

# Meta-analysis of the Relationship between Life Events and Depression in Adolescents

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## Abstract

In the present study, a meta-analysis of 71 independent samples was performed to assess the relationship between life events and adolescent depression. In addition, the influence of correlated variables is discussed. Analysis using the fixed-effect model showed that life events are positively correlated with adolescent depression ( $r = 0.319$ ). Gender, cultural background, and type of life event might mediate the relationship between life events and adolescent depression: the relationship between depression and life events was greater in adolescent females than in adolescent males. Compared to adolescents in Western countries, life events more heavily affected depression in adolescents in China. Trivial affairs were more related to adolescent depression than were critical life events. Moreover, the way in which life events were measured did not affect the observed relationship between life events and depression. Thus, the following conclusions were reached: life events are closely related to adolescent depression, and the relationship between the two is affected by gender, cultural background, and type of life event. The measurement of daily events does not affect the relationship between life events and depression in adolescents.

**Keywords:** Life events; Depression; Meta-analysis; Juvenile

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## Introduction

The influence of life events on psychological health has been extensively studied. Several such studies show that life events are associated with juvenile depression [1-5]. Negative life events may significantly influence the development of depressive mood, and depressive mood can, in turn, negatively affect one's life; thus, a vicious cycle may emerge that can damage one's mental health. Depression normally starts in adolescence and later becomes one of the important causes for mental illness. The prevalence rate of juvenile depression has been increasing in recent years, while the age of onset has been decreasing [6]. Thus, assessing the relationship between life events and juvenile depression is of great significance to the development of adolescent mental health interventions.

Research shows that the most typical age-related characteristics of juveniles are stable emotionality, gradually maturing psychology, and social development through active participation in social experience and practice. In one study [7], the term "extended adolescence" was used to describe 18- to 25-year-olds in industrialized countries who have delayed social developments

due to higher education. In the present study, juveniles are defined as individuals aged 11 to 25 years [8].

Although the correlation between life events and juvenile depression has been demonstrated, the noted relationship between these factors varies across studies: correlation coefficients are as high as 0.587 and 0.49 in Pengli et al. [2] and Fox et al. [9], respectively, and as low as 0.09 and 0.04 in Boardman et al. [3] and Wadsworth et al. [10], respectively. To establish a more comprehensive and accurate understanding of the relationship between life events and juvenile depression, the present study performed a meta-analysis on nearly ten years of Chinese and English empirical research. Moderating variables were considered to determine whether gender, cultural background, or type and measurement method of life events affected the relationship between juvenile life events and depression.

## Literature Review and Theoretical Hypothesis

### Literature review

**Life events:** The concept that life events can affect depression

derives from studies on stress. Modern studies generally adopt the Lazarus and Folkman [11] perspective that stress is the product of one's evaluation of stimuli and responses; in other words, cognitive processes determine stress. Cognitive processes include thoughts pertaining to interactions between stressful events (e.g., personal and environmental requirements), intervention factors (e.g., personal and environmental resources), and stress reactions (e.g., physical and mental health). It is widely recognized by stress researchers in the psychology field that stress is a kind of cognitive process. In order to figure out which life change causes the highest stress, Holmes [12] introduces a new concept called "life events", life events are those life changes that affecting human psychology. According to this perspective, both positive and negative events can induce stress in individuals. However, later studies indicated that not all life events lead to stress. The key determinant in whether an individual perceives an event as stressful is the degree to which the event threatens his or her self-esteem and security, and whether he or she has sufficient resources to combat the adverse effects of the event. Further, it has been demonstrated that only negative life events influence mental health [13-15].

There are two general perspectives regarding the classification of life events. In the first, life events are classified as major events or daily hassles based on the length of stress period, which is longer for daily hassles and shorter for major life events. Stress resulting from traumatic major life events is uncontrollable and unpredictable. By contrast, stress from daily hassles is more durable and has a cumulative effect on the individual's physical and mental health; however, this effect is much weaker than that of traumatic events [16,17]. In the second perspective, life events are classified as positive or negative based on their qualitative nature. Positive life events, such as marriage or winning an award, are active events for the individual and typically result in a pleasant emotional experience, which facilitates positive emotions. Negative life events, such as relationship dissolution, illness, and death, are associated with a passive emotional experience that negatively influences one's physical and mental health. The studies examined in the present analysis primarily pertain to negative life events that induce negative emotions and require substantial adaptation efforts and social readjustments.

Holmes and Rahe were the first to quantitatively evaluate life events. They developed the Social Readjustment Rating Scale (SRRS), which lists common stressful life events in American daily life and the degree of readjustment required for each event, which is referred to as the Life Change Unit (LCU). Following this, the Life Events Scale (LES) was developed based on the SRRS. Since then, quantitative studies on life events have been gradually increasing through the use of well-known life events scales like the Interviews of Recent Life Events (IRLE) and the Student-Life Stress Inventory (SLSI), which are mainly applied in Western cultures in different living environments.

In addition, the Stressful Life Events Rating Scale [18], the Life Event Scale by Yang Delin and Zhang Yalin [14], and the Life Event Scale by Zhang Mingyuan [19] are used to assess respondents' positive and negative life events within the domains of family, work, and interpersonal relationships. The Life Events Scale of

High school and College Students [20] includes life events that pertain to interpersonal relationships, economic conditions, capability, and health. The Adolescent Self-Rating Life Events Check List (ASLEC) [21] is limited to negative life events in the domains of academic pressure, interpersonal relationships, health adaptation, punishment, loss, and others. The Freshman Life Events Questionnaire developed by Chang Fengjing [22] has also been used in domestic studies. Thus, the abovementioned scales are suitable for use in a Chinese population.

As the present study is a meta-analysis, we included studies that applied self-designed scales to measure life events, which focus on measuring frequency of occurrence and subjective perception of life events [23-25], such as the SRRS, LES, and ASLEC; in addition, several self-designed scales solely assess frequency of occurrence [26,27].

**Depression:** Angold [28] states that depression is characterized by the following: unhappiness, sadness or mental pain, depressive reactions to adverse situations or events, fluctuations from a normal state to depressed mood, and the lack of long-lasting and stable pleasant mood.

Depression can be divided into depressive mood, depressive syndromes, or depressive disorder according to exhibited characteristics, judgment standards, and the degree to which the symptoms interfere with the individual's life. Depressive mood refers to feelings of unhappiness or sadness; depressive syndromes refer to the presence of multiple depression symptoms, including unhappiness, low self-esteem, anxiety, pessimism, guilt, and loneliness. Diagnosis of depressive disorder should be based on clinical diagnostic criteria for emotions, behaviors, cognitions, somatic symptoms, and related dysfunctions, and assessed via structured clinical interviews and observations. Specific features of depressive disorder include depression, loss of interest, sadness, changes in appetite, somatic complaints (such as pain), changes in mental activity (e.g., loss of excitement), fatigue, a sense of meaninglessness or guilt, attention deficits, and suicidal ideation [29,30]. In the present study, depressive mood refers to individuals' subjective feelings of depression. Based on the definitions of juvenile depression from Feng Zhengzhi and Zhang Dajun [31], depressive mood is a significant and lasting feeling of sorrow, misfortune, or irritability that primarily manifests as melancholy.

Depressive mood is one of the most common psychological problems in juveniles [30]. Depressive mood primarily consists of the following 4 groups of characteristics: (1) pessimism, sadness, disappointment, helplessness, indifference, or despair; (2) negative self-concept and self-evaluation, reduced self-confidence, a sense of that one is useless and inferior, self-guilt, and suicidal ideation; (3) sleep disturbances, hypoactivity in appetite, sex, and interest; and (4) decreased activity levels and withdrawal from social interaction.

The Children's Depression Inventory (CDI) is the earliest and most widely applied children's depression measurement scale. Adapted from the Beck Depression Inventory (BDI), the Children's Depression Inventory was the first scale used to measure depressive mood in children and adolescents in Western

countries. The Center for Epidemiological Studies Depression Scale (CES-D), developed by Radloff from the US National Institute of Mental Health (NIMH) in 1977, is also widely used for screening depressive symptoms in the general population. It is not only suitable for its original target (adults), but is appropriate for use in adolescents and elderly people. The Depression Scale from the Symptom Checklist-90, as well as its simplified version, the Brief Symptom Inventory (BSI), is also widely used self-rating depression scales. In addition, the Self-Rating Depression Scale (SDS) established by Zung is commonly used.

In the measurement of juvenile depression in China, Chinese versions of foreign depression scales such as the SCL-90, SDS, and CES-D are used. The Middle School Student Mental Health Scale established by Jisheng [32] is designed to assess depression in Chinese adolescents.

**Relationship between life events and depression:** Life events and depression are closely related. First, life events influence the development of juvenile depression. Zhang Yuejuan et al. [33] shows that depressive mood in college students is related to negative life events, negative automatic thoughts, and negative response styles. Li Li [34] also found significant differences in life events between depressed juveniles and healthy juveniles, and that adolescents exhibiting depressive symptoms encounter more negative life events. In a summary of the relationship between life events and depression, Liu Xiaohua [35] concluded the following: First, 92% of individuals experienced negative life events prior to the onset of depression, which suggests that life events are a key factor in depression; events that entail loss and humiliation are more likely to trigger depression. Second, life events not only influence the onset and symptoms of depression, but also influence its recurrence. Finally, different types of life events have different influences on the onset, improvement, and stability of depression. Regarding the relationship between life events and depression, it is estimated that roughly 75% of stressful life events can contribute to the onset of depression. This relationship is closer for the first incidence of depression than for recurrence. Early international research has also demonstrated an association between life events and juvenile depression [36,37].

Second, depressive mood can also predict life events. Williamson's [38] results indicate that depressed adolescents are more likely to experience dependent life events than are normal individuals. In a longitudinal study [39], it was found that the depression, anxiety, and neuroticism of juveniles (especially girls) predicts life events. Carlin and Bowes also found that among community juvenile groups in one city of Australia, individuals with depression and anxiety tended to experience more negative life events.

## Theoretical Assumptions

### Main effects of life events on juvenile depression

Life events influence students' mental health, and represent an important index for quantifying psychological pressure [21]. Life events and depression significantly increase in adolescence. Many studies have attempted to determine the extent to which

life events affect juvenile depression, with results showing that adolescents of various cultural backgrounds are impacted by life events; however, the degree to which they are affected may differ.

Most studies show that the occurrence and development of depression are closely related to life events. When analyzing the correlation between depression, anxiety, and stressors, Yu Jie et al. [40] found that depression in rural middle school students is closely related to negative life events, mainly those pertaining to interpersonal relationships, academic pressure, and punishment. Xu Biyun et al. [39] showed that juvenile life events are closely related to behavioral and emotional problems [41]. Zhou Pingyan's [42] comprehensive study on the influencing factors of depression at home and abroad showed that life events play an important role in depression. The relationship between life events and depression has been demonstrated in domestic and international studies conducted from the 1970s to the 1990s [38,43-51]. For example, Shrout's [51] research shows that the probability of experiencing a significant, negative life event is 2.5 times higher in depressed individuals than in non-depressed individuals. Kendler's [48] study showed that, in females, there are 13 kinds of life events that significantly predict the onset of depression, and 4 of these had a relative odds ratio > 10 for predicting depression. However, other studies [52,53] did not find a significant relationship between life events and depression. In the present study, Hypothesis 1 is based on the results of many previous studies that indicated a significant positive correlation between juvenile life events and depression.

### Regulatory effects of related factors on the relationship between juvenile life event and depression

The observed correlation between juvenile life events and depression has varied across studies, which might have resulted from differences in participant and experimental characteristics such as gender, cultural background, and measurement method. Differences in the types of life events participants experienced may have also influenced the observed relationship between life events and depression. Therefore, it is necessary to measure other factors that may contribute to the relationship between juvenile life events and depression.

**Gender:** Studies have indicated that the prevalence rate of depression significantly increases in adolescence, and that the incidence of depression varies as a function of gender. Depression is more likely to be detected in girls than boys, and this trend continues into adulthood [51]. Further, gender differences in depression are trans-regional and trans-cultural [54]. In Kessler and Walters' [55] study of 15 to 24-year-olds, the depression rate was 16.1% for girls and 9% for boys. In addition, Veytia López et al. [56] showed that juvenile girls experience more negative life events and have a greater incidence of depression. Sherrill et al. [57] found that females with depression experience a greater number of negative life events than do their male counterparts; moreover, such a gender difference does not exist in non-depressed individuals. Maciejewski et al. [58] found that the rate of depression following a stressful life event is almost three times higher in females than in males. However, Kendler et al.

[59] showed that most stressful life events have similar effects on both males and females, and they concluded that life events do not account for gender differences in depression rates. In order to determine whether gender affects the relationship between life events and depression in adolescents, gender was included as a controlling variable in the present meta-analysis. It was hypothesized that gender influences the relationship between life events and depression in adolescents (Hypothesis 2). Moreover, it was hypothesized that the correlation between juvenile life events and depression would be higher in females than in males.

**Cultural background:** In the present study, “cultural background” mainly refers to the Chinese cultural background and the Western cultural background of America, Canada, Norway, and other countries. Culture has a profound and imperceptible impact on social development and personal growth. Culture affects individuals’ cognition and mode of thinking [60]. The psychological constructions of attitude, value, belief, and regulation contained in culture affect individuals’ responses to life events and selection of coping strategies. Given that they are in a crucial period in the formation of their attitudes and values, adolescents are greatly influenced by culture. Thus, culture may mediate the relationship between life events and depression in adolescents.

Studies included in this meta-analysis show that the relationship between life events and depression in adolescence is closer in adolescents of an Eastern cultural background ( $r = 0.04-0.56$ ) than in adolescents of a Western cultural background ( $r = 0.13-0.587$ ). Thus, Hypothesis 3 proposes that the correlation between life events and depression will be higher for adolescents of an eastern Chinese cultural background relative to adolescents of a Western cultural background.

**Types of life events:** Types of life events include major events and daily hassles, which are believed by most researchers to affect juvenile depression [11]. Several studies have examined whether these two classes of life events differentially influence depression risk. Some studies suggest that major events have a greater association with depression than do daily hassles [61]. On the contrary, Windle and Windle [62] showed that major events and daily hassles do not differ in the extent to which they predict emotional and behavioral problems. However, most studies found that daily hassles are more closely related to juvenile depression than are major events [63-66]. Kanner et al. [13] stated that daily hassles are more predictive of juvenile emotional problems than are major events. Based on the results of a cross-lagged analysis of life events and depression in college students, Li Yongxin et al. [65] concluded that daily hassles, but not major events, significantly predict depression. Thus, Hypothesis 4 states that compared to major events, daily hassles are more closely related to juvenile depression.

**Measuring methods of life events:** According to Holmes’ [12] theory of life events, a life event can be measured by its subjective frequency and degree of subjective feeling. Most studies included in the present meta-analysis measured frequency and degree of objective perception [53,67-70]. However, only frequency of life events was measured in other included studies [25,29,54,71,72]. Is it possible that this difference in measurement influences the observed relationship between life events and depression

in adolescence? Measurement of frequency and degree of perception is performed to determine the quantity and nature of life events; however, neither method is indispensable [12]. The cognitive evaluation model of stress holds that the stress response is directly proportional to an individual’s cognitive evaluation of a given situation or event. This cognitive evaluation essentially determines the occurrence and degree of the stress response. Therefore, it is necessary to measure individuals’ experience of life events. Measuring the frequency of life events may not yield an adequate understanding of the way in which life events affect people. Indeed, the frequency of a given life event is subjective, while depression is a type of emotional problem. Thus, in addition to measuring frequency, it is necessary to assess juveniles’ subjective feelings about life events. The studies included in the meta-analysis show that there is no difference in results between studies testing just the frequency of life events ( $r = 0.05-0.56$ ) and those testing frequency and degree of perception simultaneously ( $r = 0.04-0.587$ ). While contradictions between theory and data prevent us from making clear assumptions, we will measure measuring methods of life events as a moderating variable in an attempt to assess whether it affects the relationship between life events and depression in adolescents.

## Research Methodology

### Data collection

Both Chinese and English studies were included in this meta-analysis. The primary sources used to obtain Chinese studies were the CNKI database (China Journal Net), the China Science and Technology Journal Database (VIP Journal), and the Wanfang data retrieval system. “Life events,” “adolescent,” “depression,” and “mental health” were used as search keywords. Since the use of “adolescent” as a key word yielded many studies of college students, college students were included in our age range. The main sources used to locate English studies were Science Direct, Web of Science, Springer Link, and Google Scholar, while Medalink was used as a supplementary source. Studies without a full text were obtained directly from the author or by virtue of interlibrary loan. English terms such as “life events,” “depression,” “adolescent,” “mental health,” and “adaption” were used as key words. The selected studies were screened according to the following standards: (1) The study explored the relationship between life events and adolescent depression; (2) a correlation between these two variables was reported, excluding data obtained through structural equation modeling, regression analysis, and other statistical methods; (3) it was not a duplicate study; and (4) subjects were normal adolescents who had not been diagnosed with any physical or emotional illness. Given that the life events to which adolescents are exposed have changed with the recent and rapid social development, studies conducted more than a decade ago were excluded from the meta-analysis.

A total of 65 studies were eventually incorporated into the meta-analysis: 43 Chinese studies and 22 English studies, of which 55 were academic papers and 10 dissertations. Seventy-one independent samples and effect sizes were obtained, and the total number of subjects was 37,173.

## Literature coding

The literature coding standards were as follows. (1) Effect sizes were in the unit of independent samples. When several independent samples were included in a study, each was coded separately. In cases where the same study was conducted at different times with samples of various sizes, each sample was coded separately. (2) When the relationship between different types of life events and adolescent depression, rather than a population correlation, was reported in literature, the effect size was based on the mean of each dimension. (3) The first two standards concern the main effects of life events on adolescent depression. For the moderating effect of gender, studies were coded according to whether all the subjects were female or male. For the moderating effect of cultural background, studies were coded according to whether 85% subjects are of a Chinese or Western cultural background. For the moderating effect of type of life events, studies were grouped according to whether the correlation between major events and/or trivial affairs was reported. Finally, for the moderating effect of measurement type, studies were grouped according to whether the study assessed both frequency and subjective intensity of life events, or frequency alone.

## Statistical analysis method

Data analysis was conducted via the professional meta-analysis software Comprehensive Meta-Analysis 2.0 (CMA 2.0). CMA 2.0 is special meta-analysis software developed and updated by the International Cochrane Collaboration Center. Effect size ( $r$ ) refers to a single correlation coefficient or an averaged correlation coefficient across several samples, as mentioned above CMA2.0 allows for the generation of analysis results for both a fixed model and a random model. A fixed effect model was adopted in this study. The major difference between the fixed model and the random model is that different elements are used to compute the weights. The within-study variation was used to calculate weights in the fixed model, while the within and between-study variation was used in the random model. The fixed effect model assumes that there is only one real effect size that applies to all studies included in the meta-analysis, and it is more accurate than is the random effect model in estimating the relationship between two related variables.

## Results

### Publication bias test and effect size homogeneity test of the relationship between life events and adolescent depression

Publication bias is inevitable in meta-analysis; thus, it is necessary to test for publication bias because of its direct influence on the analysis results. **Figure 1** shows the funnel plot of the effect size of the relationship between adolescent life events and depression. The horizontal axis in **Figure 1** is Fisher's Z effect size, while the vertical axis is the standard deviation of Fisher's Z effect size. As can be seen in **Figure 1**, most studies are at the top of the funnel and distributed near the average effect size. Moreover, the fail-safe number is  $5577 > 5K + 10$  ( $K$  refers to the quantity

of effect sizes), indicating that another 5577 studies are needed to perform an adequate reassessment. Thus, the results of this meta-analysis can be perceived as reliable (**Figure 1**).

A homogeneity test (Q-test) is used to examine whether each study result can represent the sample estimation of all effect sizes. Q-test results are employed to examine whether differences among independent samples' effect sizes are caused by potential moderating variables. If the results are significant ( $Q_{\text{BET}} > .05$ ), the role of the moderating variables is assessed in a post-test. **Table 1** shows the test results for effect size homogeneity. The Q-statistics indicate that the effect size is 969.029 ( $p < 0.001$ ), which indicates heterogeneity between studies. As this may have resulted from the role of moderating variables, the moderating effect of the related variables is also discussed in this study (**Table 1**).

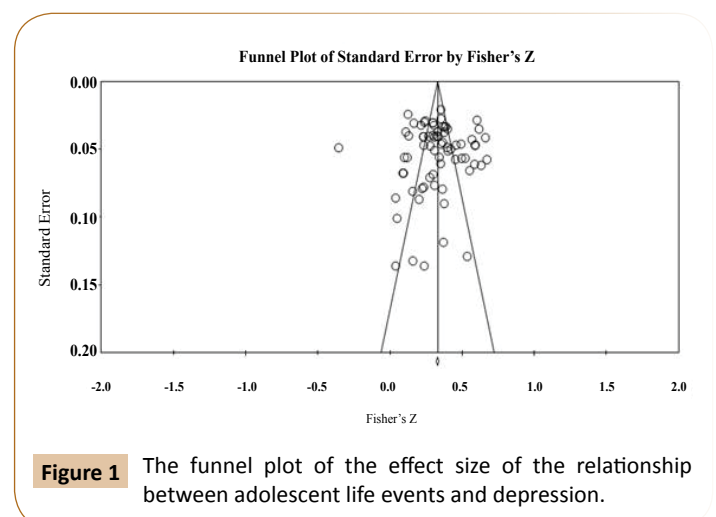
## Test of main effects

**Table 2** presents the demographic information of the studies used in the meta-analysis, while **Table 3** shows the fixed model analysis results of the relationship between life events and adolescent depression. As can be seen from **Table 3**, there is a positive correlation between adolescent life events and depression ( $r = 0.319$ ,  $p < 0.01$ ). According to Cohen, an effect size is small if it is less than or equal to 0.1, moderate if it is around 0.25, and large if it is larger than or equal to 0.40. Thus, consistent with Hypothesis 1, there is a positive correlation between life events and adolescent depression (**Tables 2 and 3**).

## Test of moderating effects

The regulatory effects of the moderating variables, including the subjects' gender and cultural background, and the types and measurement modes of life events, were also examined in the meta-analysis. These results are shown in **Table 4**.

It can be seen from **Table 4** that gender, cultural background, and type of life events are likely to affect the relationship between life events and depression in adolescents. Thus, the results support Hypotheses 2, 3, and 4. However, the way in which life events are measured does not affect the observed relationship between adolescent life events and depression.



**Figure 1** The funnel plot of the effect size of the relationship between adolescent life events and depression.

**Table 1** The test results for effect size homogeneity.

Model	k	Heterogeneity			Tau-squared				
Fixed	71	Q-value	df (Q)		I <sup>2</sup>	Tau <sup>2</sup>	SE	Variance	Tau
		969.029	70	<0.001	92.776	0.024	0.005	<0.001	0.156

**Table 2** Characteristics of studies included in the meta-analysis.

Source	N	Mean age	% female	Cultural background
Hu Pengli et al. [2]	303	20	50.83	Chinese
He Xinshe [68]	580			Chinese
Zhou Kehui et al. [135]	453	20	38.63	Chinese
Li Yongxin [106]	234	18.91	64.96	Chinese
Wang Fang [74]	388	16.39	59.80	Chinese
Li Yi [105]	612	21	83.17	Chinese
Chen Hui et al. [75]	710		43.66	Chinese
Zhang Tingting [52]	419	21	52.74	Chinese
Zhang Yuejuan [33]	321	20.53	54.51	Chinese
Chen Xiumei [73]	1222		52.29	Chinese
Wei Yimei, Zhang Jian [67]	811		48.95	Chinese
Xi Qiaozhen [87]	313		54.31	Chinese
Chen Fuxia et al. [111]	138		13.04	Chinese
Liu Jianan et al. [109]	422	17.52		Chinese
Li Shaoming [102]	384			Chinese
Debnng Houcai et al. [115]	620		46.13	Chinese
Dai Chengshu [114]	720			Chinese
Liao Chuanjing et al.	595	17.18	60.50	Chinese
Xue Zhaoxia et al. [131]	155	18.87		Chinese
Li Yuxia [107]	1180	15.46	54.41	Chinese
Yang Li [66]	454	18.51	35.68	Chinese
Liu Baoling, Gao Yueming [108]	444		65.32	Chinese
Li Songying [103]	202		55.94	Chinese
Tan Lier et al.	601	20.6		Chinese
Li Yongxin, Zhou Guangya [106]	270	18.84	62.59	Chinese
Zhang Li, Liu Bo [132]	215	19.5	100	Chinese
Zhang Wenyue [133]	950	21.5	64.52	Chinese
Li Yanhong [104]	126			Chinese
Li Peng [70]	545		57.06	Chinese
Wang Lien, Wang Jisheng [85]	957	20	62.28	Chinese
Ma Weina, Xu Hua [23]	274	16.82	54.01	Chinese
Wang Jun, Jin Yuelong [24]	1687	19.66	54.71	Chinese
Wang Xixiu et al.	404			Chinese
Yang Juan [72]	618			Chinese
Sheng Aiping [81]	450	20.12	77.56	Chinese
Chen Hongmin et al. [112]	468		57.91	Chinese
Deng Huijuan [79]	304		30.92	Chinese
Chen Yu et al. [113]	469		100	Chinese
Liu Ting et al. [110], study1	60	19.85	0	Chinese
Liu Ting et al. [110], study2	57	19.85	0	Chinese
Chen Chong , Xu Linyong	732	20.42	50.68	Chinese
Sun Shurong et al. [80]	314			Chinese
Xiao Jianwei, Shi Yong	456		50.22	Chinese
Marcela Veytia [5]	2292	17	54.01	Western
Amy J Kercher et al. [25]	896	12.3	100	Western
Esther M.C. Boumaa et al. [136], study1	1100	13.6	100	Western
Esther M.C. Boumaa et al. [136], study2	1049	13.6	0	Western
Vivian Kraaij et al. [101]	1310	18	55.73	Western

Boardman et al. [3], study1	221				Western
Boardman et al. [3], study2	221				Western
Boardman et al. [3], study3	320				Western
Boardman et al. [3], study4	320				Western
Jeremy K. Fox et al. [9]	63	17.5	100		Western
Jeff M. Gau et al. [26]	173	15.5	57.80		Western
Golan Shaha et al. [27], study1	603	15	53.89		Western
Golan Shaha et al. [27], study2	603	16	53.89		Western
Emily Burton et al. [4]	496	13	100		Western
BRIT OPPEA et al.	633		47.23		Western
Martha E. Wadsworth et al. [10]	57	14.5			Western
Susan Nolen-Hoeksema [54]	1065	12.2	48.83		Western
Andrea J. Romero	881	13	45.74		Western
Suzanne C. O et al. [53]	135				Western
Suzanne C. O'Neill et al. [53]	101		67.32		Western
Misaki N. Natsuaki et al. [95]	897	11	53.51		Western
Edward C. Changa et al. [22]	263	15.73	61.98		Western
Rachael Dyson and Kimberly Renk [116]	74	18.47	68.92		Western
Connecticut	1065		48.83		Western
Megan Flynn and Karen D. Rudolph [71]	167	12.41	51.50		Western
Trine Waaktaara et al. [84]	163	13.8	31.90		Western
Rebecca Morrison and Rory C. O'Connor [94]	161	19.32	64.60		Western
Lea Rood et al. [98]	805	12.4	59.88		Western

**Table 3** The fixed model analysis results of the relationship between life events and adolescent depression.

Outcome	k	N	R (95%CI)	Q	I <sup>2</sup>
The relationship between life events and adolescent depression.	71	37173	0.319*** (0.310, 0.328)	969.029***	92.776

k: number of studies, r correlation, CI confidence interval, Q and I<sup>2</sup> heterogeneity statistics

\*\*\* p < 0.001

**Table 4** The regulatory effects of the moderating variables, including the subjects' gender and cultural background.

Outcome	k	N	R (95%CI)	Q	I <sup>2</sup>	Contrast <sup>a</sup>
Gender						25.274***
male	3	1166	0.168 (0.111, 0.223)	0.272***	0.000	
female	5	3024	0.331*** (0.298, 0.362)	25.344***	84.217	
Cultural background						6.765**
Chinese	43	21637	0.329*** (0.317, 0.341)	739.525***	94.321	
Western	28	18283	0.305*** (0.291, 0.315)	222.739***	87.878	
Type of life events						8.304**
major events	4	1192	0.396*** (0.347, 0.443)	1.381	0.000	
daily hassles	6	2088	0.481*** (0.447, 0.513)	25.831***	80.644	
Measuring methods of life events						2.242
both <sup>b</sup>	39	19870	0.325*** (0.313, 0.338)	645.333***	94.112	
only <sup>c</sup>	16	8461	0.343*** (0.324, 0.362)	111.799***	86.583	

k number of studies, r correlation, CI confidence interval, Q and I<sup>2</sup> heterogeneity statistics

<sup>a</sup> Contrast between subsets of studies, noted in Q

<sup>b</sup> Measuring both the frequency of life events and juveniles' subjective feelings about life events

<sup>c</sup> Measuring only the frequency of life events

\* p < 0.05 \*\* p < 0.01 \*\*\* p < 0.001

## Discussions and Conclusions

### Discussion of main effects

Life events are one of the external risk factors that affect mental health, and negative life events tend to exacerbate depression in adolescents. The quantitative analysis of 65 domestic and foreign studies on the relationship between life events and adolescent depression show that there is a significant positive correlation

health, and negative life events tend to exacerbate depression in adolescents. The quantitative analysis of 65 domestic and foreign studies on the relationship between life events and adolescent depression show that there is a significant positive correlation

between life events and adolescent depression ( $r = 0.319$ ,  $k = 71$ ,  $N = 37,173$ ). This illustrates that life events are closely related to adolescent depression, which is consistent with the results of many previous studies [5,9,24,73-75]. Hypothesis 1 was supported.

The stress-sensitization model can be applied to explain the correlation between adolescent life events and depression. Negative life events lead to a decrease in an individual's tolerance for future stressful events. Thus, when subsequent negative life events occur, an individual will struggle to cope with them, which may lead to depression [76-78].

Both direct and indirect relationships exist between life events and adolescent depression. Kendler et al. [22] found through discrete-time survival analysis and co-twin control analysis that both direct and indirect relations exist between dependent stressful life events and depression, while independent stressful life events may have a complete direct relationship with depression. Further, life events may affect depression through interactions with other factors, such as coping style and self-efficacy. Some studies show that individuals with a more positive coping style experience fewer negative life events and are less affected by the negative life events they do encounter [79-87]. Ma Weina et al. [22] conducted a path analysis of life events, self-efficacy, and depression. They revealed that life events directly affect depression and indirectly influence depression through self-efficacy. For people with different degrees of self-efficacy, the same life events will lead to different emotional reactions. People with low self-efficacy are more likely to experience strong negative emotions in response to stressful life events, thus leading to depression.

## Discussion of regulatory effects

**Gender:** According to the meta-analysis results, there is a significant difference in the relationship between life events and adolescent depression among different gender groups. The correlation for females is significantly higher than that for males. This result is consistent with those of previous studies [88-90]. Thus, Hypothesis 2 was supported. This gender discrepancy can be explained by the three models proposed by Nolen-Hoeksema [91]. Model 1 assumes that the causes of depression are consistent between males and females, but are more prevalent in adolescent females. External negative stimuli and personality are the main incentives of depression. During adolescence, females begin to adapt themselves to role changes, confront more negative events, and are more likely to make internal attributions [92-99].

Model 2 holds that the causes of female and male depression are different: Females attach more importance to interpersonal communication, whereas males pay more attention to athletic ability. Girls tend to define themselves based on their relationships with others, while boys are more likely to define themselves through competition and competence [100-110]. Given that female adolescents encounter more interpersonal communication life events, the overall relationship between life events and depression is greater in females. According to Model 3, females have more traits that are associated with depression,

are more concerned about external stimuli, and are more liable to cope in a passive, pensive, and sentimental way [111-118]. Thus, they are more prone to depression after encountering an external negative stimulus [119-115]. The cognitive vulnerability-stress interaction theory states that a cognitive vulnerability will amplify the negative emotions that result from negative life events. Inappropriate coping strategies will then be employed, which will eventually lead to negative attributions and subsequent negative life events, thus entailing a vicious circle. The issue of whether different types of life events differentially affect depression in different gender groups should be examined in future studies on the relationship between life events and depression. In addition, further investigations are needed to explore whether females possess more depression-related traits that will make them more vulnerable to the negative effects of stressful life events.

**Cultural background:** The results of the meta-analysis show that the relationship between life events and adolescent depression differs across cultural backgrounds. The correlation between these two variables is greater for individuals of a Chinese cultural background, thus supporting Hypothesis 3.

The composition of life events varies greatly across different cultural backgrounds. In Chinese culture, personal value lies in individual contributions to families and groups rather than personal capability. For students, family responsibility is best demonstrated through extraordinary academic performance [116]. As parents have higher expectations and evaluations of children's academic performance, life events such as academic pressure have a greater impact on Chinese adolescents. In Chinese society, attending school is an effective way to rise from poverty towards wealth. This social pressure stimulates Chinese adolescents to perform academically, which often leads to stress. Studies show that academic and cultural elements play an important role in those stressful events faced by Chinese adolescents [117]. Moreover, the rapid modernization of Chinese society has revised the original family roles and social support system. However, these elements may protect individuals when they encounter negative life events [118].

Some studies show that culture influences the way people establish intimate relationships, which is related to interpersonal stress [119]. Chinese culture is characterized by collectivism, convergent thinking, reserved expressions of feelings, obedience, and an emphasis on relationships with others; by contrast, Western culture advocates personality, self-consciousness, and a more open approach to emotional expression. In Chinese culture, social relations, roles, rules, and united groups are more important than individual performance. Rather, individuals are expected to adjust themselves to meet others' desires and to work for the development of groups, organizations, public institutions, and the nation [120]. Given this, adolescents entrenched in Chinese culture are more sensitive than are their Western counterparts to stressful life events relevant to interpersonal communication.

Further, the formation of self-identity is an importance task for adolescents. Following the development of self-concept, adolescents attach great significance to others' evaluations and self-esteem. In Chinese culture, individuals are expected to express their feelings in an implicit way. Thus, it is not that

easy for individuals to obtain affirmation and appreciation from parents and teachers. As a consequence, individual self-esteem may be affected, and negative life events may ensue.

Cultural background should be taken into account in future studies on the relationship between life events and adolescent depression. For instance, both measurement scale selection and coping strategies may be influenced by cultural background.

**Types of life events:** The results of the meta-analysis indicate that trivial affairs play a greater role in adolescent depression than do major events, a finding that is consistent with those of many previous studies [13,59-62]. Thus, Hypothesis 4 was supported. The stress coefficient model states that trivial affairs consume individual energy and physical strength, giving rise to health problems in the long-term [61]. Impressive as they are, major events happen less frequently for the majority of adolescents. Although trivial affairs are less stressful than major events are, they are persistent and ubiquitous [57]. Therefore, relative to major events, trivial affairs affect adolescents to a far greater degree. The diathesis-stress theory also states that the stress of trivial affairs better predicts depression than does the stress of major events [121]. Hence, attention should be paid to the different effects of different types of life events on adolescent depression in future studies to enable the development of more effective psychological interventions and mental health education programs.

**Measurement modes of life events:** The meta-analysis results show that the relationship between adolescent life events and depression is not influenced by the method used to measure life events. That is, there is no significant difference between measuring both the frequency and perceived severity of life events, and measuring frequency alone.

Life events are measured via self-evaluation. Thus, individuals' feelings may have been included in the measurement of life event frequency. Specifically, individuals may have forgotten some events as a result of unimpressive individual feelings. Thus, life events that were not associated with high emotionality may not have been included in the tally. On the contrary, events with high emotionality are less likely to be forgotten and are more likely to be reported. It can be seen that life event frequency and subjective feelings about the events are sometimes intertwined and not easily separated. Thus, it is suggested that both frequency and subjective feelings should be measured in future studies assessing life events.

**Research significance and prospects:** The present meta-analysis is of both theoretical and practical significance. In terms of theoretical research, the meta-analysis results not only provide the correlation coefficients for life events and adolescent depression, but also address the influence of several moderating variables on this relationship. In addition, the results have significance for future studies of life events. Regarding practical applications, studies show that life events exert a profound influence on adolescent depression. Since there is a significant positive correlation between life events and adolescent depression, attention should be paid to the influence of life events on adolescent depression in psychological counseling and

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interventions, and importance should be placed on mental health education and students' ability to handle life events in a positive way. Moreover, the influence of specific life events on individuals of different ages and in different gender groups should be noted.

The limitations and prospects of this research are as follows: (1) Meta-analysis is a statistical method that is highly dependent on the completeness of the literature search. It is difficult to locate all relevant studies for one meta-analysis. In this meta-analysis, we excluded articles that did not include correlation coefficients for life events and adolescent depression. As such, some samples were lost. (2) Not all potential research fields were incorporated in this meta-analysis. For example, the present study did not address whether the use of different questionnaires influences the observed relationship between life events and adolescent depression. Besides, future studies should place more emphasis on the effects of life events on specific aspects of adolescent depression so that targeted intervention measures can be taken. The internal mechanisms of the influence of life events on adolescent depression should also be explored. The cognitive vulnerability-stress theory states that individuals with certain cognitive tendencies will explain stressful events to themselves in a way that increases the incidence of depression [122]. According to pressure forming theory, individuals under external or social pressure will perform a series of actions, some of which will induce negative life events and cause depression [123-127]. (3) Studies that examined the moderating role of gender and type of life events were limited, which may have led to bias in the analysis results. To reach more definitive conclusions, more empirical support and a larger sample size are required [128-136]. (4) A significant disparity was discovered when cultural background was used as a moderating variable. Classification of cultural background in this study is general because the discussions were confined to Chinese (serving as a representative of Eastern culture) and Western cultural backgrounds. Therefore, it is necessary to conduct more comparative studies that include other cultures.

## Conclusions

The findings of our meta-analysis of studies conducted over the last decade are as follows.

- (1) There is a significant positive correlation between life events and depression in adolescents, with an effect size of 0.319.
- (2) Gender affects the relationship between adolescent life events and depression. Specifically, the relationship is greater in females.
- (3) Cultural background affects the relationship between life events and depression in adolescents. Specifically, this relationship is greater for individuals from Eastern culture.
- (4) The type of life event affects the relationship between life events and depression. Trivial affairs are more closely related to depression in adolescents. The mode in which life events are measured does not affect the observed relationship between life events and adolescent depression. That is, no significant discrepancies exist between studies that measured both the frequency and juveniles' subjective feelings about life events of life events and those that measured frequency alone.

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