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Trait resilience and subjective well-being in emerging adulthood: a two-wave longitudinal study

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Abstract
Prior research has shown that trait resilience is linked with subjective well-being, however, less is revealed about the longitudinal relationship between trait resilience and subjective well-being in emerging adulthood. This study used a two-wave cross-lagged design ((N = 563 for Time 1; N = 509 for Time 2) to explore the relationship between these two variables in emerging adults. The cross-lagged path analysis found that trait resilience predicted the three components of subjective well-being (i.e., life satisfaction, positive affect and negative affect) over five months. Additionally, positive affect but not life satisfaction and negative affect predicted trait resilience over five months. The present study provides further evidence for the longitudinal relationship between trait resilience and subjective well-being in Chinese emerging adults. Limitations and future directions of the research were discussed.

Keywords Resilience · Subjective well-being · Cross-lagged analyses · Chinese emerging adults

Introduction

Resilience refers to the ability to successfully cope with adversity (Anthony, 2002; Skodol, 2010), which is an important topic for psychologists. In the positive psychology literature, resilience can be conceptualized as a trait or a state. Trait resilience is defined as a relatively stable trait that help people cope with external challenges and protect them from negative emotional experiences (Anthony, 2002; Block and Kremen; Skodol, 2010). State resilience refers to the dynamic process and outcome despite adverse life events, and the presence of resilience is inferred through reports of positive outcomes (Kuldas amd Foody, 2021). Previous research has indicated that trait resilience is negatively related to mental ill-being, such as depression and anxiety, and positively related to positive aspects of mental health like subjective well-being (SWB) (Hu et al., 2015; Kong et al., 2015a, b, 2018, 2020; Mak et al., 2011; Mota & Matos, 2015; Pretsch et al., 2012). Thus, in present study, we would take the trait orientation.

It is widely acknowledged among researchers that trait resilience is positively related to SWB that reflects individuals' emotional and cognitive evaluations of their quality of life (e.g., Mayordomo et al., 2016; Kong et al., 2020; Satici & Ahmet, 2016; Tomás et al., 2012). SWB consists of three components: life satisfaction (LS), positive affect (PA), and negative affect (NA) (Diener et al., 2017). Numerous studies have provided evidence for the positive relationship between trait resilience and SWB, and the relationship stayed significant even when the covariates like personality and emotional intelligence are controlled for (Bajaj & Pande, 2016; Di Fabio & Palazzeschi, 2015; Kong et al., 2015a, b; Liu et al., 2014; Zheng et al., 2020). Besides, neuroscientific studies have shown that trait resilience is linked with SWB through resting-state brain activity in the anterior cingulate cortex and orbitofrontal cortex (Kong et al., 2015a, b, 2018).

However, most of the studies have investigated the relationship using a cross-sectional design, so less is known about the longitudinal link between trait resilience and SWB. To our knowledge, several studies have used a longitudinal method to investigate the directionality of the link. For example, in a longitudinal study on women, trait resilience at the beginning of midlife was confirmed to predict life satisfaction in later midlife positively (Klohnen et al., 1996). Furthermore, Murphy et al. (2017) found that trait

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resilience predicted positive affect, but not negative affect in adolescents with cancer 3 months later. Recently, Harpøth et al. (2020) used a daily diary design to explore daily associations of positive and negative affect with resilience in borderline personality disorder. Multilevel lagged analyses found that daily positive emotions instead of negative emotions prospectively predicted daily resilience the next day.

Although the longitudinal studies have made progress in the investigation of trait resilience and SWB, there are still some problems that deserve further investigation. First, most of these studies did not consider whether there was a reverse or reciprocal relationship between trait resilience and SWB. As a matter of fact, trait resilience may be an antecedent or consequence of well-being. Based on the engine model of well-being, intrinsic psychological resources (e.g., resilience) can facilitate well-being outcomes through promoting internal psychological states that affect decisions and behaviors (Jayawickreme et al., 2012). Thus, resilience might serve as an antecedent of SWB. According to the broaden-and-build theory, positive emotions can assist people to build lasting personal resources such as resilience (Fredrickson, 2004, 2013). Therefore, trait resilience might serve as a consequence of SWB. Second, most of these longitudinal studies focused on one or two components of SWB, so the relationship between trait resilience and the three components of SWB remains unclear. Third, participants in most of these longitudinal studies did not include emerging adults. Emerging adulthood usually refers to the period from the late teens to the mid-to late 20s, which is the period of exploring various opportunities for identity and purpose (Arnett, 2004). Studies have generally shown that emerging adulthood is a time of improved well-being and healthy lifestyle (Galambos et al., 2006; Messersmith & Schulenberg, 2010; Pettit et al., 2011). However, Life transitions imply significant changes in environmental and social roles, which may impact on mental health and well-being (Schulenberg et al., 2004). Therefore, it is important and necessary to enhance well-being of individuals in this period. To our knowledge, it is unclear of the longitudinal relationship between trait resilience and SWB in emerging adulthood.

In summary, the current study would examine the temporal link between trait resilience and SWB in Chinese emerging adults through a two-wave longitudinal design. Using cross-lagged structural equation modeling, we would test three possible models of directionality including the antecedent model, the consequence model and the reciprocal model. In the antecedent model, trait resilience at Time 1 was hypothesized to predict the three components of SWB at Time 2. In the consequence model, the three components of SWB at Time 1 were hypothesized to predict trait resilience at Time 2. In the reciprocal model, we hypothesized that trait resilience at Time 1 would predict the three components of SWB at Time 2 and vice versa.

Method

Participants and procedure

At Time 1 (T1), 563 university students participated in the study (mean age = 19.92, SD = 1.17; 280 females). After a five-month interval, 509 students completed the followed-up assessment at Time 2 (T2). Due to the ineffective data of some participants, the final sample included 486 students (255 females). Their ages range from 17 to 29 (M = 19.90, SD = 1.40). In addition, the power analysis found that a minimum of 319 participants were needed to detect a small-to-medium-sized correlation ($r = .20, \alpha = 0.05, 1 - \beta = 0.95$). All the students voluntarily participate in current research and sign an informed consent before the study. Participants were asked to finish an online questionnaire including measures related to resilience and SWB. The study obtained approval from the institutional review board of the local university.

Measures

Connor - Davidson resilience scale (CD-RISC)

The original CD-RISC has 25 items on a 5-point Likert scale ranged from 0 (not at all true) to 4 (true nearly all of the time), with an alpha value of 0.89 and test-retest correlation of 0.87 in the studies of American participants (Connor & Davidson, 2003). Recently, a 10-item short version of the CD-RISC has been modified to solve the inconsistency of the original five-factor structure among different samples (Campbell-Sills et al., 2006; Campbell-Sills & Stein, 2007; Hartley, 2012; Yu & Zhang, 2007). Each item was evaluated on a 5-point Likert scale ranged from 1 to 7 (1 = not true at all; 5 = true nearly all the time).The Chinese version of the 10-item CD-RISC has also been found to have good internal consistency (Cronbach' s alpha = 0.91) and test-retest reliability (r = .90 for a two-week interval)(Wang et al., 2010). Higher total scores represent higher resilience levels. The Cronbach alpha coefficients were 0.92 at T1 and 0.96 at T2 in current research.

Satisfaction with life scale (SWLS)

The SWLS (Diener et al., 1985) was used to evaluate LS. It includes 5 items (e.g., 'The conditions of my life are excellent'), and each item was evaluated on a 7-point Likert scale ranged from 1 to 7 (1 = strongly disagree; 7 = strongly agree). Diener et al. (1985) reported a coefficient alpha of

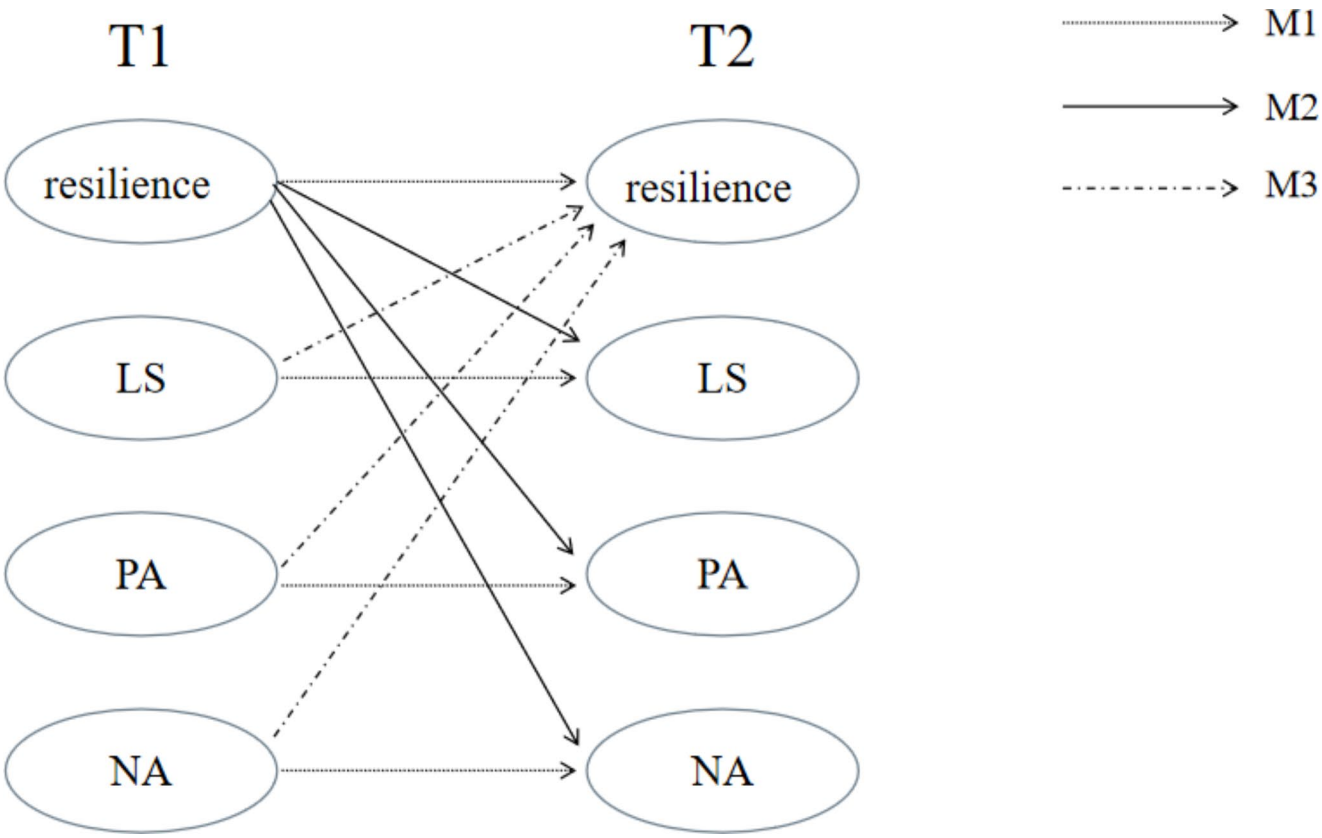

Fig. 1 Two-wave cross-lagged model for time lagged effects between resilience, positive affect (PA), negative affect (NA), and life satisfaction (LS). All paths are presented, whereby M1-paths represent the baseline or stability model, M2-paths represent the normal causation model, M3-paths represent the reversed causation model. All paths from M1 to M3 are included in M4 which represent the reciprocal causation model

0.87 for the scale and a 2-month test-retest stability coefficient of 0.82 in the original SWLS. For the Chinese version, the Cronbach alpha coefficient was 0.88 in a study of general Chinese population (Bai et al., 2011). The scale has also shown great reliability and validity in other Chinese research (Kong et al., 2019; Kong, Wang, Kong et al., 2015a, b; Kong & You, 2013; Wang et al., 2020). In this research, the Cronbach alpha coefficients were 0.83 at T1 and 0.90 at T2.

The scale of positive and negative experience (SPANE)

The SPANE was used to evaluate the positive and negative affect components of SWB (Diener et al., 2010). It is composed of 12 items: 6 items for PA (e.g., 'positive' and 'joyful') and 6 items for NA (e.g., 'negative' and 'sad'). Participants were asked to recall their own experience and assess the items on a 5-point Likert scale (1 = very slightly or not at all; 5 = almost always). The scale showed good psychometric properties in the original research with an internal consistency coefficient (Cronbach's alpha) from 0.81 to 0.90 (Diener et al., 2010). For the Chinese version, the Cronbach alpha coefficient was about 0.90 in a study of general Chinese population (Li et al., 2013). The SPANE has also been found to have good reliability and validity in other Chinese research (Tong & Wang, 2017). In current research, the Cronbach alpha coefficients of PA and NA subscale were 0.92 and 0.87 at T1 and 0.96 and 0.92 at T2.

Data analyses

SPSS 26.0 and Mplus 8.3 were used for statistical analyses. First, we used SPSS to test the correlations among the main variables. Next, we explored autoregressive effects (the stability of the same variable over time) and cross-lagged effects (the directionality of two variables over time) utilizing autoregressive cross-lagged (ACL) models to figure out the associations between trait resilience and SWB. We carried out four structural equation models (M1-M4, see Fig.1) in Mplus.

The fit of the models was evaluated by a series of indexes according to recommended guidelines (Hu & Bentler, 1999). Chi-square statistics, root mean square error of approximation (RMSEA), standardized root mean squared residual (SRMR), and comparative fit index (CFI) were reported. If (1) CFI > 0.90 (superior fit ≥ 0.95); (2) RMSEA < 0.10

Table 1 Descriptive statistics and correlations for the main variables

	1	2	3	4	5	6	7	8
1.LS-T1	-							
2.PA-T1	0.448**	-						
3.NA-T1	−0.158**	−0.356**	-					
4.resi-T1	0.355**	0.441**	−0.305**	-				
5.LS-T2	0.458**	0.322**	−0.189**	0.302**	-			
6.PA-T2	0.223**	0.421**	−0.239**	0.375**	0.628**	-		
7.NA-T2	−0.155**	−0.162**	0.270**	−0.216**	−0.303**	−0.436**	-	
8.resi-T2	0.207**	0.291**	−0.175**	0.401**	0.584**	0.745**	−0.435**	-
M	19.91	22.04	15.57	37.43	23.14	23.37	14.19	38.80
SD	5.300	3.641	3.744	5.567	5.552	4.297	4.133	6.215

Note: PA, positive affect; NA, negative affect; LS, life satisfaction; resi, resilience; TI, Time 1; T2, Time 2; **p < .01

(superior fit ≤ 0.06); and (3) SRMR < 0.10, it can be said that the model is well-fitted.

Results

Table1 presented the descriptive statistics including means, standard deviations and correlations among trait resilience, PA, NA and LS at two time points. As previously predicted, trait resilience, PA and LS were positively correlated with each other, and trait resilience, PA and LS were negatively related to NA at T1 and T2.

Next, we examined the stability and cross-lagged effects between trait resilience, LS, NA and PA. First of all, M1 was established to see the degree of stability of each variable over time (autoregressive effects). The model fitted well to the data, $\chi^2(1556) = 3703.636$, $p < .001$, RMSEA = 0.053, SRMR = 0.090, CFI = 0.902 (see Table2). All four variables were stable over two time points.

Second, we established the antecedent model (M2) to test if trait resilience at T1 would predict subsequent SWB components at T2. It was observed that the model fitted well, $\chi^2(1553) = 3659.982$, $p < .001$, RMSEA = 0.053, SRMR = 0.060, CFI = 0.904 (see Table2). The auto-regressive paths were significant and three cross-lagged paths from trait resilience at T1 to three components of SWB at T2 were also significant (see Table3).

After that, the consequence model (M3) was examined to see if SWB components at T1 would predict subsequent resilience at T2. The model fitted well, $\chi^2(1553) = 3688.353$, $p < .001$, RMSEA = 0.053, SRMR = 0.080, CFI = 0.903 (see Table2). The auto-regressive paths were significant and the path from positive affect at T1 to resilience at T2 was significant (see Table3).

Finally, we established the reciprocal model (M4) to figure out if there was a reverse or reciprocal relationship between trait resilience and the components of SWB. The model showed a good fit, $\chi^2(1550) = 3651.530$, $p < .001$, RMSEA = 0.053, SRMR = 0.058, CFI = 0.905 (see Table2). The chi-squared comparison and fitting indexes suggested that Model 4 fit the data best compared with the other three models. Resilience at T1 significantly predicted three components of SWB at T2 and positive affect at T1 significantly predicted resilience at T2 (see Table3).

To sum up, our results revealed the predictive effect of trait resilience on subsequent SWB and the reciprocal relationship between positive affect and resilience.

Discussion

In order to make a further exploration of the relationship between trait resilience and SWB, we adopted a longitudinal design to reveal the temporal link between them. Previous studies on that link mostly used the cross-sectional method, which could not draw conclusions about the temporal directionality of a relationship. Therefore, based on previous research, a two-wave cross-lagged design was applied in our study and we found that trait resilience predicted subsequent LS, PA and NA in Chinese emerging adults. Furthermore, positive affect could predict subsequent resilience, indicating that there is a reciprocal relationship between trait resilience and positive affect. As far as we know, this is the first to explore the temporal link between trait resilience and SWB in Chinese emerging adults.

First of all, at the cross-sectional level, trait resilience was positively related to PA and LS, and negatively related to NA at both time points in Chinese college students, which is in accordance with previous research that found the association between resilience and the components of SWB (Mak et al., 2011; Mota & Matos, 2015; Pretsch et al., 2012). Furthermore, significant autoregressive effects on trait resilience suggest that trait resilience is relatively stable and support our approach of taking resilience as a personality trait, which is in line with tons of studies (Block & Kremen, 1996; Bonanno, 2004; Anthony, 2002; Skodol, 2010).

Second, at the longitudinal level, our results revealed that trait resilience positively predicted LS, PA and NA in

Table 2 Fit indices for all the models

Model	$\chi 2$	df	CMIN/df	p	RMSEA	SRMR	CFI	Comparison	$\Delta\chi 2$	Δdf	p
Model 1	3703.636	1556	2.380	0.000	0.053	0.090	0.902				
Model 2	3659.982	1553	2.357	0.000	0.053	0.060	0.904	M1-M2	43.654	3	< 0.001
Model 3	3688.353	1553	2.375	0.000	0.053	0.080	0.903	M1-M3	15.283	3	< 0.005
Model 4	3651.530	1550	2.356	0.000	0.053	0.058	0.905	M1-M4	52.106	6	< 0.001

Note: RMSEA, root mean square error of approximation; SRMR, standardized root mean squared residual; CFI, comparative fit index

Table 3 Overview of the standardized stability and cross-lagged coefficients

Model	Autogressive path	β	Cross-lagged path	β
1	$RESI_{T1}\rightarrow RESI_{T2}$	0.240^{***}		
	$LS_{T1}\rightarrow LS_{T2}$	0.467^{***}		
	$PA_{T1}\rightarrow PA_{T2}$	0.324^{***}		
	$NA_{T1}\rightarrow NA_{T2}$	0.227^{***}		
2	$RESI_{T1}\rightarrow RESI_{T2}$	0.470^{***}	$RESI_{T1}\rightarrow LS_{T2}$	0.245^{***}
	$LS_{T1}\rightarrow LS_{T2}$	0.444^{***}	$RESI_{T1}\rightarrow PA_{T2}$	0.337^{***}
	$PA_{T1}\rightarrow PA_{T2}$	0.265^{***}	$RESI_{T1}\rightarrow NA_{T2}$	-0.183^{**}
	$NA_{T1}\rightarrow NA_{T2}$	0.205^{***}		
3	$RESI_{T1}\rightarrow RESI_{T2}$	0.184^{***}	$LS_{T1}\rightarrow RESI_{T2}$	0.048
	$LS_{T1}\rightarrow LS_{T2}$	0.518^{***}	$PA_{T1}\rightarrow RESI_{T2}$	0.150^{**}
	$PA_{T1}\rightarrow PA_{T2}$	0.396^{***}	$NA_{T1}\rightarrow RESI_{T2}$	0.043
	$NA_{T1}\rightarrow NA_{T2}$	0.237^{***}		
4	$RESI_{T1}\rightarrow RESI_{T2}$	0.417^{***}	$RESI_{T1}\rightarrow LS_{T2}$	0.230^{***}
	$LS_{T1}\rightarrow LS_{T2}$	0.480^{***}	$RESI_{T1}\rightarrow PA_{T2}$	0.311^{***}
	$PA_{T1}\rightarrow PA_{T2}$	0.323^{***}	$RESI_{T1}\rightarrow NA_{T2}$	-0.183^{**}
	$NA_{T1}\rightarrow NA_{T2}$	0.205^{***}	$LS_{T1}\rightarrow RESI_{T2}$	0.038
			$PA_{T1}\rightarrow RESI_{T2}$	0.112^{*}
			$NA_{T1}\rightarrow RESI_{T2}$	0.049

Note: RESI, resilience; PA, positive affect; NA, negative affect; SWB, subjective well-being; T1, measurement time 1; T2, measurement time 2; β, standardized coefficient. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

Chinese college students, which is in accordance with the engine-model-of-well-being (Jayawickreme et al., 2012) which assumes that intrinsic psychological resources (e.g., resilience) can facilitate well-being outcomes given that such resources promote internal psychological states that affect decisions and behaviors, which in turn promote well-being (Jayawickreme et al., 2012). In addition, this finding that trait resilience positively predicted LS and PA is partly consistent with previous longitudinal studies that reported trait resilience predicted life satisfaction in women (Klohnen et al., 1996) and positive affect in adolescents (Murphy et al., 2017).

Importantly, the reverse and reciprocal relations between trait resilience and SWB were also tested in current study with the cross-lagged method. We found that positive affect but not life satisfaction and negative affect could predict subsequent resilience, and thus there was a bi-directional relationship between resilience and positive affect. This is in accordance with the broaden-and-build theory, which states that positive affect can improve the belief to cope with stress and adversity by broadening and building individual psychological, physical, and social resources such as resilience (Fredrickson, 2004, 2008, 2013; Ong et al., 2006). Generally speaking, it is the first time to illustrate the directionality of the link between trait resilience and SWB components using the cross-lagged model.

Before the conclusion, several limitations of our study need to be pointed out. To begin with, even though our

scales have satisfactory reliability and validity, the results are obtained through self-reporting. Thus, other evaluation methods (e.g., peer report and parent report) could be supplemented in the studies afterwards. Secondly, the sample covers only the emerging adults, so we cannot generalize the results to other groups such as middle-aged population. Therefore, whether the same results can be obtained in other groups remains to be further explored.

In spite of the limitations above, our study brings new empirical evidence to the longitudinal relationship between trait resilience and SWB in Chinese emerging adults utilizing a two-wave cross-lagged panel design. The results revealed the predictive effect of trait resilience on individuals' SWB later and the reciprocal relationship between positive affect and trait resilience. Importantly, this study has implications for mental health practitioners. Given the predicted effect of resilience on well-being, psychologists and guidance counselors may integrate resilience-enhancing activities when implementing psychological interventions to emerging adults with low levels of well-being. On the other hand, as positive affect was associated with cross-temporal increases in resilience, psychological interventions related to positive affect may serve as a potential solution to enhance an individual's resilience.

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Data Availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Disclosures The authors declare that they have no conflict of interest.

Inform Consent Inform consent was obtained from all participants to fill out the questionnaires.

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