and others exhibiting greater differences (participant B). Additionally, some individuals showed larger volatility (participant B), while others showed smaller (participant A), indicating individual differences in the volatility of stress mindset. In addition, the time series of participant B showed significant jumps in stress mindset at certain time points, suggesting that stress mindset may be influenced by specific life events and experiences. Taken together, these results suggest that the stress mindset does have a state component that can fluctuate and change over a short period of time.

TABLE 2 | Descriptive statistics and correlations between positive and negative stress mindset, positive and negative affect, and psychological distress ($N = 356$).

			Correlations				
	***M* (SD between)**	**ICC**	**1**	**2**	**3**	**4**	**5**
1 Positive stress mindset	4.473 (0.666)	0.694	—	−0.394***	0.109***	−0.090***	−0.107***
2 Negative stress mindset	3.573 (0.749)	0.667	−0.745***	—	−0.084***	0.184***	0.215***
3 Positive affect	2.729 (0.974)	0.708	0.437***	−0.337***	—	−0.057***	−0.125***
4 Negative affect	1.639 (0.810)	0.687	−0.269***	0.372***	−0.048	—	0.623***
5 Psychological distress	1.725 (0.876)	0.673	−0.296***	0.411***	−0.100	0.944***	—

Note: Between-person correlations are presented below the diagonal, and within-person correlations are presented above the diagonal.
Abbreviation: ICC = Intraclass correlation.
***$p < 0.001$.

TABLE 3 | Descriptive statistics for person-specific equilibrium and volatility of positive and negative stress mindset.

		Mean	**Median**	**SD**	**Range**	**95% HI**	**90% HI**
Mean (equilibrium)	Positive stress mindset	4.473	4.507	1.173	[1.000, 7.000]	[1.363, 6.038]	[1.570, 5.742]
	Negative stress mindset	3.573	3.681	1.235	[1.000, 6.448]	[1.939, 6.831]	[2.287, 6.357]
MSSD (volatility)	Positive stress mindset	0.997	0.613	1.165	[0.000, 8.656]	[0.000, 5.236]	[0.000, 4.123]
	Negative stress mindset	1.22	0.75	1.388	[0.000, 8.188]	[0.000, 4.019]	[0.000, 3.165]

Abbreviation: HI = Heterogeneity intervals; *MSSD* = Mean square of successive difference; SD = Standard deviation.

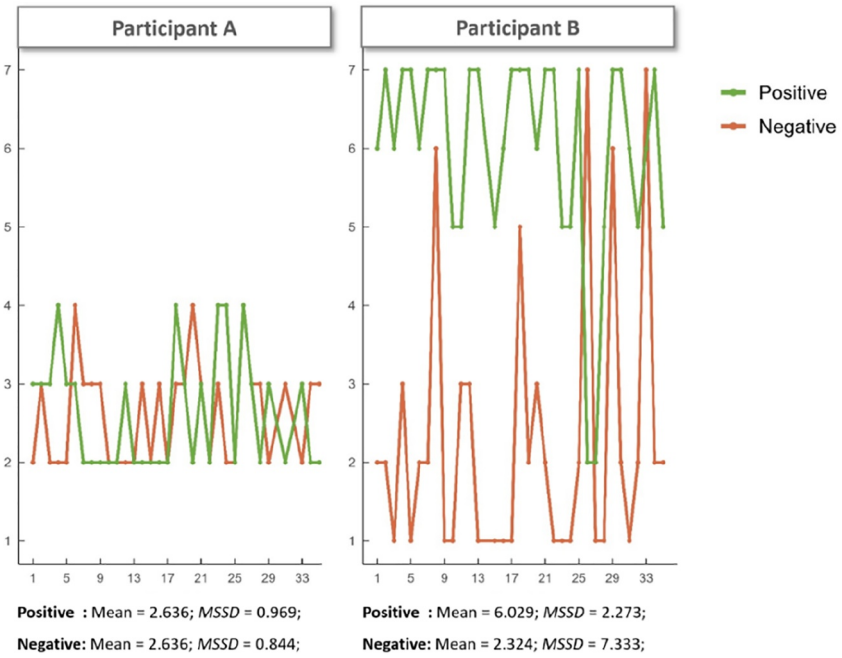

FIGURE 3 | Dynamics of Positive and Negative Stress Mindset for Two Example Participants. Positive = Positive stress mindset, Negative = Negative stress mindset.

To examine the prevalence of the co-occurrence of positive and negative stress mindset, we conducted an exploratory analysis at the person level. Results indicated that 5.62% of participants (20 out of 356) consistently reported scores ≥ 4 (on a 1–7 scale) on both positive and negative stress mindset across all valid assessments. Moreover, 28.93% of participants (103 out of 356) exhibited this pattern in at least half of their assessments. These findings suggest that such mixed patterns of stress mindset are not uncommon in naturalistic settings.

Inertia and Reciprocal Effects. Table 4 presents the results of the bivariate DSEM for positive and negative stress mindset. For the average person, positive (β = 0.164, 95% CI [0.137, 0.193]) and negative (β = 0.144, 95% CI [0.116, 0.171]) stress mindset showed significantly positive autoregressive effects (inertia). Further, the majority of individuals exhibited the same direction of autoregressive effects as the averaged effects (over 90%). These suggested that most people tend to be consistently above or below their average levels of stress mindset. Nonetheless, substantial individual differences in inertia were observed. The person at the low end of the distribution showed a reversal (2.5th percentile of autoregressive effect: positive = −0.060; negative = −0.125) and the person at the high end of the distribution showed an inertia about three times as large as the average person (97.5th percentile of autoregressive effect: positive = 0.491; negative = 0.448).

Regarding the reciprocal effects between positive and negative stress mindset, higher levels of negative stress mindset predicted lower levels of positive stress mindset a few hours later for the average person (β = −0.038, 95% CI = [−0.065, −0.012]). Although the person-specific lagged effects were mostly consistent with this direction (n = 267, 75.00%), the distribution of the effects ranged widely (2.5th percentile = −0.348; 97.5th percentile = 0.404), indicating substantial heterogeneity and frequent reversals across individuals. In contrast, the lagged effect of positive stress mindset on negative stress mindset was nonsignificant (β = −0.011, 95% CI = [−0.038, 0.015]). These person-specific lagged effects showed greater variability (2.5th percentile = −0.256; 97.5th percentile = 0.242) and only half of the individuals (n = 190, 53.37%) exhibited the same direction as the average effect.

In addition, the DSEM also revealed concurrent within-person and between-person associations between positive and negative stress mindset. At the within-person level, the concurrent correlation was moderate (r = −0.399, 95% CI [−0.417, −0.381]), suggesting that at a given time point, when an individual reported a higher-than-usual positive stress mindset, they were likely to report a lower-than-usual negative stress mindset. At the between-person level, a strong negative correlation was found (r = −0.826, 95% CI [−0.862, −0.779]), indicating that individuals who generally reported higher levels of positive stress mindset across the study period tended to report lower levels of negative stress mindset.

3.3 | External Processes With Affective Well-Being and Psychological Distress

We further examined the dynamic relations between stress mindset and affective well-being (i.e., positive affect, negative affect) and psychological distress, and the results are presented in Table 5 and Figure 4. The autoregressive effects of positive and negative stress mindset, positive and negative affect, and psychological distress were significantly positive. The cross-lagged effects between positive and negative stress mindset remained robust, with negative stress mindset negatively predicting subsequent positive stress mindset, while positive stress mindset not predicting negative stress mindset.

TABLE 4 | Results of the bivariate DSEM of positive and negative stress mindset.

	Standardized	Unstandardised				
	Fixed effects	**Fixed effects**	**Random variances**	**Percentage**	**95% HI**	**90% HI**
Autoregressive effects						
φ positive→positive	**0.144 [0.116, 0.171]**	**0.144 [0.109, 0.179]**	**0.044 [0.031, 0.062]**	91.85%	[−0.060, 0.491]	[−0.033, 0.410]
φ negative→negative	**0.164 [0.137, 0.193]**	**0.165 [0.129, 0.200]**	**0.044 [0.032, 0.061]**	90.17%	[−0.125, 0.448]	[−0.046, 0.390]
Cross-lagged effects						
φ positive→negative	−0.011 [−0.038, 0.015]	−0.011 [−0.052, 0.032]	**0.071 [0.053, 0.093]**	53.37%	[−0.256, 0.242]	[−0.204, 0.136]
φ negative→positive	**−0.038 [−0.065, −0.012]**	**−0.035 [−0.065, −0.005]**	**0.029 [0.020, 0.041]**	75%	[−0.348, 0.404]	[−0.255, 0.245]

Note: Percentage refers to the percentage of individuals whose estimated effect is in the same direction as the fixed effect for the average person. 95% credible intervals are in the brackets. Significant effects (zero is not within the 95% CIs) are bolded.

TABLE 5 | Results of the bidirectional relations of positive and negative stress mindset with affective well-being and psychological distress.

	Model 1 Positive affect	**Model 2 Negative affect**	**Model 3 Psychological distress**
Autoregressive effects (inertia)			
Positive $_{t-1}$ → Positive $_{t}$	**0.145 [0.118, 0.172]**	**0.135 [0.107, 0.162]**	**0.144 [0.117, 0.171]**
Negative $_{t-1}$ → Negative $_{t}$	**0.153 [0.126, 0.180]**	**0.145 [0.119, 0.172]**	**0.143 [0.116, 0.171]**
AW/PD $_{t-1}$ → AW/PD $_{t}$	**0.272 [0.248, 0.295]**	**0.239 [0.213, 0.264]**	**0.248 [0.222, 0.274]**
Cross-lagged effects (reciprocal effects)			
Positive $_{t-1}$ → Negative $_{t}$	−0.018 [−0.044, 0.007]	−0.018 [−0.044, 0.008]	−0.013 [−0.039, 0.013]
Negative $_{t-1}$ → Positive $_{t}$	**−0.035 [−0.062, −0.010]**	**−0.033 [−0.060, −0.007]**	**−0.031 [−0.057, −0.002]**
Positive $_{t-1}$ → AW/PD $_{t}$	0.007 [−0.020, 0.032]	−0.021 [−0.047, 0.008]	−0.022 [−0.049, 0.004]
AW/PD $_{t-1}$ → Positive $_{t}$	0.013 [−0.010, 0.035]	−0.014 [−0.040, 0.012]	**−0.026 [−0.051, −0.002]**
Negative $_{t-1}$ → AW/PD $_{t}$	0.024 [−0.001, 0.052]	**0.044 [0.016, 0.073]**	**0.040 [0.012, 0.067]**
AW/PD $_{t-1}$ → Negative $_{t}$	0.015 [−0.007, 0.039]	**0.067 [0.039, 0.095]**	**0.061 [0.033, 0.085]**
Within-level R^2			
Positive	0.123 [0.108, 0.138]	0.127 [0.110, 0.144]	0.120 [0.104, 0.136]
Negative	0.146 [0.129, 0.162]	0.163 [0.147, 0.179]	0.141 [0.125, 0.158]
AW/PD	0.143 [0.125, 0.165]	0.218 [0.199, 0.236]	0.186 [0.169, 0.205]

Note: Model 1 to Model 3 represents the DSEMs for negative and positive stress mindset and (1) positive affect, (2) negative affect, and (3) psychological distress. 95% credible intervals are in the brackets. Significant effects (zero is not within the 95% CIs) are bolded.
Abbreviation: Positive = Positive stress mindset, Negative = Negative stress mindset, AW/PD = Affective well-being and Psychological distress.

Regarding the dynamic associations of negative stress mindset, there were significant bidirectional relations of negative stress mindset with negative affect and psychological distress, but not with positive affect. Specifically, negative stress mindset predicted subsequent negative affect (β = 0.044, 95% CI [0.016, 0.073]) and psychological distress (β = 0.040, 95% CI [0.012, 0.067]), and negative affect (β = 0.067, 95% CI [0.039, 0.095]) and psychological distress (β = 0.061, 95% CI [0.033, 0.085]) predicted the subsequent negative stress mindset. These suggested self-perpetuating loops of negative stress mindset with negative affect and psychological distress.

Regarding the dynamic associations of positive stress mindset, only the lagged effect of psychological distress on positive stress mindset (β = −0.026, 95% CI [−0.051, −0.002]) was significant. This suggested that when individuals had higher levels of psychological distress, they tended to subsequently report lower levels of positive stress mindset.

4 | Discussion

The present study offers a novel exploration of the dynamics of positive and negative stress mindset using ecological momentary assessment. First, we confirmed that stress mindset is more than a stable trait; it does fluctuate in daily life. And these fluctuations exhibit substantial individual differences. Moreover, this study comprehensively captured the dynamic processes of stress

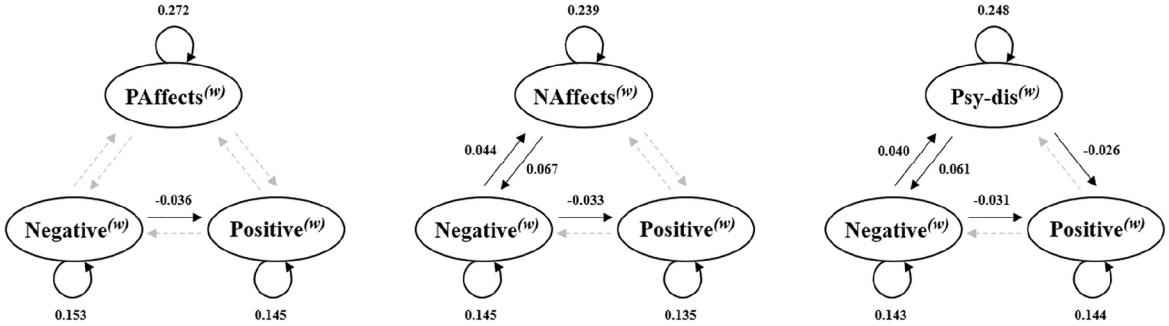

FIGURE 4 | Dynamic Associations of Positive and Negative Stress Mindset with Affective Well-being and Psychological Distress. The curved lines indicate autoregressive effects, and the strait lines indicate cross-lagged effects. Solid lines indicate statistically significant effects, while dashed lines indicate effects that were estimated in the model but not statistically significant.

mindset from internal and external perspectives. Regarding the internal dynamic system, the results did not support a dynamic loop between positive and negative stress mindset, with only negative aspect continuously predicting positive aspect. It revealed that negative stress mindset served as the primary force that drives the internal stress mindset system, while positive stress mindset was vulnerable and passively adapted to changes in the other component. Regarding the external dynamic loop, negative stress mindset had bidirectional associations with negative affect and psychological distress, whereas positive stress mindset did not show bidirectional relations with any affective experiences. The results suggested that negative stress mindset dominated the interplay with psychological outcomes, while positive stress mindset was more reactive and less autonomous in shaping these experiences. These novel findings on the internal and external dynamic processes of stress mindset may contribute to the construction and expansion of theories of stress mindset, and can provide valuable insights into stress mindset-related practices.

4.1 | Internal System of Dynamic Stress Mindset and Individual Differences

Using a high ecological validity approach, our findings provide empirical support to the view that stress mindset is not merely a fixed trait but also a dynamic state. Whereas previous studies have explored whether stress mindset can be changed using laboratory manipulations or interventions (Crum et al. 2013, 2020; Yeager et al. 2022), the present study demonstrates that stress mindset fluctuates in our daily lives without manipulation or intervention. This may reflect the influence of specific stressful life events and relevant feelings on an individual's stress beliefs. Researchers have noted that stress mindset reflects an individual's automatic thinking about the most salient stressors when prompted to evaluate the effects of stress (Crum et al. 2013). Since individuals may experience different stressful events and be affected differently in diverse situations, their stress mindset is likely to change and fluctuate over time in natural contexts.

In addition, we observed meaningful individual differences in the dynamic characteristics of stress mindset. Previous research on individual differences in dynamic processes has focused on emotion dynamics. For example, individuals demonstrated different levels of positive and negative affect inertia (Zhu et al. 2022), and greater inertia of positive and negative affect was associated with psychological maladjustment and other negative outcomes (Houben et al. 2015). More importantly, individual differences may be a key factor influencing the effectiveness of interventions. For people with different levels of emotional stability, the impact of interventions on physiological stress reactivity was different (Higgins and Hughes 2012). With respect to stress mindset dynamics, the present study introduced four quantifiable indicators to capture its dynamic characteristics. These indicators provide the foundational material for identifying individual differences. e.g., individuals with higher negative stress mindset inertia may require special attention, as they may be persistently trapped in negative beliefs about stress. Therefore, we encourage future studies to further explore the individual differences of stress mindset dynamic characteristics as well as their associations with psychological and physical outcomes. This could help identify individuals who are most in need of stress mindset interventions, and design personalised interventions for these individuals.

In addition to individual differences in the dynamic characteristics of stress mindset, we also observed an interesting pattern in the co-occurrence of positive and negative stress mindset. Specifically, some individuals reported similar levels of positive and negative stress mindset (e.g., participant A in Figure 1). Although this pattern has not been examined in the stress mindset literature, similar findings have emerged in the field of intelligence mindset (Barroso et al. 2023; Chiu et al. 2023; McNeil et al. 2023; Qi et al. 2025). For example, Barroso et al. (2023) identified a 'mixed intelligence mindset', which was an intelligence mindset between fixed mindset and growth mindset. McNeil et al. (2023) also found that people's fixed and growth mindset exhibited high-high and low-low profiles, rather than a purely high-low pattern. These parallels raise the possibility that people may also hold ambivalent or mixed beliefs about stress—that is, simultaneously seeing stress as both enhancing and debilitating (Crum et al. 2013). Such coexistence of seemingly opposing beliefs could reflect internal conflict or, alternatively, cognitive flexibility that supports adaptive functioning (Qi et al. 2025). Future research could further investigate these within-person profiles of stress mindset, including their formation, stability, and potential consequences for psychological well-being and behavioural outcomes. Clarifying these profiles may offer deeper insight into the nuanced and multidimensional nature of stress mindset.

4.2 | External Dynamic Processes of Stress Mindset

For negative stress mindset, we found its dynamic bidirectional relations with negative affect and psychological distress. On the one hand, negative stress mindset increased subsequent negative affect and psychological distress. This was consistent with previous findings that negative stress mindset had a detrimental effect on psychological outcomes (Crum et al. 2013). On the other hand, negative affect and psychological distress reinforced negative stress mindset a few hours later. Previous researchers suggested that stress mindset could be affirmed when stressful events led to favourable or adverse outcomes (Park et al. 2018). Our study empirically supported this view by showing that individuals' negative psychological experiences shaped negative stress mindset. More importantly, we found self-perpetuating loops between negative stress mindset and negative affective experiences. Individuals with higher levels of negative stress mindset suffered from more negative affect and psychological distress a few hours later, which further exacerbated their negative stress mindset. This calls for targeted interventions to break the self-perpetuating loops of negative stress mindset.

For positive stress mindset, we did not find its bidirectional relations with affective experiences. Instead, positive stress mindset was unidirectionally impaired by psychological distress, but not by negative affect. This distinction is important, as previous studies have shown that psychological distress represents a more severe emotional state, typically characterised by symptoms of depression and anxiety (Arvidsdotter et al. 2016). Our finding suggests that positive stress mindset is relatively resilient to daily fluctuations in negative affect. However, such resilience may be limited; when individuals experience more intense negative states, as reflected by psychological distress, positive stress mindset becomes vulnerable. In addition, we found that positive stress mindset was negatively affected by negative stress mindset. Although daily negative affect did not directly undermine positive stress mindset, its potential involvement in self-perpetuating loops with negative stress mindset could indirectly erode positive stress mindset over time. Thus, positive stress mindset, though resilient within a certain range, may become vulnerable when individuals experience more intense distress or maintain prolonged negative beliefs.

Taken together, our findings provided valuable insight into intervention practices about stress mindset. First, we found that negative stress mindset tended to drive other relevant factors, whereas positive stress mindset was more susceptible to other factors. Previous interventions have typically focused on one aspect of stress mindset, either enhancing positive stress mindset (Yeager et al. 2022) or reducing negative stress mindset (Crum et al. 2020). However, our study revealed distinct roles of positive and negative stress mindset. The negative stress mindset tended to serve as a driving factor, whereas the positive mindset was more of an adaptive outcome. This suggests that interventions targeting stress mindset should consider both its positive and negative aspects. Specifically, given that negative stress mindset, along with its self-perpetuating loops with negative affective experiences, had detrimental effects on individuals, interventions designed to reduce it may be particularly effective. And, since positive stress mindset was vulnerable to negative stress mindset and psychological distress, interventions could use the presence of a positive stress mindset as an indicator to evaluate their effectiveness. In addition, this study revealed the critical role of psychological distress in the dynamic interplay between negative and positive stress mindset. Specifically, negative stress mindset weakened an individual's positive stress mindset by triggering higher levels of psychological distress (higher levels of depression and anxiety states). This contributed to a deeper understanding of the mechanism by which negative stress mindset influenced positive stress mindset, and revealed the complex dynamic interactions between stress mindset and depression and anxiety states. In practice, relevant interventions should not only focus on the cognitive aspect (e.g., stress mindset), but also consider the emotional aspects of stress (e.g., psychological distress).

4.3 | Limitations and Future Directions

There were several limitations in our study that are worth noting. First, the two items we selected to assess state stress mindset were representative and straightforward; however, it is important to acknowledge that their reliability and validity have not been verified in capturing the moment-to-moment fluctuations. Given the urgent need for suitable state measures in intensive longitudinal studies, future research is encouraged to develop items with greater temporal sensitivity to reflect the dynamic nature of positive and negative stress mindset.

Second, we included only college students, which may limit the generalisability of our findings. Given that college students frequently encounter various stressors in their daily lives (e.g., academic, career, and financial stressors), special attention to college students may be warranted. Nevertheless, whether our findings still hold in a broader population remains to be investigated in the future.

Another limitation lies in the use of interval-contingent sampling design. Although these time points were selected to represent key segments of the day, it may induce participants to anticipate upcoming prompts, potentially introducing reactivity or cognitive reporting biases or behavioural reactivity (Consolvo and Walker 2003). Future research is encouraged to adopt signal-contingent sampling (prompts are delivered at random times) to improve ecological validity and minimise anticipation (Berkel et al. 2019).

Finally, our study focused on the general dynamics of positive and negative stress mindset. However, domain-specific stressors may exert different influences on stress mindset over time (Ruiter and Thomaes 2023; Z. Wang et al. 2021). In our study, participants often reported multiple types of stressors at each time point, and stress mindset was assessed in a general form. These design features limited our ability to examine whether different stressors elicited different changes in mindset. Future research is encouraged to adopt more targeted approaches—for example, assessing stress mindset in relation to a specific stressor domain—to clarify the contextual factors shaping momentary stress beliefs.

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Ethics Statement

This study was approved by the Ethics Committee of Beijing Normal University, with all participants providing informed consent prior to participation.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

This study was not preregistered. All data, M*plus* syntax and R code are available at https://osf.io/xjqcb/?view_only=02ff8d7823a04a93b2dc314f68a066e0.

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