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Mediating role of resilience in relationship between negative life events and depression among Chinese adolescents

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ABSTRACT

Purpose: To explore whether resilience acted as a protective factor between negative life events and depression among Chinese adolescents.
Method: Using convenient sampling, students (N = 278) in two junior and senior high schools in Wuhan, China were investigated, and structural equation model was used to examine the mediating effect of resilience in the relationship between negative life events and depression.
Results: Resilience was negatively correlated with negative life events and depression, and negative life events were positively correlated with depression. Resilience partially mediated the effects of negative life events on depression in Chinese adolescents.
Conclusions: It is important for educators to improve adolescents' resilience to mitigate the effects of negative life events on depression.

Introduction

The depression among adolescents is a major public health concern in China (Chen, Yao, Ming, & Hou, 2012; Luo, Shen, & Zhang, 2009; Zhang et al., 2007; Zhao, Wang, & Lin, 2015). Research has shown the association between negative life events (NLE) and depression. The distinct culture in China provides particular sources of NLEs for Chinese adolescents, such as interpersonal tension and severe academic pressure (Zhang, Li, Gong, & Ungar, 2013). Researchers also observed the potential protective function of resilience on the relationship between NLE and depression (Anyan & Hjemdal, 2016; Wingo et al., 2010). However, research exploring the mediating role of resilience is scarce, which makes it imperative to conduct a study to examine whether resilience is beneficial to alleviate the negative effects of NLEs on depressive symptoms among Chinese adolescents.

Adolescence, usually defined as years 10 through 19, is a critical period of significant physical, psychological and social changes linking child and adult health (Population Reference, 2014). Confronted with increased autonomy and exploration of identity, adolescents experience a dramatic transition which may be stressful and can lead to depression (Auerbach, Eberhart, & Abela, 2010). Depression has been frequently recognized to begin in adolescence (Hankin, 2006) and is a significant leading cause of illness and disability as well as the third leading cause of death in this period (World Health Organization, 2018). Depression during this period can result in unsatisfactory school performance, peer isolation and even suicide (Cui, Shi, & Tian, 2013). The prevalence rate of depression increases substantially from 3% at age 15 to 17% at age 18 (Hankin, 2006). In China, the prevalence rates for adolescents with depressive symptoms based on a score of 16 or higher on the Center for Epidemiological Studies Depression Scale (CES-D) ranged from 27.4% to 69.2% (Chen et al., 2012; Luo et al., 2009; Zhang et al., 2007; Zhao et al., 2015), indicating depression should be considered a major public health concern among Chinese adolescents.

Negative life events (NLEs) as a source of stress play a pronounced role in the development of depression in adolescence (Murberg & Bru, 2009). These events can result in disturbances, lifelong maladjustment and inability to make adaptations (Liu, Zhao, Tian, Zou, & Li, 2015). Cross sectional (Mileviciute, Trujillo, Gray, & Scott, 2016; Sun, Niu,

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You, Zhou, & Tang, 2017) and prospective studies (Murberg & Bru, 2009; Spinhoven et al., 2011) have reported an association between NLEs and depression. Diverse cultural contexts determine the impact of an NLE in different countries.

In China, interpersonal problems and academic pressure were found to be significant NLEs related to depression in adolescents (Zhang et al., 2013). In Chinese society where interpersonal harmony is highly valued, relationship tension with parents, teachers and peers can be quite stressful (Zhang et al., 2013). The One-Child policy made the child the focus of the entire family with the added burden of high expectations. Moreover, dramatic social changes in China have increasingly exposed adolescents to Western values such as individualism and materialism that contradict with traditional Chinese beliefs and may cause conflicts between teenagers, parents and teachers. On the other hand, adolescents in China are confronted with more severe academic pressure as compared to teenagers in Western countries. The distinct exam-oriented school system plus competitive admission to high school and college make Chinese adolescents overwhelmed with homework, exams and pressure to perform well (Auerbach et al., 2010; Zhang et al., 2013).

Despite the salient association between NLEs and depression, some research has pointed out that one NLE itself was not sufficient to predict depression in adolescents if not combined with negative cognition (Miloseva, Vukosavljevic-Gvozden, Richter, Milosev, & Niklewski, 2017). It was observed that equally faced with life stress or adversity, while some developed psychological distress, others seemed to function well, who were thought to be resilient (Elisei, Sciarma, Verdolini, & Anastasi, 2013). Resilience is usually understood as the capacity to adapt successfully and remain healthy following exposure to stress and adversity (Seery, Holman, & Silver, 2010). Resilient people are inclined to have more positive adaptive behaviors toward negative life events (Peng et al., 2012). Numerous empirical studies have proved the function of resilience as a protective factor against the development of psychiatric disorders such as depression (Elisei et al., 2013; Skrove, Romundstad, & Indredavik, 2013). Further, resilience has also proven to have buffering effects on the influence of stress and adversity toward the development of depression. Wingo et al. found that resilience significantly moderated the depressive symptom severity in African Americans (Wingo et al., 2010). A survey of Ghanaian adolescents revealed the mediating role of resilience between stress and symptoms of anxiety and depression (Anyan & Hjemdal, 2016). In China, although several studies have presented the mediation effects of resilience on the association between NLEs and depression among college students and adolescents exposed to an earthquake (Han, Zhao, Pan, & Liao, 2018; Peng et al., 2012; Zhu et al., 2012), research focused on adolescents remains scarce. Only one study was found which examined the protective functions of some resilience factors such as peer/home caring relationships and self-awareness on the relationship between NLEs and depression in junior high school students (Zhang et al., 2013).

Considering the high rate of depression in Chinese adolescents, the culturally distinct negative life events they are exposed to, and the potential mediating effect of resilience between NLEs and depression, this study aimed to describe the levels of depression, NLEs and resilience among Chinese adolescents and examine the mediating role of resilience on the relationship between negative life events and depression. We hypothesized that resilience would ameliorate the impact of NLEs on depression among adolescents.

Methods

Design

This was a cross-sectional study. It was approved by the Ethics Committee of the School of Health Sciences of Wuhan University.

Setting and participants

A convenient sample of 301 junior and senior high school students in different districts of Wuhan was recruited to participate in this study. Adolescents who were aged 12–18 years old and were able to cooperate to complete the data collection were eligible for participating in the study. Informed consent was obtained from eligible participants and their guardians. Only 278 students completed all the questionnaires and were included in the analysis with a response rate of 92.36%.

Measurements

Negative life events

Adolescent Self-Rating Life Event Checklist (ASLEC) developed by Liu et al. (Liu et al., 1997) was used to assess the psychological impact of negative life events during the prior 6 months on adolescents. It consists of 27 items which covers six components including interpersonal relationships, study pressure, being punished, bereavement and property loss, health and adaptation and others. Each item is scored from 1 (=not at all) to 5 (=extremely severe). A higher total score represents greater impact of negative life events. According to Liu et al., the Cronbach α coefficient was 0.85, indicating satisfactory internal consistency. This scale has been used with Chinese college students and demonstrated high reliability (Han et al., 2018; Liu et al., 2015). The Cronbach α in this study was 0.87.

Resilience

The Chinese version of the Connor-Davidson Resilience Scale (CD-RISC) (Yu & Zhang, 2007) was used to measure resilience based on participants' feelings over the previous month. The CD-RISC was developed by Connor and Davidson as a self-rating tool to assess resilience (Connor & Davidson, 2003). It contains 25 items on a 5-point Likert scale, rated from 0 (not true at all) to 4 (true nearly all of the time). The total score ranges from 0 to 100, with higher scores reflecting higher levels of resilience. This scale has been tested in general and clinical populations, and demonstrated good internal consistency and test-retest reliability (Connor & Davidson, 2003). In the current study, the Cronbach α was 0.935.

Depression

The Chinese version of the Center for Epidemiological Studies Depression Scale (CES-D) (Zhang et al., 2010) was used to evaluate participants' depressive symptoms. This scale consists of four components (depressed affect, positive affect, somatic and retarded activity, and interpersonal), including 20 items (16 negative affect and four positive affect) structured on a 4-point scale rated from 0 (rarely or none of the time – < 1 day) to 3 (most or all of the time – 5 to 7 days), based on the frequency of symptoms experienced during the prior week. The four positive affect items are scored reversely. The total score ranges from 0 to 60, with a cutoff of 16 or above indicating depressive symptoms, and higher scores suggesting more symptoms. This scale has also been examined to be reliable in Chinese adolescents (Niu, Sun, Tian, Fan, & Zhou, 2016). The Cronbach α in the current study was 0.89.

Data collection and procedure

The data were collected in 2017. Informed consent was gained from the eligible adolescents and their guardians. They were informed of the purpose and procedures of this study as well as their rights and ethical protection during this study. After that, a demographic questionnaire and the ASLEC, CD-RISC and CES-D (all paper-pencil based) were distributed, filled and collected in the participants in the target schools.

Statistical analysis

Frequency and percentages were used to describe the demographic variables. Mean and standard deviation (SD) were used to describe the total and subscale scores of ASLEC, CES-D and CD-RISC. *t*-Test and one-way analysis of variance (ANOVA) were performed to compare the differences in CES-D scores among demographic characteristics. Pearson or Spearman correlation analysis explored the relationships among NLEs, depression and resilience. Structural equation model (SEM) was employed to examine the mediating effect of resilience in the relationship between NLEs and symptoms of depression. Several fit indices were used to assess the model fit, including Chi-square to degrees-of-freedom ratio (χ^2/df), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI) and Tucher-Lewis index (TLI). The model is regarded to have good fit if $\chi^2/df \leq 3$, RMSEA ≤ 0.08, GFI ≥ 0.90, AGFI ≥ 0.90, CFI ≥ 0.90, NFI ≥ 0.90 and TLI ≥ 0.90 (Hu & Bentler, 1999; Wang, 2014). Data analyses were carried out using SPSS 17.0 and AMOS 17.0., and $p < .05$ was considered statistically significant.

Results

Characteristics of participants and the differences in depression, NLE and resilience scores

The sample consisted of 153 males (55%) and 125 females (45%) and a majority (87.6%) were junior high school student and the only child (63%) in the family. Female students had higher CES-D scores than male students ($p < .05$), and scores of junior high school students were significantly higher than senior high school students ($p < .05$), indicating that female and younger participants had a higher level of depression. Junior high school students had higher ASLEC scores ($p < .05$) but lower CD-RISC scores ($p < .01$) than senior high school students, suggesting that younger adolescents had lower levels of resilience and were more likely to be affected by NLEs. Additionally, the differences in ASLEC and CD-RISC scores related to family income were statistically significant ($p < .01$). Post hoc tests indicated that participants from families with the highest monthly income (> 3000 RMB) were least influenced by NLEs and had the highest level of resilience (Table 1).

Levels of negative life events, depression and resilience

The total scores and subscale item-average scores on life events, depression and resilience as indicated by the ASLEC, CES-D and CD-RISC, respectively, are shown in Table 2. Regarding the CES-D scores, 153 respondents (55%) had scores of 16 or higher, indicating a depressive symptom. The average total depression score was 17.14, indicating a mild to moderate level of depression. Participants' scores on the life events were not consistent among the six dimensions: scores on the interpersonal relationship and study pressure dimensions were higher than other dimensions. Participants' average resilience score was 52.52, indicating a medium level of resilience.

Correlation analysis of negative life events, depression and resilience

The results of correlation analysis are shown in Table 3. Depression was positively associated with interpersonal relationship (r = 0.38, $p < .01$), study pressure (r = 0.28, $p < .01$), being punished (r = 0.24, $p < .01$), health and adaptation (r = 0.26, $p < .01$), others (r = 0.31, $p < .01$) and overall NLEs (r = 0.33, $p < .01$). Depression was negatively associated with resilience (r = −0.51, $p < .01$). Resilience was negatively associated with interpersonal relationship (r = −0.22, $p < .01$), study pressure (r = −0.16, $p < .01$), being punished (r = −0.19, $p < .01$), health and adaptation (r = −0.16, $p < .01$), others (r = −0.22, $p < .01$), and general negative life events (r = −0.23, $p < .01$).

The mediating role of resilience in the relationship between negative life events and depression

Structural equation model was employed using the maximum likelihood method of parameter estimation on the covariance matrix. In this study, NLEs and depression were latent variables, which were measured by several manifest indicator variables. Confirmatory factor analysis (CFA) was first conducted to examine the relationships between the latent variables and their indicator variables (Table 4). Based on the initial measurement models (Model 1 and Model 3), adjustments were made according to the modification indices (MI), and the models' goodness of fit was improved (Model 2 and Model 4), indicating that the observed variables reflected the latent variables well.

The initial structural equation model was modified by adjusting the error terms and adding the demographic variables. The final structural equation model showed an acceptable goodness of fit ($\chi^2/df = 2.60$, RMSEA = 0.076, CFI = 0.939, NFI = 0.906, TLI = 0.918 and IFI (incremental fit index) = 0.940). Fig. 1 presents the final structural equation model with standardized path coefficients. As shown in Fig. 1, the manifest variables of latent variable NLEs included interpersonal relationship, study pressure, being punished, bereavement health and adaptation, and others. The manifest variables of latent variable depression included depressed affect, positive affect, somatic and retarded, and interpersonal. All of the coefficients were statistically significant, indicating that NLEs and depression were measured with these indicators well. The values of the coefficients represent to which degree each manifest variable contributed to the latent variable. The coefficients between the three latent variables indicated that negative life events had a positive direct effect on depression (b = 0.25, $p < .001$), with a higher level of NLEs leading to elevated depression. NLEs were negatively associated with resilience (b = −0.17, $p < .01$), which in turn was negatively associated with depression (b = −0.43, $p < .001$). Thus, NLEs not only had a significant direct effect on depression, but also had a significant indirect effect on depression mediated by resilience. Resilience partially mediated the relationship between NLEs and depression by the value of 0.07 [(−0.17) ∗ (−0.43)], which accounted for 21.9% [0.07 / (0.25 + 0.07)] of the total effect.

Discussion

The present study found a high incidence of depression (55%) among Chinese junior and senior high school adolescents, which is consistent with previous studies (Chen et al., 2012; Zhao et al., 2015). The prevalence rates for adolescents with depressive symptoms based on a score of ≥16 on the CES-D Scale ranged from 27.4% to 69.2% (Chen et al., 2012; Luo et al., 2009; Zhang et al., 2007; Zhao et al., 2015). As one of the leading causes of disability among adolescents globally (World Health Organization, 2018), depression is more common than anticipated and becomes a critical issue in promoting the mental health of adolescents. Parents, health professionals, educators and public health program planners should focus on early recognition of depression in adolescents and the provision of effective mental health diagnostic and treatment interventions. Adolescence is a special developmental period characterized by dramatic physiological and psychosocial changes (World Health Organization, 2018); these changes themselves are stressors which contribute to depression and suicide.

Gender is a key issue related to depression in adolescents. The current study found that females had a higher level of depression, which is in line with other research (Dalgard et al., 2006; Mileviciute et al., 2016; Sun et al., 2017), although there were no significant differences in the scores on the ASLEC and CD-RISC. Sun et al. conducted a study of 5989 Chinese university students and found that female students had a higher prevalence rate of depression, and gender had a significant effect in the stage from moderate to major depression (Sun

Table 1
Participant characteristics and differences in depression, NLE and resilience.

Demographic factors	N (%)	CES-D[a] score (M ± SD)	*p*	ASLEC[b] score (M ± SD)	*p*	CD-RISC[c] score (M ± SD)	*p*
Gender							
Male	153 (55.0)	15.97 ± 8.18	.023*	47.04 ± 13.76	.952	52.88 ± 19.23	.726
Female	125 (45.0)	18.58 ± 10.34		47.09 ± 13.43		52.08 ± 18.32	
Grade (in school)							
Junior grade two	241 (87.6)	17.68 ± 9.23	.012*	47.63 ± 13.45	.027*	50.88 ± 18.82	.000**
Senior grade one	37 (13.3)	13.59 ± 8.97		43.38 ± 14.07		63.22 ± 14.91	
Birthplace							
City	53 (19.1)	17.08 ± 9.56	.984	47.55 ± 14.70	.145	55.58 ± 18.92	.224
Town	89 (32.0)	16.80 ± 9.07		44.76 ± 12.56		53.53 ± 18.10	
Village	136 (48.9)	17.39 ± 9.38		48.38 ± 13.69		50.66 ± 19.13	
Father's education							
Junior high school or below	170 (61.2)	16.72 ± 8.96	.388	47.52 ± 14.07	.600	50.94 ± 19.13	.203
Senior high school	82 (29.5)	18.30 ± 10.22		46.95 ± 12.97		55.34 ± 18.64	
College or above	26 (9.3)	16.19 ± 8.26		44.38 ± 12.37		53.92 ± 16.49	
Mother's education							
Junior high school or below	202 (72.7)	16.82 ± 9.19	.351	47.91 ± 14.26	.405	52.16 ± 19.06	.748
Senior high school	54 (19.4)	18.74 ± 9.78		45.13 ± 11.25		52.70 ± 18.35	
College or above	22 (7.9)	16.14 ± 8.94		44.05 ± 11.92		55.36 ± 18.02	
Whether the only child							
Yes	103 (37.1)	16.26 ± 8.42	.227	45.61 ± 13.41	.146	54.18 ± 16.86	.317
No	175 (62.9)	17.66 ± 9.75		47.91 ± 13.66		51.54 ± 19.83	
Monthly family income (RMB)							
< 1000	9 (3.2)	19.00 ± 8.80	.187	52.33 ± 17.86	.001**	43.11 ± 17.80	.001**
1000–1999	46 (16.5)	18.39 ± 8.51		47.41 ± 12.29		45.22 ± 19.14	
2000–3499	105 (37.8)	18.01 ± 9.56		50.10 ± 13.46		51.29 ± 16.72	
> 3500	118 (42.5)	15.74 ± 9.29		43.82 ± 13.23		57.18 ± 19.36	

Note: M: mean; SD: standard deviation.
* $p < .05$.
** $p < .01$.
[a] Center for Epidemiological Studies Depression Scale.
[b] Adolescent Self-Rating Life Event Checklist.
[c] Connor-Davidson Resilience Scale.

Table 2
Scores of negative life events, depression and resilience of adolescents (N = 278).

Scale	Subscale items	M ± SD
ASLEC	Interpersonal relationship	2.02 ± 0.73
	Study pressure	1.94 ± 0.64
	Being punished	1.60 ± 0.62
	Bereavement and property loss	1.65 ± 0.91
	Health and adaptation	1.49 ± 0.51
	Others	1.60 ± 0.66
	Total	47.06 ± 13.59
CES-D	Depressed affect	0.77 ± 0.53
	Positive affect	1.22 ± 0.71
	Somatic and retarded activity	0.77 ± 0.47
	Interpersonal	0.74 ± 0.74
	Total	17.14 ± 9.287
CD-RISC	Total	52.52 ± 18.80

et al., 2017). Another study assessed cigarette smoking, alcohol consumption and depressive symptoms among 19,578 adolescents in Chongqing, China, and the researchers found that girls reported more depressive symptoms (10.4%) than boys (7.7%) (Yue et al., 2015). Hankin explored the sex differences in adolescent depression based on stress exposure and reactivity models and found that girls reported and reacted with more depressive symptoms in the interpersonal domain (especially the family and peers) than boys in managing stressors (Hankin, Mermelstein, & Roesch, 2007). This gender difference might be explained by taking into consideration the physiological factors (genetic vulnerability, hormonal changes), cognitive style (Sun et al., 2017) and stress exposure and reactivity models (Hankin et al., 2007).

Results of this study revealed that depression scores of junior high school students were significantly higher than that of senior high school students, indicating that younger students had a higher degree of depression. Contrary to these findings, another study in China reported that the prevalence of depression was higher in senior high school

Table 3
Correlations of NLEs, depression and resilience among adolescents.

Variables	1	2	3	4	5	6	7	8
1 Depression								
2 Interpersonal relationship	0.378**							
3 Study pressure	0.275**	0.594**						
4 Being punished	0.243**	0.592**	0.599**					
5 Bereavement and property loss	−0.037*	0.247**	0.270**	0.408**				
6 Health and adaptation	0.260**	0.403**	0.327**	0.453**	0.315**			
7 Others	0.309**	0.480**	0.487**	0.685**	0.299**	0.426**		
8 Negative life events	0.332**	0.787**	0.761**	0.830**	0.541**	0.616**	0.732**	
9 Resilience	−0.512**	−0.219**	−0.155**	−0.191**	−0.035	−0.164**	−0.221**	−0.230**

Note: Item 2, 3, 4, 5, 6 and 7 were the six dimensions of NLEs measured by the ASLEC. Items 1, 8 and 9 were total scores of the CES-D, ASLEC and CD-RISC separately.
* $p < .05$.
** $p < .01$.

Table 4
Confirmatory factor analysis of the latent variables.

Fit index	Negative life events		Depression	
	Model 1	Model 2	Model 3	Model 4
χ^2/df[a]	4.403	2.569	4.899	0.162
RMSEA[b]	0.111	0.075	0.119	0.000
GFI[c]	0.957	0.979	0.984	1.000
AGFI[d]	0.900	0.944	0.920	0.997
CFI[e]	0.955	0.981	0.983	1.000
NFI[f]	0.942	0.970	0.978	1.000
TLI[g]	0.924	0.965	0.948	1.011

[a] Chi-square to degrees-of-freedom ratio.
[b] Root mean square error of approximation.
[c] Goodness-of-fit index.
[d] Adjusted goodness-of-fit index.
[e] Comparative fit index.
[f] Normed fit index.
[g] Tucher-Lewis index.

students than in junior high school, which might be explained by the pressure that high school students face when preparing the competitive national college entrance examination (Luo et al., 2009). However, in the current research, results indicated that junior high students experienced more NLEs and had a lower level of resilience than senior high student which could account for their higher rate of depression. Another possible explanation may be the fact that junior high students are in an earlier stage of adolescence, which is often viewed as a vulnerability window because more problem behaviors begin to rise at this time of concentrated pubertal and social changes (Masten, 2014, p. 280). At this stage their self-awareness and self-identification are remarkably developed, and a new relationship style with parents and teachers is established by the way of rebellion (Luo et al., 2009; Zhao et al., 2015). Simultaneously, they struggle to face the dramatic changes of the more complex and structured curriculum, and enrollment pressure of senior high school (Zhang et al., 2013; Zheng, Rijsdijk, Pingault, Mcmahon, & Unger, 2016). Additionally, these students' coping strategies are not fully developed which leads to difficulty in dealing with these stressful events (Zhang et al., 2007).

In the current study, the three highest subscale scores on life events were: interpersonal relationship (e.g. I was misunderstood), study pressure (e.g. the study burden was very heavy) and bereavement and property loss (e.g. a family member or close friend died). Moreover, interpersonal relationship and study pressure had a significant positive association with depression. In line with these findings, interpersonal relationships and study pressure were considered as crucial stressors contributing to depression in other research (Auerbach et al., 2010; Luo, Xiang, Zhang, & Wang, 2017; Zhang et al., 2007; Zhang et al., 2013). Interpersonal tensions and conflict with teachers, parents and peers may be increasingly prominent and fierce. There are several reasons: adolescents manifest their independence from adults by the way of rebellion; China's social changes have resulted in adolescents being exposed to more Western values that contradict with traditional Chinese values (Auerbach et al., 2010); there is overwhelming pressure from parents and teachers on students to succeed academically (Wang, Deng, & Du, 2018); and competition pressure occurs from peers (Auerbach et al., 2010). Luo et al. presented that high-quality relationships with teachers and peers could reduce the risk of depressive symptoms (Luo et al., 2017). In regard to study pressure, academic performance is highly valued in the context of exam-oriented education and Chinese parents tend to exert strict control over their children to push them toward higher achievements (Auerbach et al., 2010; Wang et al., 2018). The combination of stringent control, high expectations (Auerbach et al., 2010; Wang et al., 2018) and enrollment pressure (Luo et al., 2009; Wang et al., 2018; Zhao et al., 2015) lead to increased pressure to study among adolescents. For these reasons, it may not be unusual that the rate of depression was 55% for Chinese students in this current study.

It is important to consider that not all individuals are equally affected by stressors or NLEs. In fact, the majority of participants in this study retained social functions and were able to adapt and manage their emotional responses. Thus, it can be deduced that certain positive traits, such as resilience, may buffer the negative influence of stress and are conductive to protecting individuals from psychological disturbance.

The most important contribution of the present study was to reveal that resilience was not only negatively associated with NLEs and depression, but also mediated the effects on the relationship between NLEs and depression in adolescents. The value of the mediating effect was 0.07, and accounted for 21.9% of the total effects. Namely, resilience acted in a protective manner to prevent depression related to NLEs. The finding is consistent with previous studies (Niu et al., 2016;

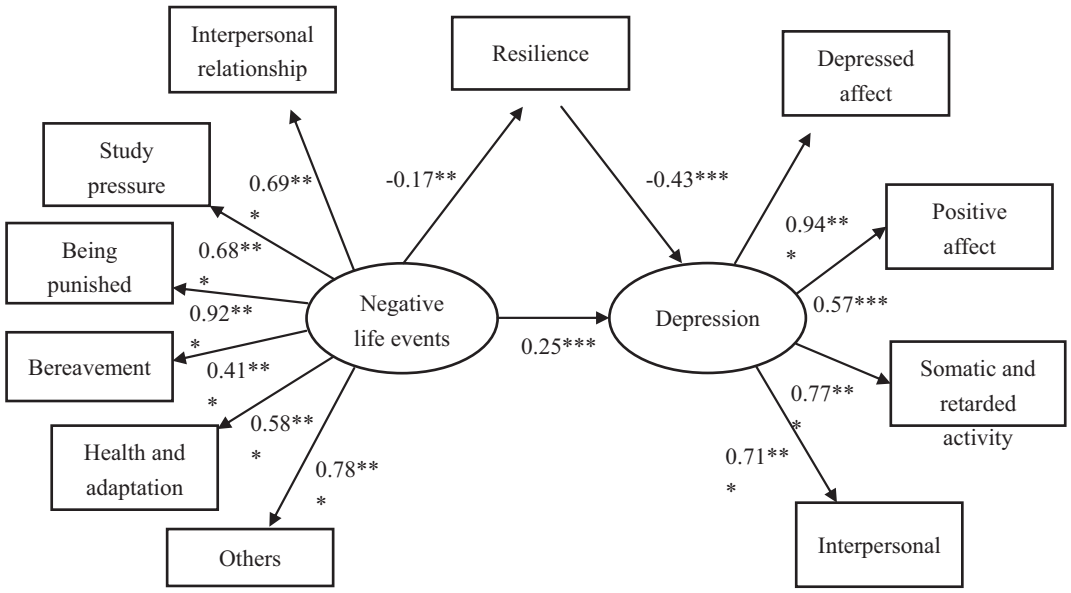

Fig. 1. Structural equation model showing the mediating effect of resilience on the relationship between negative life events and depression. Standard path coefficients and factor loading were shown on the single-headed arrows. $^{**}p < .01$; $^{***}p < .001$.

Skrove et al., 2013; Zhang et al., 2013; Zhu et al., 2012). Han et al. suggested that adolescents with a high level of resilience have more cognitive flexibility to alleviate risk factors and depressive symptoms and bounce back from NLEs or adversity much sooner (Han et al., 2018). Additionally, people with high resilience may have more psychological advantages and accessible resources, such as optimism, self-esteem, self-confidence, active coping strategies and social support (Connor & Davidson, 2003; Niu et al., 2016). Resilience is not only regarded as a by-product of exposure to moderate adversity and protects individuals against maladjustment with future stress (Liu, Reed, & Girard, 2017), but also offers protective factors, such as the ability to maintain a close relationship with other capable adults, emotional regulation, self-efficacy, self-control, motivation, and problem-solving skills that counteract the potential risks and vulnerabilities (Masten, 2014). Furthermore, resilience is seen as a multi-layered construct that consists of core resilience, internal resilience and external resilience, and is an interactive and dynamic process between adversity and intra-individual, inter-individual, and socio-ecological factors (Liu et al., 2017). Masten emphasized that resilience is influenced by multiple interactions within the individual (genetic, neural, immunological, cognitive, etc.) and also between the individual and the environment (family, peers, school, and community) and highlighted the importance of culture and developmental timing to resilience (Masten, 2014). Participants in the present study are in the stage of adolescence, which is regarded as a vulnerability window, and thus are inclined to encounter a variety of negative life events and struggle with adaptation to physical, psychological and social changes as well as high expectations and engaged parents oriented by the Chinese culture. Thus, they are at high risk for depression. However, resilience can buffer or mitigate the effect of these stressful events and facilitate successful adaptation.

This study reinforces important implications for adolescent mental health research and practice. Research is needed to promote effective methods to facilitate resilience in adolescents. These could include cognitive reappraisal training (reframing negative events in a more positive approach), active coping strategies (such as problem solving); emotional regulation (mindfulness and relaxation training) and interpersonal communication skill (dealing with interpersonal conflict and seeking social support) (Southwick & Charney, 2012). Effective practices intended to promote and strengthen resilience could then be carried out in junior and senior high schools to reduce the likelihood of stress-related depression and facilitate the psychological health and well-being of adolescents. Programs for adolescents at risk of depression require a multilevel approach with varied platforms (World Health Organization, 2018). Parents and educators should be involved in education training programs that lead to providing strong and effective emotional supports.

Limitations

Students were recruited from a junior high school grade two and a senior high school grade one in a large city in central China using purposive sampling. Thus, the findings of this study may not be generalizable to adolescents throughout China. Further research should be conducted using multi-area random and stratified sampling and focus on a larger sample. Another limitation is that life events, as stressors, are complicated concepts and may be both positive and negative and lead to different outcomes. This study focused only on the mediating effect of resilience between NLEs and depression. Additional studies are needed to explore the mediating effect of resilience on the relationship between positive life events and depression.

Conclusions

In the current study, we found that resilience was negatively associated with NLE and depression and was a protective factor for depression among adolescents experiencing NLE. Interventions aimed at improving the resilience of adolescents should be carried out to decrease the psychological impacts of NLEs.

Authorship statement

X.Q. Wang and L. Zhou conceived the work, designed the study and collected the data. W.J. Liu, L. Zhou and J.F. Jiang performed the statistical analysis. W. J. Liu and X. Q. Wang drafted and revised the manuscript. B.X. Yang conducted critical revisions. Y. Wang participated in the data collection. All authors contributed significantly to the work and approved the final manuscript.

Declaration of competing interest

The authors declare no conflicts of interest.

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